To be more specific, it feels like time is being spent little by little on various things, such as technology. I'm checking things

Let's take an example.

When this email arrives, how many people have received emails like this?

I've been tagged in a photo.

When you see this, you can't help but click now.

right? I mean, what if the photo is bad?

Therefore, you should click now.

But instead of just clicking "see photos", what you actually do is the next 20 minutes.

(Laughter) But the worst thing is that you know it's going to happen, and you know it's going to happen, but you can't stop doing it again the next time.

Alternatively, I found myself in a situation where I pull down to refresh while checking my email. But the problem is that after 60 seconds it pulls down again to refresh.

why am i doing this

This makes no sense.

But I'll give you a hint as to why this is happening.

What do you think makes more money in America than movies, game parks and baseball combined?

slot machine.

How can slot machines make so much money when we play with such little money?

we play with coins

How is this possible?

Now the question is...

My cell phone is a slot machine.

Every time I check my phone, I play slot machines to see what I can get.

what are you gonna get?

Every time I check my email, I'm playing slot machines and thinking, "What am I going to get?"

Every time I scroll through my news feed, I'm playing slot machines to see what's next.

And the point is, again, I know exactly how this works, and I'm a designer, so I know exactly how this psychology works, and I know exactly what's going on -- but it doesn't leave me with a choice, and yet I just get sucked into it.

So what shall we do?

Because it puts us in a high stakes relationship with technology.

Either it's on and you're always connected and you're distracted, or you're off and you wonder if you're missing something important.

In other words, you are either distracted or afraid of missing an opportunity.

right?

Therefore, we need to recover our options.

We want to build relationships where people can choose how they spend their time with technology. Knowing this is useless and requires the designer's help.

I will need help with the design.

So what would it look like?

So let's take chat, or text messaging, as an example we all face.

So let's say there are two people.

Nancy is doing paperwork on the left and John is on the right.

Then John suddenly remembered. "I have to ask Nancy for the document before I forget."

So when he sends that message to her, her attention is blown.

That's what we do all the time, focusing each other's attention left and right.

And this comes at a serious price. Because every time we interrupt each other, it takes an average of about 23 minutes to refocus our attention.

In fact, we iterate through two different projects and then go back to work.

It's a combination of Gloria Mark's research and Microsoft's research that shows this.

And her research also shows that it actually trains bad habits.

The more interruptions we get from the outside, the more it conditions and trains us to interrupt ourselves.

It's actually automatically interrupted every three and a half minutes.

I'm crazy

So how do we fix this?

Because Nancy and John have an all-or-nothing relationship.

Nancy may want to hang up, but then she'll be worried. "What if I miss something important?"

Design can solve this problem.

Again, let's say Nancy is on the left and John is on the right.

Then John remembered, "I have to send the papers to Nancy."

Except this time, Nancy can mark being focused.

Let's say she drags the slider and says, "I want to focus for 30 minutes." I mean, she's focused.

Now when John wants to send her a message, I can get the thought out of my head. Because he has a need, he has an idea, and he needs to get it out before he forgets.

Except this time, the message is still held so that Nancy can concentrate, but John is able to get the thought out of his head.

But this only works if the last thing is true. It's just that Nancy needs to know that if something is really important, John can interrupt.

But instead of always having accidental or unintentional interruptions, it now only creates conscious interruptions. So, we're doing two things here.

We are creating new options for both Nancy and John. But we're also doing a second subtle thing here.

And that is changing the questions we answer.

Instead of having the chat goal be "design it to make it easy to send a message", the chat goal should be really easy to message someone. Change that goal to a deeper human value. In other words, "Let's create the highest quality communication possible between two people."

So I upgraded my goals.

Now, do designers actually care about this?

Would you like to discuss what these deeper human goals are?

Now, let me tell you something.

A little over a year ago, I was asked to help organize a meeting with some of the tech industry's leading designers and Thich Nhat Hanh.

Thich Nhat Hanh is the international spokesperson for mindfulness meditation.

And it was the most wonderful encounter.

Imagine -- imagine a room -- on one side of the room is a group of tech geeks. On the other side of the room are many brown robes, shaved heads and Buddhist monks.

And the question was about the deepest human values. For example, what would the future of technology look like if it were designed with the deepest questions and deepest human values ​​in mind?

And our conversation centered on hearing more deeply what those values ​​are.

During our conversation, he joked what would happen if we replaced spell checking with compassion checking. This means that you might inadvertently highlight potentially offensive words, or perceive them as offensive to others.

So, do these conversations happen in the real world, not just in design meetings?

The answer is yes. One of my favorites is couchsurfing.

In case you didn't know, Couchsurfing is a website that matches people looking for accommodation with free sofas with people who are willing to provide them.

So great service -- what are their design goals?

If you work for Couchsurfing, what are you designing for?

Well, you'd think it's for matching guests and hosts.

right?

That's a pretty good goal.

But it's more like the previous messaging goal of simply trying to deliver a message.

What, then, is man's deeper goal?

They targeted the need to create lasting, positive experiences and relationships between people they had never met before.

The most amazing thing about this is that in 2007 we introduced a method to measure this. This is unbelievable.

I will explain how it works.

Each design goal requires a corresponding measurement to know progress, a way to measure success.

So what they do is, say, they take two people they met, calculate how many days they spent together, and estimate how many hours that day was. How many hours did the two of you spend together?

Then, after spending time together, ask them: "How positive was your experience?"

Did you have a good experience with the person you met?

And from those positive hours, subtract the time people spent on your website. Because it costs people's lives.

Why should it be rated as a success?

And what you're left with is what they call "net-tuned hilarity," or really, just net-created "good times."

A net time that never would have existed if couchsurfing didn't exist.

Can you imagine how encouraging it would be to come to work each day and measure your own success by actually measuring how many net new hours you are contributing to people's lives? It never would have existed if I hadn't done what I'm going to do at work today.

Can you imagine a whole world working like this?

Can you imagine a social network? For example, can you imagine if you were interested in cooking and measured your success by planning a cooking night and the number of cooking articles you enjoyed reading, minus the time spent scrolling through articles you didn't like or didn't like?

Imagine a professional social network that doesn't measure success in terms of connections made or messages sent, but instead in terms of jobs people get and are excited about.

And then subtract the time people spent on the website.

Or imagine a dating service such as Tinder. There, instead of measuring how many times people swiped left and right, the way we measure success today is the deep, romantic and fulfilling connections people make.

By the way, whatever it is for them.

But can you imagine a whole world that works this way and helps you spend your time wisely?

To do this, you also need a new system. You probably think that today's Internet economy, or today's economy in general, is measured in time spent.

The more users you have, the more you use and the more time people spend. This is how we measure our success.

However, we have resolved this issue before.

When we argued that things needed to be evaluated differently, we organically worked it out.

We said this is a different kind of food.

Therefore, price alone cannot be compared. This is another category of food.

We solved this problem with lead verification. The certification claimed that this was a different kind of building representing different values ​​of environmental sustainability.

What if technology had something like that?

What if there was something whose aim and goal was to create a net new positive contribution to human life?

And what if we evaluated it differently and it actually works?

Imagine giving your app store this extra premium shelf space.

Imagine you had a web browser that helped you access this kind of design product.

Can you imagine how fun it would be to live and create that world?

We can create this world today.

Dear company leaders, it's all you have to do. Only you can prioritize new indicators - indicators of net positive contribution to human life.

And be honest about it.

It may not go so well at first, but start a conversation.

Designers, you can redefine success. You can redefine your design.

Perhaps you have more power than many in your organization in creating choices for how we all live.

Perhaps as in medicine, there is the Hippocratic Oath to recognize the responsibility and high value of treating patients.

What if designers had something like that for this new kind of design?

And users can demand technology that works for all of us.

It may seem difficult now, but McDonald's didn't have salads until consumer demand increased.

Walmart didn't have organic food until consumer demand increased.

We must seek out this new kind of technology.

And it can.

And doing that means moving from a world driven and run entirely by time spent to a world driven by quality time.

I want to live in this world and want this conversation to happen.

Let's start that conversation now.

thank you.

(applause)

So we all have our own prejudices.

For example, some of us tend to think that a broken government system is very difficult to transform.

When we think of a system of government, we tend to think it's outdated, fixed in its ways, and perhaps leadership too bureaucratic to change things.

Well, today I would like to challenge that theory.

What I want to tell you is the story of a very large system of government that not only went on the road to reform, but achieved pretty impressive results in less than three years.

This is what a public school classroom in India looks like.

There are one million such schools in India.

And even for me, who has lived in India all my life, stepping into one of these schools is pretty heartbreaking.

By the time they are 11 years old, 50% of children are far behind in education and have no hope of recovery.

An 11-year-old can't do simple addition or form grammatically correct sentences.

These are the things you and I expect our 8-year-olds to be able to do.

Children tend to drop out of school by the time they are 13 or 14.

In India, public schools not only provide free education, but also free textbooks, free workbooks, free meals, and in some cases, cash scholarships.

Yet today, 40 percent of parents choose to drop their children from public school and pay out of their own pocket to send them to private school.

By comparison, in the much wealthier United States, the number is just 10%.

This is a big statement about how broken the public education system in India is.

It was against this background that in the summer of 2013, I received a phone call from a very talented woman named Srina Rajan.

She was then Director General of the Ministry of School Education in Haryana, India.

So she told us, "I've been in charge of this department for the last two years.

I've tried many things, but none seem to work.

Maybe you can help me? ”

Let me tell you a little bit about Haryana.

Haryana is a state of 30 million people.

There are 15,000 public schools and more than 2 million children attend public schools.

Basically, on that call, I promised to help transform nations and systems as big as Peru and Canada.

When starting this project, I was keenly aware of two things.

The first is that I've never done anything like this before.

And the second is probably not very successful, but many others have been.

As my colleagues and I looked around the country and around the world, we could not find any other examples that could be taken and reproduced in Haryana.

We knew we had to craft our trip ourselves.

Anyway, we jumped right in. All sorts of ideas started flying as we dived in.

People said, ``Let's change the way we recruit teachers, hire and train new principals, send them on international study tours, and bring technology into the classroom.''

By the end of week 1, we had 50 ideas on the table, all great, and all sounding right.

There was no way we could implement 50 things.

So I said, 'Wait a minute, stop.

Let's at least first decide what we're trying to achieve. ”

So, after much push-pull and debate, Haryana has set a target of 80% of children attaining grade-level knowledge by 2020.

The specifics of the goal aren't important here, but what matters is how specific the goal is.

Because we were able to actually take every idea thrown at us and decide which ones to implement.

Does this idea support this goal? If yes, leave it alone.

But if not, or if you're not sure, let's put that aside.

It may sound simple, but having a very specific goal at the beginning allowed us to focus our transformation efforts very sharply.

Looking back over the past two and a half years, it's been a big plus for us.

So we had a goal, now we needed to figure out what was wrong and what was broken.

Before we entered school, many people said that the quality of education was poor because teachers were lazy, didn't come to school, or were incompetent and didn't really know how to teach.

Now, when I entered the school, I discovered something completely different.

Most of the teachers were actually inside the school most days.

And after talking to them, I found that they are perfectly capable of teaching an elementary class.

But they didn't teach.

At the school I went to, teachers oversaw the construction of classrooms and toilets.

At another school I went to, two of the teachers went to a nearby bank branch to deposit scholarships into the children's accounts.

During lunch, most teachers spent all their time cooking, supervising, and serving lunch to their students.

So we asked our teachers, "What's going on? Why aren't you teaching?"

And they said, 'This is what is expected of us.

These are exactly the things my boss checks when he visits.

Were you able to use the toilet and were you provided with food?

When my principal goes to headquarters meetings, these very things are discussed. ”

As you can see, over the last two decades, India has struggled with the challenges of getting enough schools and enrollments to keep its children in school.

Governments then launched various programs to address these challenges, and teachers became the tacit performers of these programs.

Not explicitly, but implicitly.

And what was really needed now was not to actually train teachers more or monitor attendance, but to teach them that the most important thing is to go back to the classroom and teach.

They needed to be monitored, measured and rewarded based on the quality of their education and not on all sorts of other things.

So, as we examined the education system and dug deeper, we found some such core root causes that determine and shape how people behave within the system.

And then I realized I could do a lot of other things as long as I didn't change those specific things.

We can train them, we can bring technology to schools, but the system remains the same.

Addressing these non-obvious core issues then became an important part of the program.

So, we had our goals and we had our problems. And now I had to figure out what the solution was.

We obviously weren't going to remake the wheels, so we said, 'Let's have a look around and see what we can find.'

And we've found beautiful, small-scale pilots like this all over the country and around the world.

Small things are done by NGOs, sometimes by foundations.

But what's interesting is that none of them can really scale.

Each was limited to 50, 100, or 500 schools.

And here we were looking for a solution for 15,000 schools.

So I looked into why these things actually work, so why can't they actually extend them?

When a typical NGO enters, they not only bring their expertise, but they also bring additional resources.

So they may bring money, they may bring people, they may bring technology.

And with 50 or 100 schools in operation, these additional resources really make a difference.

But now imagine that the head of this NGO went to the Director of School Education and said, "Let's do this in 15,000 schools."

Where will we get the funding to actually scale this up to 15,000 schools?

He has no extra money or resources.

Therefore innovation does not scale.

So what we said right after the project started was, 'Whatever we have to do, it has to be scalable and work for all 15,000 schools.'

Therefore, it must work within the existing budgets and resources that states actually have.

Easy to say, hard to do.

(Laughter) I think the team definitely hated me at this point.

We spent a lot of time in offices, in cafes, and sometimes even in bars, racking our brains, wondering, "Where is the solution, how do we solve this problem?"

I think I finally found a solution to many of my problems.

Let's take an example.

In terms of effective learning, one of the things people talk about is learning by doing.

Children should do activities instead of memorizing things in books, which is a more effective way of learning.

This basically means giving students beads, learning sticks, abacuses, etc.

But we didn't have the budget to provide that for 15,000 schools, 2 million children.

I needed another solution.

We couldn't think of anything.

One day, one of our team members went to school and saw a teacher picking up sticks and stones from the garden outside and bringing them into the classroom to give to the students.

It was a moment of great discovery for us.

What is happening now in Haryana textbooks is that after every concept there is a little box that is an instruction to the teacher saying, "You can do the following activities to teach this concept."

By the way, in order to actually carry out this activity, we will introduce things that can be used as learning materials for children from familiar environments, whether it is an outdoor garden or an indoor classroom. ”

And we see teachers across Haryana utilizing many innovations to teach their students.

In this way, whatever we designed was practically implemented in all 15,000 schools from day one.

Okay, this brings us to our final point.

How do we implement something for 15,000 schools and 100,000 teachers?

This department has had a very interesting process.

I like to call it the "Chain of Hope".

They wrote a letter from headquarters and sent it to the next level, the local office.

They want an official at each of these district offices to pick up the letters, open them, read them, and forward them to the next level, the district office.

And you'd expect someone at the ward office to pick it up, open it, read it, and eventually forward it to the 15,000 principals.

And I would hope that the principals would receive the letter, receive it, understand it, and begin to act on it.

It was kind of ridiculous.

Well, we knew technology was the solution, but we also knew most of these schools didn't have computers or email.

But teachers have smartphones.

They are constantly on SMS, Facebook and WhatsApp.

What is happening now in Haryana is that all principals and teachers are split into hundreds of WhatsApp groups and whenever they need to communicate something they post to all WhatsApp groups.

It spreads like wildfire.

You can instantly see who received it and who read it.

Teachers can ask clarification questions instantly.

And what's interesting is that corporate headquarters aren't the only ones answering these questions.

Another teacher from a completely different part of the state stands up and answers the question.

Everyone acts as everyone's peer group and things get done.

So today, going to school in Haryana, things look different.

The teachers are back in the classroom and teaching.

Innovative technology is often used.

When the supervisor comes to the classroom, he checks not only the structure of the toilet, but also the quality of the lesson.

Quarterly, all students in the state are evaluated for academic achievement and top performing schools are recognized.

And in schools that are not doing so well, we find that conversation becomes difficult.

Of course, you will also get additional support for better results in the future.

In the field of education, it is very difficult to produce immediate results.

When people talk about systemic large-scale change, they talk about 7- and 10-year periods.

But in Haryana this is not the case.

Three independent studies have been conducted in the past year, all measuring student learning outcomes, and suggesting that something radical and unique is happening in Haryana.

Children's learning levels have stopped declining and are beginning to rise.

Haryana is one of the few states showing improvement in the country and certainly one of the fastest improving states.

These are still early signs and there is a long way to go, but this gives us great hope for the future.

I recently went to school and met a woman on my way home. Her name was Parvati and she was a mother of one child. she was smiling.

And I said, "Why are you laughing, what's going on?"

And she said, "I don't know what's going on, but what I do know is that the kids are learning and having fun. For the time being, I won't be looking for a private school to send them to."

So I return to my starting point. Can the government system be transformed?

I certainly think so.

I think if you give them the right levers, they can move mountains.

thank you.

(applause)

As a child, I experienced something so powerful that I spent the rest of my life searching for it in the wrong place.

What I experienced was not virtual reality.

it was the music.

And here the story begins.

I'm listening to The Beatles' White Album.

And the look on my face is the emotion I've been searching for ever since.

Music goes directly to your emotional veins, your bloodstream, and your heart.

It deepens every experience.

Friends?

(music) Great Mackenzie Stabert and Joshua Roman.

Music -- (Applause) Right.

Music gives everything an emotional resonance.

Let's see what happens in this talk.

The right music at the right time merges with us on a cellular level.

When I hear that song from that summer with that girl, it immediately takes me back to that place.

Hi Stacey.

However, here are some of my greedy stories.

I thought if I added an extra layer on top of the music, I could express a stronger emotion.

So I started directing music videos.

It looked like this.

That's my brother, Jeff.

I'm sorry, Jeff.

(Laughter) Here I am, so that we are even.

incredible movement.

I should have been a dancer.

(Laughter) These experiments grew and eventually became more similar.

However, in both cases, I'm looking for the same thing to catch the lightning bolt inside the bottle.

However, I am not.

Adding moving pictures to the music certainly added a narrative dimension, but it didn't quite equate the power that raw music alone has for me.

For someone who has dedicated his life and professional career to becoming a music video director, this is not great.

I kept asking myself if I had chosen the wrong path.

So I started thinking that maybe if I could get more of you, the audience involved, you might feel something more.

So Aaron Cobrin and I began auditioning new technologies that could bring more of you into the story, including the childhood home in The Wilderness Downtown, hand-painted portraits in The Johnny Cash Project, and interactive dreams in Three Dreams of Black.

We wanted to go beyond the screen and connect more deeply with people's hearts and imaginations.

But that wasn't enough.

For me, I didn't yet have the raw experience of pure music.

So I started following new technologies that I had only read about in science fiction.

After years of searching, I found a prototype.

This was a project by Nony de la Peña in the Mark Bolas lab at the University of Southern California.

And when I tried it, I knew I had found it.

I could taste the lightning.

It was called virtual reality.

This was what I ran into 5 years ago.

This is how it looks now.

I quickly started building something with this new medium, and through the process realized that VR was going to play a very important role in the history of the medium.

Actually, this will be the last.

I say this because it is the first medium to actually jump from the internalization of an author's representation of an experience to experiencing it directly.

Sounds confusing. I will explain. do not worry.

(Laughter) Going back to the origins of the medium, maybe it starts with a good story, around fire.

Our clan leader tells us how he hunted a wooly mammoth in the tundra that day.

We listen to his words and translate them into our own inner truth.

The same thing happens when you watch stories of cave paintings, books about hunting mammoths, plays, radio broadcasts, TV shows, movies, etc.

All of these mediums require what we call 'suspension of disbelief'. Because there is a translation gap between the reality of the story and our consciousness that interprets the story as it is.

I use the term 'consciousness' as the sense of reality we get from the sense we experience the world around us.

Virtual reality fills that gap.

You are now on a tundra hunt with your clan leader.

Or you are the clan leader.

Or maybe you are a woolly mammoth too.

(Laughter) Now let me explain what is special about VR.

In all other mediums your consciousness interprets the medium.

In VR, your consciousness is the medium.

So the potential for VR is huge.

But where are we now?

What is the current state of technology?

Well here we are.

We are equivalent to year 1 of the movie.

This is a film by the Lumiere Brothers, and it is said that a packed theater escaped for their lives when they thought a train was approaching.

As in the early days of this medium, VR must move beyond spectacle to storytelling.

It took me mid-decades to find a preferred storytelling language in the form of feature films.

In VR today, we learn grammar more than we write language.

VR company Vrse made 15 movies last year and learned a few things.

We realized that you have a unique and direct path to your senses, emotions and even your body.

Now let me show you a few.

For the purposes of this demo, we take every possible direction and stretch it to this giant rectangle.

yes, I'll go.

First of all, camera movement is difficult in VR.

Doing it the wrong way can actually make you sick.

However, I've found that it can actually be avoided by moving the camera in a straight line at a constant speed.

On my first day at film school, they told me I had to learn all the rules before I broke them.

We haven't learned all the rules.

We have learned very little, but are already trying to break them to see what creative things can be achieved.

In this shot, we're moving off the ground and added acceleration.

I did that because I wanted to give the physical sensation of being lifted off the ground.

VR makes it possible.

(Music) Of course, music is very important in this medium as well.

It guides us how to feel.

Created with The New York Times, Zach Richter, and friend JR, this project takes you by helicopter. Even though you're flying 2,000 feet above Manhattan, you don't feel scared.

I feel victorious in JR's personality.

Music will get you there.

(music) Contrary to popular belief, virtual reality has a composition, which is quite different from movies, which have rectangular frames.

Configuration is where your consciousness resides and how the world moves around you.

Co-produced by Vrse, United Nations, Gabo Arora and Imran Ismail, the film Waves of Grace also sees the changing role of close-ups in virtual reality.

Close-up in VR means getting close to someone in real life.

It brings that character into your personal space, a space we usually reserve for the people we love.

And it is precisely because we have a physical affinity that we feel an emotional affinity with that character.

Direction in VR is different than direction for rectangles.

It's rather the choreography that grabs the viewer's attention.

One of the tools you can use to guide the user's attention is called "spatialized sound."

You can place the sound anywhere front, left, right, or behind, and when you turn your head the sound will rotate accordingly.

You can use this to direct your attention to where you want people to look.

Next time you hear someone singing over your shoulder, it could be Bono.

(Laughter) VR makes us feel part of something.

For most of human history, we have lived in small family units.

We started in caves, moved on to clans and tribes, villages and towns, and now we are all global citizens.

But I think we're still built to value what's local to us most.

And VR makes anyone, anywhere, feel at home.

That's why it works as an empathy machine.

Our film "Clouds Over Sidra" takes you to a Syrian refugee camp. Instead of seeing a story about the people there, it becomes a story about us here.

But where do we go from here?

The trouble is that all previous media had a fixed format at birth.

From Muybridge and his horse to the present day, the film was a series of rectangles.

The format has never changed.

But VR as a format and as a medium is not yet complete.

We do not use physical celluloid, paper or TV signals.

It actually employs what we use to make sense of the world.

We use your senses as paint on canvas, but for now it's just two things.

Ultimately, we'll see if we can harness all of our human senses and have the agency to live the story on whatever path we choose.

And we call it virtual reality now, but what happens when we move beyond simulated reality?

What shall we call it?

What if instead of telling you about your dreams in words, you let them live in them?

What if instead of simply experiencing a visit to our terrestrial reality, we could surf gravitational waves on the edge of a black hole, create a galaxy from scratch, or use our raw thoughts to communicate with each other without words?

It's not virtual reality anymore.

And to be honest, I don't know what it's called.

But I hope you know where we are going.

But I am saying here that media intellectualization is experiential.

Let's experience it.

I think I have a piece of cardboard in my hand.

Let's open the flap.

Tap the power button to unlock the phone.

For those watching at home, here's a card now explaining how to download the experience yourself to your phone. Additionally, you can get Google cardboard to try it yourself.

We used to play in cardboard boxes when we were kids, and now that we're grown up, we're going to stick our heads in cardboard boxes again and hope we can spot some of those lightning bolts.

You are about to participate in the largest collective VR viewing of all time.

And in old-fashioned, classic style, we're all going to see something together at exactly the same time.

Let's hope it works.

What does the countdown look like? I can not see.

Audience: ...15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 (birds chirping) (train engine) Audience: (Shrikes) (video) JR: Let me tell you how I filmed the New York Times cover "Walking New York."

I was strapped down outside the helicopter and had to be perfectly vertical to grab it.

And when I was completely on top, you know, we had to do some rework because of the wind, but we kept shooting after that.

(Video) Female voice: Dear Lord, protect us from evil. for you are the Lord and the Light.

You who gave us life have taken it away.

let your will be fulfilled.

Bring peace to the many who have lost loved ones.

Please help us live again.

(music) (video) (children's voices) Children's voices: There are now more children than adults in Zaatari.

Sometimes I wonder if we are to blame.

Chris Milk: How was it?

(Applause.) That was a cheap way to get a standing ovation.

I just made you all stand. I thought they would applaud me at the end.

(Applause.) I think everyone on the planet needs to go through what you just went through.

In doing so, we can begin to collectively shape this not as a technology platform, but as a human platform.

To that end, last November, The New York Times and Vrse created a VR project called "The Displaced."

The project started by shipping 1 million Google Cardboards to newspaper subscribers every Sunday.

But something interesting happened that Sunday morning.

Many were received by people who were not the intended recipients on the mailing label.

And we're starting to see this all over Instagram.

Does it look familiar?

Music has led me down a path that has long seemed unattainable.

Now, millions of children have had the same formative experiences that I had in my childhood.

But I think this game goes beyond that.

Let's see where this takes them.

thank you.

(applause)

As little Hawaiians, my mother and aunt always told me stories of Kalaupapa (Hawaii's leprosy colony surrounded by the world's highest sea cliffs) and the Belgian missionary Father Damien who gave his life for the Hawaiian community.

Almost 100 years after Father Damien died of leprosy, my aunt trained nuns as young nurses to care for the remaining lepers.

I recall the story of when she rode a mule down a switchback cliff path while her uncle played his favorite hula song on his ukulele all the way to Kalaupapa.

When I was younger, I was always interested in some things.

First, it was about why the Belgian missionary chose to live in total isolation in Kalaupapa, knowing that he would inevitably contract leprosy from the community of people he helped.

And second, where did leprosy come from?

And why were the Kanaka Maori, the indigenous people of Hawaii, susceptible to leprosy, or "mai pake"?

This made me curious about what makes us unique as Hawaiians: our genetic makeup.

But it wasn't until high school that I realized I wasn't the only one trying to connect our unique genetic ancestry to our potential health, wellness, and disease through the Human Genome Project.

As you know, this $2.7 billion project promised an era of predictive and preventive medicine based on our unique genetic makeup.

Therefore, it always seemed obvious to me that to achieve this dream, we would need to sequence diverse populations of people in order to obtain the full extent of human genetic diversity on Earth.

That's why, ten years later, it still shocks me to learn that 96 percent of genomic studies linking common genetic variants to specific diseases focused exclusively on people of European descent.

You don't need a PhD to know that the remaining 4 percent is the rest of the diversity.

And in my own research, I found that less than 1 percent actually focus on Indigenous communities as much as I do.

So the question arises: Who is the Human Genome Project really for?

Just as we have different eye and hair colors, we also metabolize drugs differently based on genomic diversity.

So how many of us would be shocked to learn that 95 percent of clinical trials only involve people of European descent?

This prejudice and the systematic lack of involvement of indigenous peoples in both clinical trials and genomic research are partly the result of a history of mistrust.

For example, in 1989, researchers at Arizona State University obtained a blood sample from Arizona's Havasupai tribe, promising to reduce the burden of type 2 diabetes plaguing the community, but then turned around and used that very same sample, without the Havasupai's consent, to challenge schizophrenia rates, inbreeding, and the Havasupai's origin story.

Upon learning of this, the Havasupai tribe successfully sued for $700,000 and barred the ASU from conducting research on their reservation.

This culminated in a sort of domino effect, with the Southwest's local tribes, including the Navajo, one of the nation's largest tribes, suspending genetic research.

Despite this history of mistrust, I still believe that indigenous peoples can benefit from genetic research.

And if we don't do something soon, health inequalities will continue to widen.

For example, Hawaii has the longest life expectancy of any state in the United States, but Native Hawaiians like me die a full decade earlier than non-Indigenous people. That's because Hawaii has the highest prevalence of type 2 diabetes and obesity, caused by cardiovascular disease and cancer, which are the number one and two leading causes of death in the United States.

So what can we do to ensure that those most in need of genome sequencing aren't the last to benefit?

My vision is to make genetic research more native and genome sequencing technology unique.

Genome sequencing has traditionally been done in laboratories.

Here is an image of a classic genome sequencer.

it's huge.

It's about the size of a refrigerator.

There are obviously physical limitations.

But what if you could analyze the genome sequence on the spot?

What if you could have a genome sequencer in your pocket?

This nanopore-based sequencer is 10,000 times smaller than conventional genome sequencers.

There are no similar physical restrictions in that you are not tied to a lab bench with extraneous cords, or to a large container of chemicals or a computer monitor.

This allows us to unlock the black box of genome sequencing technology development in an immersive and collaborative way, revitalizing and empowering indigenous communities...

as a citizen scientist.

100 years later, Kalaupapa has the technology to sequence leprosy bacteria in real time using mobile genome sequencers, remote access to the internet and cloud computing.

But only if that's what the Hawaiian people want.

In our space, on our terms.

Indigenomics is science by people, for people.

We begin with tribal consultation resources focused on educating indigenous communities about the potential uses and misuses of genetic information.

Ultimately, we want to have our own indigenomics research institute to conduct our own experiments and educate the next generation of indigenous scientists.

Ultimately, indigenous peoples need to be partners in genetic research, not subjects.

And for outsiders, the research community needs to immerse themselves in indigenous cultures, as Father Damien did, or try to die.

thank you.

(applause)

I will never forget the sound of laughter with my friends.

I will never forget the voice of my mother that I heard just before falling asleep.

And the soothing sound of flowing water in the river will never be forgotten.

Imagine my terror, pure terror, when, at 10, I was told I was going to lose my hearing.

And over the next five years the symptoms progressed and I was classified as severely deaf.

But I believe losing my hearing was one of the greatest gifts I have ever received.

You know, I can experience the world in a unique way.

And I believe that it is these unique experiences that people with disabilities have that will help us create and design a better world for all, with and without disabilities.

I used to be a disability rights attorney who spent a lot of time enforcing the law and ensuring that it was environmentally friendly.

And I was asked to work on a United Nations convention protecting people with disabilities, so I had to learn international policy quickly.

So as an NGO leader, I spent most of my energy convincing people about the capabilities of people with disabilities.

But somewhere along the way, and through many job changes that my parents weren't very happy with, I came across a solution that I believe could be an even more powerful tool for solving some of the world's biggest problems, with and without disabilities.

And that tool is called Design Thinking.

Design thinking is a process for innovation and problem solving.

There are 5 steps.

The first is to define the problem and understand its constraints.

The second is observing and empathizing with people in real-life situations.

Third, generate hundreds of ideas. More is better, wilder is better.

Fourth, prototyping: Collecting everything you can and can find to mimic, test, and refine your solution.

And finally the implementation. Make sure the solutions you come up with are sustainable.

Warren Berger says Design Thinking teaches us to look sideways, reconfigure, refine, experiment and, perhaps most importantly, ask stupid questions.

Design thinkers believe that everyone is creative.

They believe in connecting people from multiple fields. Because we want to share multiple perspectives, bring them together, and ultimately integrate them to form a new one.

Design thinking is such a successful and versatile tool that it has been applied in almost every industry.

I decided to go back to school and pursue a master's degree in social design because I saw the potential it could bring to the problem I was facing.

Here we explore how design can be used to create positive change in the world.

While there, I fell in love with woodworking.

But I soon realized that I was missing something.

When you're working with a tool, you'll hear a sound just before the tool is about to bounce back at you, i.e. just before the part or tool bounces at you.

And this sound was not heard.

So I decided to try and solve it.

My solution was safety glasses designed to visually alert the user to changes in tool pitch before the human ear sensed it.

Why didn't the tool designers come up with this before?

(Laughter) There are two reasons. One was that I was a novice.

We were not bound by expertise or common sense.

The second is, "I was deaf."

My unique world experience helped me with my solution.

And as I kept going, I came across more and more solutions that were originally created for people with disabilities, but ended up being embraced, embraced and loved by the mainstream, regardless of disability.

OXO potato peeler.

It was originally designed for people with arthritis, but it's very comfortable and everyone loves it.

Text messaging: Originally designed for the deaf.

And you know, everyone loves it.

(Laughter.) I started thinking: what if we changed our mindset?

What if we started designing for disability first, instead of standards?

As you can see, when we design for impediments first, we often come across solutions that are not only comprehensive, but also better than those designed for standards.

And this excites me. Because this means that the energy needed to serve people with disabilities can be harnessed, shaped and harnessed as a force of creativity and innovation.

This moves us from the mindset of mind-change and the scarcity of tolerance to being an alchemist, the type of magician this world desperately needs to solve some of its greatest problems.

Now, I also believe that people with disabilities have great potential to become designers within this design thinking process.

Unknowingly, I've been honing my skills as a design thinker since I was a little girl.

Design thinkers are inherently problem solvers.

So imagine listening to a conversation and only understanding 50% of what is being said.

You can't ask them to repeat every word.

They will just get annoyed with you.

So, unbeknownst to myself, my solution was to turn the muffled sound I heard, which was the beat, into a rhythm and place it with my read lips.

Years later, someone commented that my writing had rhythm.

Well, because you experience the conversation as a rhythm.

I also became really good at failing.

(Laughter) It's literally.

I got a D in my first semester in Spanish.

But what I've learned is that when I picked myself up and changed a few things, it worked in the end.

Similarly, design thinking encourages people to fail and to fail again and again. Because in the end you will succeed.

Few great innovations in this world come from people who succeed on the first try.

I have also learned this lesson in sports.

I will never forget what my coach said to my mother. "If it wasn't for her hearing loss, she would have made it to the national team."

But what my coach was saying, and what I didn't know at the time, was that my hearing loss was actually helping me excel in sports.

As you know, when you lose your hearing, not only your behavior adapts, but so do your physical sensations.

One example is increased visual attention span.

Imagine a football player coming down from the left flank.

Imagine being a goalkeeper, like I was, with the ball flowing down the left flank.

A person with normal hearing will be able to see this visually.

We benefited from such a broad spectrum.

So I picked up players who were moving around here or coming down the field.

And I picked up the ball sooner so that if it was passed I could reposition myself and be ready for that shot.

As you can see, I've been a design thinker most of my life.

My powers of observation are so honed that I can spot things that other people never notice.

The constant need to adapt allows me to come up with great ideas and solve problems.

And we often had to do this within limits and constraints.

This is something designers often have to deal with as well.

My most recent job took me to Haiti.

Design thinkers often look for extreme situations. Because it often leads to the best design.

And Haiti was like a perfect storm.

I lived and worked with 300 deaf people who relocated after the 2010 earthquake.

However, five and a half years later there was still no electricity. There was still no safe drinking water. There were no job opportunities yet. Crime remained rampant, but went unpunished.

International aid agencies came one after another.

But they had pre-determined solutions.

They were not prepared to observe the needs of the community and adapt accordingly.

One group gave them goats and chickens.

But they didn't know that there was so much hunger in that community that when the deaf went to sleep at night and became deaf, people would break into their yards and houses, steal chickens and goats, and eventually they were all gone.

If the organization had taken the time to observe the deaf and the community, they would have become aware of their problems and perhaps come up with solutions like solar lights, lighting up safe enclosures to keep them safe at night, and letting the deaf in.

You don't have to be a design thinking expert to adopt the ideas I shared today.

you are creative

You are a designer - everyone is a designer.

Let someone like me help you.

Let people with disabilities help you look sideways and solve some of the biggest problems along the way.

that's it. thank you.

(applause)

This is the Large Hadron Collider.

The circumference is 27 kilometers.

This is the greatest science experiment ever attempted.

More than 10,000 physicists and engineers from 85 countries have come together over decades to build this machine.

What we're doing is accelerating protons, or hydrogen nuclei, at about 99.999999 percent the speed of light.

right? At that speed, they circle that 27 kilometer 11,000 times a second.

It is then collided with another proton beam traveling in the opposite direction.

Crash them in a giant detector.

It's essentially a digital camera.

And here's the ATLAS I'm working on.

I think you can see the size to some extent. You can only see EU standard sized people below.

(Laughter) You can kind of see how big it is, 44 meters wide, 22 meters in diameter, and 7,000 tons.

It then reproduces in its detectors up to 600 million times a second, a huge number, the conditions that existed within a billionth of a second since the universe began.

And if you see pieces of metal there, they're giant magnets that bend charged particles, allowing you to measure how fast they move.

This is a photo from about a year ago.

That magnet is in there.

And this is also a real-life person of EU standard size, so you can get a sense of scale to some extent.

And sometime this summer, that mini-Big Bang will be born there.

And indeed, this morning I received an email saying that the last part of ATLAS had been built today.

So, as of today, it's complete. I wish I could say I planned it for TED, but I didn't. As of today, it has been completed.

(Applause) Yes, great achievement.

So you may be asking, "Why?"

How could these conditions arise less than a billionth of a second after the universe began?"

Well, particle physicists are not ambitious.

And the purpose of particle physics is to understand what everything is made of and how everything is connected.

And by all I mean, of course, I and you, the earth, the sun, the 100 billion suns in our galaxy, and the 100 billion galaxies in the observable universe.

Absolutely everything.

Now, you might say, "Okay, but why don't you just take a look?"

Look? If you want to know what I'm made of, look at me. ”

Yes, as we look back in time, we've found that the universe is getting hotter, denser, and simpler.

I don't know the real reason, but apparently it is.

Therefore, we believe that in the early days of the universe it was very simple and easy to understand.

All this complexity, down to these wonderful things, down to the human brain, is an ancient, ruthless, complex property of the universe.

We believe that in the first billionth of a second it was very simple.

it almost seems like...

Imagine holding a snowflake in your hand and looking at it, it is an incredibly complex and beautiful object. But when you heat it, it melts and forms a puddle, revealing that it's actually made of H20, or water.

So it's like looking back in time to understand what the universe is made of.

And as of today it is made of these things.

Just 12 particles of matter held together by four forces of nature.

Quarks, these pink ones, are what make up the protons and neutrons that make up the nuclei of atoms in the body.

By the way, electrons--things that orbit around the nucleus--are kept in orbit by the electromagnetic force carried by this object, the photon.

Quarks are held together by other things called gluons.

And these guys, the weak nuclear forces here, are probably the most unfamiliar ones.

But the sun wouldn't shine without it.

And when the sun shines, it rains down large amounts of these substances called neutrinos.

In fact, if you look at a thumbnail about 1 square centimeter, 60 billion neutrinos from the sun pass through each square centimeter of the body every second.

But you don't feel them, because the weak forces are rightly named - so short-range and so weak that they just pass through you.

And these particles have been discovered for almost the past century.

The first, the electron, was discovered in 1897, and the last, called the tau neutrino, was discovered in 2000. In fact, I was just going to say -- right up the road in Chicago. America is a big country.

It is located up the road.

Compared to the universe, it is still only halfway through.

(Laughs) And this was discovered in 2000, so it's a relatively recent photo.

In fact, one of the great things is that once you realize how small they are, you can discover any of them.

As you know, they are one step larger than the entire observable universe.

That means there are 100 billion galaxies 13.7 billion light years away. In fact, the step size from there to Monterey is about the size from Monterey to these galaxies.

All in all, a very fine, but almost complete set was found.

So one of my most prominent ancestors at the University of Manchester, Ernest Rutherford, the discoverer of the atomic nucleus, once said, "All science is either physics or stamp collecting."

Although he was from New Zealand, I don't think he intended to insult other scientists. It is possible.

(Laughter.) But what he meant was that what we actually did was collect stamps there.

OK, so you've found the particles, but if you don't understand the underlying reason for the pattern, why it's constructed the way it is, you're really done with stamp collecting. You never did science.

Fortunately, we have perhaps one of the greatest scientific achievements of the 20th century to support that pattern.

It's Newton's laws of particle physics, so to speak.

This is what we call the standard model, and it's a beautifully simple formula.

Stick it on the front of your t-shirt and it will always be a symbol of elegance.

This is it.

(Laughter) I was a little disingenuous because I expanded on all that gory detail.

However, you can use this equation to calculate everything that happens in space except gravity.

So you want to know why the sky is blue, why the nuclei stick together, why the DNA is the way it is, given that you have a big enough computer in principle.

In principle, it should be possible to calculate from that formula.

But there is a problem.

can anyone see what it is?

A bottle of champagne will be presented to the person who told me.

In fact, I'll zoom in on one of the lines and briefly explain it.

Basically each of these terms refers to a part of a particle.

So the W there refers to W and how they fit together.

So are the carriers of these weak forces, Zs.

But there is an additional symbol H in this equation.

Yes H.

H stands for Higgs boson.

The Higgs boson has not been discovered.

But they are necessary. It's necessary for the math to work.

So all the very detailed calculations that can be done with this wonderful equation are impossible without the extra bit.

So this is a prediction, a prediction of new particles.

what is it for?

Well, it took me a long time to come up with a good analogy.

And when we were seeking funding from the British government for the LHC in the 1980s, Margaret Thatcher at the time said, "If you can explain what the hell you guys are doing in terms that politicians can understand, they'll get the money.

I want to know what this Higgs boson does. ”

And then we came up with this analogy and it seemed to work.

Well, what the Higgs boson does is give the elementary particle mass.

And the whole universe, which doesn't mean just space, but I mean myself, and inside you, is that the whole universe is filled with something called the Higgs field.

The Higgs particle, for example.

As an analogy, these people in the room are the Higgs particles.

As particles travel through space, they can interact with these Higgs bosons.

But imagine a less popular person moving around the room.

Then everyone ignores me. They can travel through rooms very quickly, essentially at the speed of light. they have no mass.

And imagine someone very important, popular and intelligent walks into the room.

They are surrounded by people and are blocked from passing through the room.

It's as if it's gotten heavy. they get huge.

And that's exactly how the Higgs mechanism works.

The picture is that the cosmic electrons and quarks that we see in our bodies and around us are in a sense heavy and huge because they are surrounded by Higgs bosons.

They are interacting with the Higgs field.

If this picture is true, we need to discover the Higgs boson at the LHC.

If that's not true, it's the simplest mechanism we can think of, but it's so complex that whatever the Higgs boson as we know it works, it should show up at the LHC.

That's one of the main reasons we built this giant machine.

Nice to meet you Margaret Thatcher.

I actually wanted to make it more culturally relevant, but anyway (laughs).

it is one.

It essentially guarantees what the LHC will find.

There are many others. You have heard many of the big problems in particle physics.

One of them you may have heard of is dark matter or dark energy.

There is one more problem. The forces of nature are actually quite beautiful, but they seem to change in strength as we go back in time.

Well, strength changes.

So the electromagnetic force, the force that binds us together, gets stronger the higher the temperature.

The strong force that holds atomic nuclei together, that is, the strong nuclear force, weakens. And what you're looking at is the standard model - you can calculate how these vary - the force, the three forces other than gravity, seem to converge pretty much.

It's as if a kind of beautiful superforce existed in ancient times.

But they just miss it.

There is now a theory called supersymmetry that doubles the number of particles in the Standard Model, but this doesn't sound like a simplification at first glance.

But in fact, according to this theory, we find that the forces of nature certainly appeared to be united around the time of the Big Bang. This is an absolutely beautiful prophecy. This model wasn't built that way, but it looks like it could.

Also, these supersymmetric particles are very strong candidates for dark matter.

So it's a very compelling theory and indeed mainstream physics.

And if I funded it, in a very unscientific way, I would fund these things to happen at the LHC as well.

Many other things the LHC can discover.

But in the last few minutes, I want to talk about what I'm thinking, what particle physics really means to me, particle physics and cosmology, from a different perspective.

And I think it has given us a wonderful story about the universe—almost a creation story, if you like—from decades of modern science.

And, in the spirit of Wade Davis' lecture, I'd say it deserves at least a wonderful creation story of the people of the Andean plateau and the icy north.

I think this is an equally wonderful story of creation.

The story goes like this. We know that the universe began 13.7 billion years ago in a very hot and dense state much smaller than a single atom.

After the big bang it started to inflate, about a millionth of a second, a billionth of a second, which I think is correct.

Gravity was separated from other forces.

After that, the universe experienced an exponential expansion called inflation.

In the first billionth of a second or so, the Higgs field kicked in and the quarks, gluons, and electrons that make us up have mass.

The universe continued to expand and cool.

A few minutes later, there was hydrogen and helium in space. that's all.

The universe was made up of about 75 percent hydrogen and 25 percent helium. It's still going on.

It continued to expand for about 300 million years.

And light began to travel through space.

It's big enough to let light through, and that's what we see in the cosmic microwave background, which George Smoot described as seeing God's face.

About 400 million years later, the first stars formed and their hydrogen and helium began to cook into heavier elements.

So the elements of life—carbon, oxygen, iron, and all the other elements necessary to make us up—were cooked in the first generation of stars, and then they ran out of fuel and exploded, throwing those elements back into space.

Then they collapsed again into another generation of stars and planets.

And on some of those planets, the oxygen produced in the first-generation stars could merge with hydrogen to form liquid water, water, on the surface.

Primordial life evolved on at least one planet, and perhaps only one, to walk upright over millions of years, leaving footprints in the mudflats of Tanzania about 3.5 million years ago, and eventually to another world.

And built this civilization that turned darkness into light, this wonderful picture, and you can see civilization from outer space.

As one of my great heroes, Carl Sagan, said, these are, in fact, not only these, but I was looking around, things like the Saturn V rocket, Sputnik, DNA, literature, science, and these are what a hydrogen atom would do given 13.7 billion years.

Just worth your attention.

and the laws of physics. right?

So the correct laws of physics are beautifully balanced.

If the weak forces were a little different, carbon and oxygen would not be stable in the core of the star and would not exist in the universe.

And I think that's a wonderfully important story.

Fifty years ago we couldn't tell the story because we didn't know it.

I genuinely feel that civilization emerged purely as a result of the laws of physics and a handful of hydrogen atoms, if you believe in the story of scientific creation, but for me anyway, it makes me feel incredibly valuable.

That's the LHC.

Starting in the summer, the LHC will no doubt be writing the next chapter of its book.

And I'm certainly very excited and looking forward to it being turned on.

thank you.

(applause)

What an interesting group of individuals you are...

to a psychologist.

(Laughter) Over the past few days, I've had the opportunity to hear some of your conversations and see you interact with each other.

And I think it's fair to say already that there are 47 people in this audience at this time exhibiting the psychiatric symptoms I want to discuss today.

(Laughter.) And I thought you might want to know who you are.

(Laughter.) But instead of pointing at you and becoming needless and intrusive, I wanted to tell you some facts and stories that give you a glimpse into yourself.

I belong to a field of study known as personality psychology, which is part of a larger science of personality that spans the spectrum from neurons to narratives.

And what we are trying to do in our own way is to understand that each of us, each of you, is in some ways just like everyone else, just like everyone else, and no one else.

Well, you may have already said to yourself, "I'm not intrigued."

I am the 46th most boring person in the Western Hemisphere. ”

Or you might say of yourself, "I'm an interesting person, even though many people think I'm a wonderful, amazing and twisted person."

(Laughter) But what really fascinates me, as a psychologist, about you is your self-judgmental boredom and innate "witness."

Now let me explain why this is so.

One of the most influential approaches in personality science is known as trait psychology, which aligns you along five dimensions that are normally distributed and describe universally held aspects of differences between people.

They spell the acronym "OCEAN".

So, 'O' stands for 'open to experience', a more closed person.

"C" stands for "honesty" and contrasts with people who have a more lazy approach to life.

"E" -- "Extroverted" as opposed to introverted people.

"A" -- "agreeable individuals", as opposed to those who clearly disagree.

And "N" - a "nervous person", as opposed to more stable people.

All these aspects affect our well-being and the way we lead our lives.

So, for example, openness and honesty have been found to be very good predictors of success in life, and open people achieve that success by being bold and sometimes bizarre.

Conscientious people meet deadlines, be patient, and achieve them with a certain amount of passion.

Both extroversion and agreeableness help you get along well with people.

For example, I am intrigued by extroverts.

In my class, I sometimes teach basic facts about their personality that may come to light. Tell them that it is virtually impossible for adults to lick the outside of their elbows.

(laughs) Did you know?

Some of you may have already tried to lick the outside of your elbow.

But if you're an extrovert, you've not only tried it, but you've managed to lick the elbow of the person sitting next to you.

(Laughter.) Those people are extroverts.

Let's talk a little bit more about extroversion. It's consequential, it's interesting, and it helps us understand what I call the three human qualities.

The first is our biological origin, or neurophysiology.

Second, our social or second nature, which concerns the cultural and social aspects of our lives.

And thirdly, what makes you individual is the singularity, or what I call your “peculiar” quality.

Let me explain.

One of the characteristics of extroverts is their need for stimulation.

And that stimulation can be achieved by finding stimulating things like loud noises, parties and social events here at TED. We see that extroverts form the center of magnetism.

everyone gathers.

And I've seen you

Introverts tend to spend time in quieter spaces upstairs where they can reduce stimulation and can be mistaken for being antisocial, but they are not necessarily antisocial.

You may simply find that your performance improves when you have the opportunity to lower your stimulation level.

In some cases, it can also be an internal irritant from the body.

For example, caffeine works much better for extroverts than for introverts.

When extroverts come into the office at 9 in the morning and say, "I really need coffee," they're not joking, they really are.

Introverts don't get much done, especially when the task they're working on over coffee is fast and quantitative. Introverts may seem less quantitative.

But that is a misunderstanding.

Here we get really very interesting results. We are not always what we seem. Which brings me to my next point.

We may be short on time, but before we get to the point, I'd like to say a few words about intercourse.

So if you want me to do that, will you?

OK。

(Laughter) There have been studies of the frequency with which individuals participate in marital activities, disaggregated by male and female. Introverted, extroverted.

So I ask you: How many times in a minute -- oh sorry, it was a rat study -- (laughter) how many times a month does an introverted man engage in that act?

3.0。

extroverted man?

more or less?

Yes, even more.

5.5 -- almost double.

Introverted Woman: 3.1.

extrovert woman?

Frankly, as I'll explain later, as introverted men, they're heroic.

7.5。

They not only treat all extroverted men, but they select a few introverted men as well.

(Laughter) (Applause) We, extroverts and introverts, communicate in different ways.

Extroverts want many social encounters punctuated by intimacy when interacting.

They want to be nearby for comfortable communication.

They like to make a lot of eye contact and stares.

Some studies have found that they use more demeaning language when meeting someone.

So when an extrovert meets Charles, it immediately becomes "Charlie," then "Chuck," and then "Chuckles Baby."

(Laughter) On the other hand, if you're an introvert, you'll stay "Charles" until the other person gives you permission to be more intimate.

we say it differently.

Extroverts prefer black-and-white, concrete, and simple language.

Introverts like introverts -- and again, I'm as extreme an introvert as you can imagine -- we speak differently.

We like contextually complex, accidental, weasel-like sentences -- (laughter) more or less.

(laughs) So to speak.

(Laughter) Let's not get too specific.

When we talk, sometimes we pass each other.

I had a consulting contract that I shared with probably two or more different colleagues than me.

First, his name is Tom.

mine is not.

(Laughter) Second, he's 6 foot 5 tall.

This tends not to be the case.

(Laughter.) And third, he's about as extroverted as you can find.

I'm a serious introvert.

I'm so overloaded that I can't even drink coffee after 3pm and I should be able to sleep in the evening.

A colleague named Michael was seconded to this project.

And Michael nearly brought the project to a halt.

So the guy who seconded him asked Tom and me, "What do you think of Michael?"

Well, I'll tell you what Tom said in a moment.

He spoke in the classic "extroverted" language.

And show how the extroverted ear heard what I said. This is actually pretty accurate.

I said, "Michael, some of us tend to act in ways that are perhaps more assertive than normal."

(Laughter) Tom rolled his eyes and said, 'Brian, that's what I said.

(Laughter) (Applause) Now, as an introvert, I might softly hint at the "disgusting" nature of this man's behavior, but I'm not jumping on that.

(Laughter.) But as an extrovert, he said, "If he walks like that person and he talks like that person, I call him that person."

And we pass each other.

Now, is this something we should be concerned about?

of course.

It's important to know this.

Are we just that?

Are we just a collection of traits?

No, we are not.

Remember that you are just like everyone else and not everyone else.

How about you, that peculiar person?

As Elizabeth, or as George, you might share your own extroversion and nervousness.

But are there some Elizabethan, or your Georgian, distinguishing traits in your behavior that help understand you better than just a bunch of traits?

So can we love you?

It's not just because you're a certain type of person.

I feel uncomfortable stereotyping people.

I don't even think pigeons belong in the pigeonhole.

So what makes us different?

It's what we do in life, a personal project.

You currently have a personal project, but no one here may know it.

It concerns your child. You've been to the hospital three times and the kids still don't know what's wrong.

Or maybe your mother.

And you were acting out of character.

These are free traits.

You are a very positive person, but you act obnoxious in order to give something to mothers and children to break down the barriers of administrative lethargy in hospitals.

What are these free characteristics?

This is where we enact the scripts for the core projects of our lives.

And those are the things that matter.

Don't ask people what type you are. Ask, "What is the central project in your life?"

And we enact those liberal qualities.

I'm an introvert, but I profess to have a core project.

i am a professor

And I love my students and I love my field.

And I can't wait to tell them about what's new, what's exciting, and what I can't wait to tell them.

So I act in an extroverted manner. Because at 8 in the morning, students need a little humor and a little involvement to keep up with their hard days of studying.

However, extreme caution is required when engaging in behavior contrary to character for a long period of time.

Sometimes we may find that we don't take care of ourselves.

For example, after a period of pseudo-extroverted behavior, you know you need to fix something.

As Susan Kane noted in her book Quiet, in a chapter featuring a queer Canadian professor who was teaching at Harvard at the time, I sometimes go to the men's bathroom to escape the trebuchet and arrows of outrageous extroverts.

(Laughter) I remember one particular day when I was in a cubicle trying to avoid overstimulation.

And then a really extrovert came next to me—not in my cubicle, but in the cubicle next door—and heard various evacuation sounds. Sounds we hate—even our own. So we wash our face both inside and after.

(Laughter.) And then I heard a gravelly voice say, "Hey, is that Dr. Little?"

(Laughter) If an introvert is guaranteed to be constipated for six months, it's a joke.

(Laughter) That's where I'm going now.

don't follow me

thank you.

(applause)

When designing a new product, service, or business, the only way to know if it's a good one or a good design is to see how it's used in the real world, contextually.

Every time I pass Highbury Fields in north London, I am reminded of that.

It's really beautiful.

There are extensive green spaces.

It is surrounded by Georgian-style buildings.

But there is this mud trap across the middle.

People obviously don't want to walk all the way over the edge.

Rather, they want to take shortcuts, and those shortcuts are self-reinforcing.

Now, this shortcut is called the path of desire and is often the path of least resistance.

I find them fascinating because they are often the point of divergence between design and user experience.

Well, at this point I have to apologize. Because you're going to see things like this all over the place.

But today, I'd like to share with you three that I found interesting and really reminded me of launching a new product or service.

The first is Brasilia, the capital of Brazil.

And it's a reminder that sometimes we just have to focus on designing for real low-friction needs.

Now Brasilia is attractive.

Designed by Niemeyer in the 1950s.

It was the golden age of airplanes back then, so you see, he laid it out like an airplane.

A little worryingly, he put most of the important government buildings in the cockpit.

But if you zoom in on the very center of Brasília, the point right there, you will find that it is littered with desire paths.

They are absolutely everywhere.

Well, they thought this design was future proof.

They believed that in the future we would not have to walk anywhere and would be able to drive, so there was little need for sidewalks and sidewalks.

But as you can see, I have a real need.

These are very dangerous paths of desire.

If you select just the middle one, you'll see that it crosses 15 lanes.

It should come as no surprise to anyone that Brasilia has five times the pedestrian accident rate of the average US city.

People are resourceful.

They always find a route with less friction to save money and time.

Not all of these paths of desire are dangerous. I remember flying here when I was at Heathrow Airport.

Many of us get frustrated when faced with the obligation to go through a duty free shop.

I was amazed at how many people refused to take the long and winding road to the left and just pierced right and pierced the path of desire.

An interesting question is what do designers think about what we do here?

Will they think we are stupid?

Do they think we are lazy?

Or do they accept that this is the only truth?

This is their product.

We virtually co-design their products.

So our job is to design for real needs with less friction. Because if you don't, your customers will anyway.

The second aspiration path I wanted to share is at the University of California.

And a reminder that the best way to come up with a great design is to just launch it.

Now, college campuses are great for finding the path of desire.

I think it's because students are always late and they are very smart.

So they rush to lecture.

They will always find a shortcut.

And the designers here knew that.

So they built a building and waited several months for a path.

Then they paved them.

(Laughter) It's an incredibly clever approach.

In fact, often just launching a strawman for a service reveals what people really want.

For example, Air Muir of Boston wanted to open a restaurant.

But where should it be?

what should the menu be?

He set up a service, in this case a food truck, changing locations every day.

He wrote another menu on the side with a whiteboard marker to figure out what people wanted.

He now owns a chain of restaurants.

So launching something to identify the pathways of desire can be very efficient.

The third and final aspiration path I wanted to share with you is UNIH.

A reminder that the world is in flux and we must adapt to its changes.

As you can imagine, this is a hospital.

I marked the oncology department on the left.

Patients usually stay in the lower right hotel.

This was a patient-centric organization, so we laid the car down for our patients.

But when they started offering chemotherapy, they found that patients rarely wanted to get in their cars.

They were so nauseated that they walked back to their hotel.

This oblique-looking path of desire was formed.

Patients even called it a "chemo trail."

Well, when the hospital first saw this they tried to ignore it by laying grass over it.

But after a while they realized it was a critical need for patients and paved it.

And I think our job is often to pave the way for these new desires.

Looking back at North London's stuff again, that desire road wasn't always there.

The event was born because on match day, people make their way from the underground station you see in the bottom right to the massive Arsenal Football Club stadium.

So you see the path of desire.

If you turn the clock back a few years to when the stadium was built, the road to hope doesn't exist.

Our job, therefore, is to watch for the emergence of these paths of desire, and to pave them when necessary, as someone has done here.

Someone put up a barrier and as you can see people started circling across the bottom and it was paved.

(Laughter) But I think it's also a great reminder that the world is really in flux.

If you look at the top of this image, it is constantly changing as another path of desire is formed.

Therefore, these three desire pathways are a reminder that they should be designed around the actual human needs.

I think empathy for what customers want is probably the biggest leading indicator of business success.

We design them according to your actual needs and design them with low friction. Because if you don't offer low friction, someone else, often a customer, will.

Second, often the best way to find out what people really want is to start a service.

The answer is rarely in the building.

Let's go out and see what people really want.

And finally, the world is incredibly fluid right now, partly because of technology.

it is always changing.

These paths of desire will spring up faster than ever.

Our job is to pick the right one and pave it.

thank you very much.

(applause)

Every weekend for as long as I can remember, my dad used to wake up on Saturdays in his worn-out sweatshirt and scrape off the old creaky wheels of the house we lived in.

I wouldn't call it a restoration. It was a ritual, a catharsis.

All year long he used this old heat gun and spackle knife to scrape off the paint and repaint where he had chipped off, but the next year he started again.

Sharpening and resharpening, painting and repainting: the work on an old house never ends.

On my father's 52nd birthday, I received a phone call.

My mother called me to tell me that doctors had found a lump in his stomach, meaning he had terminal cancer and had been told he had three weeks to live.

I immediately returned to my home in Poughkeepsie, New York, to watch the death with my father, not knowing what would happen next.

To distract myself, I rolled up my sleeves and set about doing something he couldn't do anymore: finish restoring an old house.

He was still alive when the looming deadline of three weeks came and went.

And three months later he joined me.

I stripped the interior and repainted it.

The old windows were refinished after 6 months, and the rotten porch was finally replaced after 18 months.

And as my father stood outside with me, in complete remission and hair on his head, admiring the day's work, he turned to me and said, "Michael, this house saved my life."

So the next year I decided to go to architecture school.

(Laughter) But there I learned something different about buildings.

Ribbon or...

Pickles?

(laughter) I think this is a snail.

I was wondering something about this.

Why are the best architects, the best architecture - all beautiful, visionary and innovative - so rare, so few are useful?

More importantly, what more could you do with this creative talent?

Just as my final exams were about to begin, I decided to stop staying up all night and go to a lecture by Dr. Paul Farmer, one of the world's leading health advocates for the poor.

I was surprised to hear the doctor talk about architecture.

The buildings are exacerbating people's illnesses, and for the world's poorest people, this poses an epidemic-level problem, he said.

At this hospital in South Africa, patients who came to wait in this unventilated hallway with broken legs, for example, came out with multidrug-resistant tuberculosis.

A simple design for infection control was not considered, and people died because of it.

"Where's the architect?" said Paul.

If hospitals make people sicker, where are the architects and designers to help build and design hospitals that we can heal?

The following summer, I was in the backseat of a Land Rover with a few classmates hitting a mountainside in Rwanda.

The next year I ended up living in this old guest house in Butaro. It was a prison after the massacre.

I was there with Dr. Farmer and his team to design and build a new type of hospital.

If corridors make patients sicker, what if you could design a hospital that flips the corridors outward and lets people walk on the outside?

What if you could design a hospital that breathes naturally, while reducing its environmental impact when mechanical systems rarely work?

And what about the patient's experience?

Evidence shows that a simple view of nature can radically improve your health. So why couldn't we design a hospital where every patient has a window with a view?

A simple and site-specific design can realize a healing hospital.

Designing it is another thing. It turns out that building it is a whole other thing.

We worked with a brilliant engineer, Bruce Nizei, who thought differently about construction than I was taught in school.

When the top of this huge hill had to be excavated, and bulldozers were expensive and difficult to get to, Bruce suggested doing it by hand, using the Rwandan technique 'ubdeje', which means 'community works for community'.

Hundreds of people came with shovels and hoes and we dug that hill in half the time and half the cost of a bulldozer.

Instead of importing furniture, Bruce established a guild, gathering master carpenters to train others in how to make hand-made furniture.

And here, 15 years after the Rwandan genocide, Bruce claimed to employ workers from all backgrounds, half of whom were women.

Bruce used the building process not only to heal the sick, but to heal entire communities.

We call this our locally manufactured building method, or “low fab”. It has four pillars. Hire locally, source locally, train where possible, and most importantly, think of every design decision as an opportunity to invest in the integrity of the places you serve.

Think of it like a local food movement, but about architecture.

And we believe that this way of building can be replicated around the world and change the way we talk about and appreciate architecture.

With low-fab building methods, even aesthetic decisions can be designed to impact people's lives.

Butalo decided to use local volcanic stone, which is abundant in the area, but was seen as a nuisance by farmers and was piled up on the side of the road.

We worked with masonry to cut these stones and mold them into the walls of the hospital.

And when they started from this corner and wrapped around the whole hospital, they were so good at putting these stones together that they asked us if they could tear down the original wall and rebuild it.

and see what is possible.

beautiful.

And the beauty of it for me comes from the fact that I know that these stones were cut by hand to form this thick wall made only in this place with rocks from this soil.

Today, when you go out and see the world you built, don't just ask, "What is your environmental footprint?" -- Important question -- But what if you also asked, "What is the human handprint of the person who made it?"

We started a new practice based on these questions and tested it around the world.

I asked if a new hospital, like Haiti, could end the cholera epidemic.

The 100-bed hospital designed a simple strategy to clean up contaminated medical waste before it enters the water table. Our partners at Les Centers GHESKIO are already saving lives thanks to it.

Or Malawi: We asked whether midwifery centers could radically reduce maternal and infant mortality.

Malawi has one of the highest maternal and child mortality rates in the world.

Using simple strategies that are replicated nationally, we designed birthing centers to get women and their attendants to the hospital faster and deliver safer births.

Or in Congo, I asked if education centers could be used to help conserve endangered wildlife.

Poaching for ivory and bushmeat is causing global epidemics, disease transmission and war.

In one of the most inaccessible places in the world, we have built a center using the mud, dirt and trees around us to show how we can protect and conserve our rich biodiversity.

Here in the United States, too, we have been asked to rethink the world's largest university for the deaf.

The deaf community shows us the power of visual communication through sign language.

We have designed a campus that awakens the way we as humans communicate verbally and non-verbally.

Even in my hometown of Poughkeepsie, I was thinking about old industrial infrastructure.

This is what we thought. Could art, culture, and design be used to revitalize this city, and other Rust Belt cities across the country, and transform them into centers of innovation and growth?

With each of these projects, we asked a simple question: "What more could architecture do?"

And asking that question has forced us to think about how we can create jobs, how we can source locally, and how we can invest in the dignity of the communities we serve.

I learned that architecture can be a force for change.

About a year ago, I read an article about a dynamic and courageous civil rights leader named Brian Stevenson.

(Applause.) And Brian had a bold architectural vision.

He and his team documented over 4,000 lynchings of African Americans in the American South.

And they were planning to mark every county where these lynchings happened and build a national memorial for the lynching victims in Montgomery, Alabama.

Countries such as Germany, South Africa and, of course, Rwanda recognize the need to build memorials to past atrocities to heal the national spirit.

The US has not yet done this.

So I sent a cold email to info@equaljusticeintiative.org: "Dear Brian", it read:

By any chance, do you know who designed it? ”

(Laughter) Amazingly, shockingly, Brian contacted me immediately and invited me to meet and talk to his team.

Needless to say, I canceled all meetings and hopped on a plane to Montgomery, Alabama.

Once there, Brian and his team picked me up and took me around the city.

And they took the time to point out the many markers of Confederate history placed throughout the city, and the very few markers of slavery history.

Then he took me up the hill.

I could see the whole city.

He pointed to rivers and railroad tracks where America's largest domestic slave-trading port once flourished.

And to the Rotunda of the Capitol, where George Wallace stood on the steps and declared "permanent segregation."

And to the hills below.

"Here we will build a new monument that will change the identity of this city and this country," he said.

Our two teams have collaborated on the design of this memorial for the last year.

This monument takes us on a journey through classic and mostly familiar building types like the Parthenon and the Vatican portico.

But once inside, the ground drops below us, our perception changes, and we realize that these pillars remind us of the lynching that took place in the public square.

And as you go on, you begin to understand that there are still vast numbers of people who have not been put to rest.

Their names will be engraved on the markers that hang above our heads.

And just outside that is a field with the same rows.

But these are temporary queues waiting in Purgatory, to be placed in the very county where the lynching occurred.

Over the next few years, this site will prove that each of these markers is claimed and visibly installed in their counties.

Our nation will begin to recover from more than a century of silence.

When thinking about how it should be built, we were reminded of the Ubudeje building process we learned in Rwanda.

We wondered if we could fill that very pillar with soil from the sites where these killings took place.

Brian and his team began collecting the soil and storing it in individual jars with family members, community leaders and descendants.

The very act of collecting soil is connected to a kind of spiritual healing.

It is an act of restorative justice.

One member of the EJI team said in collecting dirt from the site where Will McBride was lynched, "If Will McBride left a drop of sweat, a drop of blood, a drop of hair follicle, I will dig it up and I hope his whole body rests in peace."

We plan to break ground on this memorial later this year, and it will be the final place to speak about the unspeakable acts that have scarred our nation.

(Applause.) What I didn't know when my father told me that day that this house, our house, had saved his life, was that he was referring to a deeper relationship between architecture and us.

The building is more than just an expressive sculpture.

They make our individual and collective aspirations visible as a society.

Great architecture gives us hope.

Amazing architecture heals.

thank you very much.

(applause)

So at Google, I lead a team working on machine intelligence. In other words, the field of engineering that allows computers and devices to do some of what the brain does.

Because of this, we also become interested in the actual brain and neuroscience, especially how our brain works, which is far superior to the performance of computers.

Historically, one of those areas is perception, the process by which things in the world (sounds and images) are transformed into concepts in the mind.

This is essential for our own brains and very useful on computers as well.

For example, a machine recognition algorithm developed by our team will allow you to search for photos on Google Photos based on their content.

The flip side of perception is creativity. That is, turning a concept into something in the world.

Thus, over the past year, our research on machine perception has unexpectedly been linked to the world of machine creativity and machine art.

I think Michelangelo had a keen insight into this dual relationship between perception and creativity.

These are his famous words. "Inside every stone block is a statue, and the sculptor's job is to find it."

I think what Michelangelo meant was that people create by perceiving, and that perception itself is an act of imagination and an element of creativity.

Of course, the organ that carries out all thinking, perception and imagination is the brain.

I'd like to start with a brief history of what we know about the brain.

This is because, unlike hearts and intestines, you can't tell much about the brain, at least not by looking at it with the naked eye.

Early anatomists who studied the brain gave this surface structure all sorts of fanciful names, including the hippocampus, which means "little shrimp."

But of course, such things don't tell us much about what's really going on under the hood.

I think the first person to really develop any insight into what is going on in the brain was the great 19th-century Spanish neuroanatomist, Santiago Ramón y Cajal. To understand their morphology, he used a microscope and special stains that could either selectively fill in individual cells in the brain or render them in very high contrast.

These are the kinds of pictures he made of neurons in the 19th century.

This is taken from the brain of a bird.

And while we see this incredible variety of cell types, the cell theory itself was also quite new at this point.

And these structures, these cells with these dendritic structures, these branches that can travel very long distances, this was very novel at the time.

Of course, they remind me of wires.

It may have been obvious to some in the 19th century. The wiring and electrical revolution was just beginning.

But Ramon y Cajal's microanatomical drawings, like this one, are still superior in many respects.

More than a century later, we are still completing the work Ramón y Cajal started.

These are raw data from collaborators at the Max Planck Institute for Neuroscience.

And what our collaborators did is image small pieces of brain tissue.

The entire sample here is about 1 cubic millimeter in size, and I'm showing you a very small portion of it here.

The bar on the left is approximately 1 micron.

The structures you see are mitochondria, about the size of bacteria.

These are continuous slices of this very small tissue block.

For comparison, the average hair is about 100 microns in diameter.

So what we're looking at is much smaller than a single strand of hair.

And from these kinds of serial electron microscopy slices, we can start reconstructing these-like neurons in 3D.

So these are the same style as Ramon y Cajal.

Only a few neurons lit up. Because otherwise you can't see anything here.

All the wires connecting one neuron to another will be very crowded and filled with structures.

So Ramón y Cajal was a little ahead of his time, and progress in understanding the brain slowly progressed over the decades that followed.

But we knew that neurons use electricity. By World War II, our technology was advanced enough to allow us to start doing real electrical experiments with living neurons to better understand how neurons work.

This was around the same time that computers were invented based on the idea of ​​modeling the brains of what Alan Turing, one of the fathers of computer science, called "intelligent machines."

Warren McCulloch and Walter Pitts examined Ramón y Cajal's diagram of the visual cortex, which I present here.

This is the cortex that processes the images coming from the eye.

To them, this looked like a schematic.

Therefore, there are many details in McCulloch and Pitts' schematics that are not accurate.

But this basic idea that the visual cortex functions like a series of computational elements that pass information from one to the next in a cascade is inherently true.

Let's talk a little bit about what a model that processes visual information needs to do.

The basic job of perception is to take an image like this and say, "This is a bird," which is a very simple thing we do with our brains.

But we all know that with computers this was almost impossible just a few years ago.

Classical computing paradigms do not make this task easy.

So what's going on between pixels, between the image of a bird and the word "bird," is essentially a set of neurons connected together in a neural network, as illustrated here.

This neural network could be biological within the visual cortex. Alternatively, today we are beginning to have the ability to model such neural networks on computers.

And we'll show you what it's really like.

Pixels can therefore be thought of as the first layer of neurons, and in fact are how they function in the eye: the neurons of the retina.

They then feed forward to the next layer, the next layer of neurons, all connected by synapses of different weights.

The behavior of this network is characterized by the strength of all these synapses.

These characterize the computational properties of this network.

And at the end of the day you will have a neuron or a small group of neurons that says "bird" and lights up.

Now we represent these three things (the input pixels and synapses of the neural network and the output bird) by the three variables x, w and y.

That image probably has about a million x's, or a million pixels.

There are billions or trillions of w, representing all these synaptic weights in a neural network.

And that network has a very small number of y's in its outputs.

"Bird" is only 4 letters, right?

So let's assume this is the simple expression x "x" w = y.

Of course, what's really going on there is a very complicated series of mathematical operations, so I put it in time-scaring quotes.

It's an equation.

There are 3 variables.

And we all know that if we have one equation, we can solve one variable by knowing two other things.

The problem of inference, or deciding that a picture of a bird is a bird, is when y is unknown and w and x are known.

You know neural networks and pixels.

As you can see, this is actually a relatively easy problem.

Multiply by 2 x 3 and you're done.

I'll show you an artificial neural network we recently built that does just that.

This is running in real time on a mobile phone, and the fact that a mobile phone can perform billions and trillions of operations per second is of course amazing in itself.

What you're looking at is looking at photo after photo of a bird on your phone and not just actually saying "Yes, it's a bird", but identifying the type of bird in this kind of network.

So in that diagram, x and w are known, but y is unknown.

Of course, we're ignoring the very hard part, but how on earth do we understand the brain to be able to do such a thing?

How do we learn such a model?

So this learning process, the process of solving for w, if it does this using a simple equation that thinks of these as numbers, it knows exactly how to do it: 6 = 2 x w, well, divide by 2 and you're done.

The problem is with this operator.

Now, regarding division, I used division because it is the opposite of multiplication, but as I said earlier, multiplication here is a bit of a lie.

This is a very complex and highly non-linear operation. Not the other way around.

So I have to find a way to solve the equation without using the division operator.

And it's very easy to do.

You just say let's do a little algebraic trick and move 6 to the right side of the equation.

Well, we're still using multiplication.

And that zero should be considered an error.

In other words, if you solve for w the right way, the error will be zero.

And if it's not done perfectly right, the error will be greater than zero.

So now we can minimize the error by just making guesses. This is an area where computers excel.

Now you have your first guess. What if w = 0?

Well, the error is 6.

What if w = 1? The error is 4.

And the computer can play Marco Polo and bring the error closer to zero.

Doing so gives a successive approximation to w.

We usually don't get there perfectly, but after about 12 steps we get to w = 2.999 which is close enough.

And this is the learning process.

So remember what's happening here is taking many known x's and known y's and solving for a central w through an iterative process.

That's exactly how we learn on our own.

We have so many images of when we were babies, and we are told, 'This is a bird, this is not a bird.

Then iterate over time to solve for w and solve those neural connections.

Now we have fixed x and w to solve for y. It is an everyday, quick recognition.

Find a way to solve w. This is learning, but this is very difficult as it requires a lot of training examples to minimize the error.

And about a year ago, Alex Mordvintsev from our team decided to experiment with what would happen if we tried to solve for x given a known w and a known y.

In other words, you know it's a bird, and you already have a neural network trained on birds, but what's a picture of a bird?

Using the exact same error minimization procedure, we find that we can do it with a network trained to recognize birds, and the results are as follows...

bird painting.

In other words, this is an image of a bird generated entirely by a neural network trained to recognize birds. Instead of solving y , just solve x and do it iteratively.

Let me give you another interesting example.

This is made by Mike Tyka from our group and he calls it "Animal Parade".

It reminds me a little of the work of William Kentridge. Make a sketch, rub it, make a sketch, rub it, and in this way make a movie.

In this case, what Mike is doing is varying y across the space of different animals in a network designed to recognize and distinguish different animals from each other.

And then you get weird Escher-like morphs from one animal to another.

Here he and Alex together tried to reduce y to only two-dimensional space, thereby creating a map from the space of everything perceived by this network.

Doing this kind of compositing or image generation over the surface and varying y over the surface creates a kind of map, a visual map of everything the network knows how to perceive.

All the animals are here. "armadillo" is right there.

Other types of networks can also do this.

This is a network designed to recognize faces and distinguish one face from another.

Here, I'm entering y for my own face parameter, "I".

And when this solves for x, it produces a pretty crazy, kind of cubist, surreal, psychedelic picture of me from multiple perspectives at once.

The reason it looks like multiple perspectives at once is that the network is designed to disambiguate whether a face is seen in one pose or another, or in one kind of lighting, or in another.

So if you don't use some sort of guiding imagery or guiding statistics when doing this kind of reconstruction, you get a kind of confusion of different points of view because they are ambiguous.

When Alex uses my face as a guide image during the optimization process to reconstruct my own face, the following happens.

So you know it's not perfect.

There is still a lot of work to be done on how to optimize that optimization process.

But I'm starting to get something like a more consistent face rendered using my own face as a guide.

You don't have to start with a blank canvas or white noise.

When solving for x, you can start with x. x itself is already another image.

That's this little demonstration.

This is a network designed to classify various objects of all kinds, such as man-made structures, animals, etc.

Here we start with just a picture of clouds. As we optimize, this network basically understands what we see in the clouds.

And the more time you spend looking at this, the more you see in the clouds.

You can also hallucinate this with facial networks and you get some pretty crazy stuff.

(Laughter) Or Mike has done some experiments where he's taken images of the cloud and hallucinating and zooming and hallucinating and hallucinating and zooming.

In this way, I think we can get a kind of fugue state of the network, or a kind of free association where the network is eating its own tail.

So every image is now the basis for "What do you think we'll see next?"

What do you think we'll see next? What do you think we'll see next? ”

I first showed this publicly to a group at a talk in Seattle called "Higher Education". This was shortly after marijuana was legalized.

(Laughter) So I'm just going to jump right in and say that this technology has no limits.

I gave a purely visual example because it's really fun to watch.

It's not a purely visual technology.

Our artist collaborator Ross Goodwin conducted an experiment where a camera took a picture and a computer in a backpack wrote a poem based on the content of the image using a neural network.

And that poetry neural network is trained on a large corpus of 20th century poetry.

And I think poetry is actually not bad.

(Laughter) Finally, I think Michelangelo was right. Perception and creativity are very closely related.

What we have just seen is a neural network fully trained to discriminate or recognize different things in the world, which we can run in reverse to generate.

One thing that suggests to me is that not only did Michelangelo actually see a stone block sculpture, but any creature, any being, an alien that could perform that kind of perceptive act could also be created, as it is the exact same machine used in both cases.

Also, I don't think perception or creativity is anything unique to humans.

Computer models are beginning to emerge that can do just this.

That should come as no surprise. The brain is doing calculations.

And finally, computing began as an exercise in designing intelligent machines.

This very much modeled the idea of ​​how machines could be made intelligent.

And we are finally starting to live up to some of the promises made by early pioneers like Turing, von Neumann, McCulloch and Pitts.

And I don't think computing is just about doing bills or playing candy crush or whatever.

From the beginning, we modeled them with the mind as our model.

And they give us the ability to understand and expand our minds more deeply.

thank you very much.

(applause)

So two weeks ago, I searched Twitter for the word "nationalist."

The results were very diverse, with expressions such as 'courageous racist', (laughter) 'white supremacist idiot', 'fascist sock puppet', (laughter) 'Orwellian, Hitlerian, terrifying'.

A second search for the word “globalist” yielded results like “socialist pitch,” “offensive corporate propaganda,” “elitist financial lords,” and “ruthless cosmopolitan rat.”

(Laughter) Even by social media standards, the language is cruel and disgusting.

But they reflect the intensity of one of the most fundamental questions of our time: nationalism or globalism, what is the best way forward.

This question affects everything we care about: our cultural identity, our prosperity, our political institutions, everything, the health of our planet, everything.

So on the one hand there is nationalism.

Collins defines it as "a devotion to one's own country" and "a doctrine that puts national interests ahead of international considerations."

For nationalists, our modern society is built on national foundations. So we share land, history, and culture, and we protect each other.

In a world of great chaos, they see nationalism as the only sensible way to maintain social stability.

But wary globalists warn that self-centered nationalism can easily turn ugly.

We have seen it in 20th century fascism. Bloody wars, millions of deaths, unfathomable destruction.

On the other hand, there is also globalism.

The Oxford Living Dictionary defines it as "the operation or planning of economic and foreign policy on a global scale".

For nationalists, globalism is rapidly dismantling what our ancestors took decades to build.

It's like spitting into the grave of our soldiers. It is eroding our national unity and opening the door to foreign aggression.

But globalists argue that stronger global governance is the only way to address major supranational issues such as nuclear proliferation, the global refugee crisis, climate change and terrorism, and even the impact of superhuman AI.

We are now at a crossroads and are forced to choose between nationalism and globalism.

Having lived on four continents, I have always been interested in this question.

But when I saw this happening it took it to a whole new level. It is the largest surge in nationalist votes in Western democracies since World War II.

Suddenly this is no longer a theory.

So these political movements have built their success on the idea that in the future I could be stripped of my French citizenship because I am North African, or I could be barred from returning to the United States because I am from a Muslim-majority country.

Living in a democracy, we live with the idea that the government will always protect us as long as we abide by the law.

With the rise of national populism, I have to live with the idea that even though I am the best citizen I can be, the government can hurt me for reasons beyond my control.

I am very uneasy.

But it forced me to rethink this question and try to think more deeply.

And the more I thought about it, the more I questioned that question.

Why do we have to choose between nationalism and globalism, between loving our country and caring for the world?

There is no reason for that.

We don't have to choose between family and country, region, religion and country.

We already have multiple identities and coexist well with them.

Why should we choose between the country and the world?

What if, instead of accepting this absurd choice, we took it upon ourselves to fight this dangerous, dualistic way of thinking?

So, I would like to ask the globalists in the audience what kind of image comes to mind when they hear the word "nationalist"?

something like this?

Believe me, I think that too.

But I would like you to remember that for most people nationalism is:

Or maybe something like that.

You know, that's what's in your mind when you happen to see an obscure Olympic sport on TV -- (laughter) wait -- and just seeing an obscure athlete wearing a national flag excites everyone.

Your heart rate goes up, your stress level rises, you stand in front of the TV, and you yell for that player to win.

That is nationalism.

People are happy to be together and happy to belong to a large national community.

Why is it wrong?

Globalists, you might think that nationalism is an old 19th century idea destined for extinction.

Unfortunately, facts are not on your side.

When the World Values ​​Survey asked more than 89,000 people in 60 countries how proud they were of their country, 88.5% said they were 'very proud' or 'very proud'.

Nationalism is not going away anytime soon.

Another study found this to be a powerful emotion and a strong predictor of personal well-being.

Strangely enough, your happiness correlates more with public satisfaction than with household income, job satisfaction, health satisfaction, or whatever else you expect.

So if nationalism makes people happy, why would anyone want to take it away from them?

Globalists, if you are like me, you may be obsessed with globalization for humanitarian reasons.

And you may take great pleasure in some of its achievements since 1945.

After all, major parts of the world were exceptionally peaceful. Extreme poverty rates around the world are trending downward. And especially in Asia, where more than 2 billion people are showing remarkable improvements in their living standards.

But research also shows that globalization has a darker side.

And, according to some studies, hundreds of millions of people in the Western middle class have been stranded by the roadside after stagnant income growth for more than 20, perhaps 30 years.

We cannot ignore this elephant in our room.

Rather, our collective energies will be better spent finding ways to fix this aspect of globalization than fighting the polarizing battle against nationalism.

Now, nationalists in the room, I have prepared some brusque non-binary material for you.

(Laughter) What do you think of when you say the word 'globalist'?

A mad 1% plutocracy?

(Laughter) Or maybe the cold, greedy Wall Street type?

Or maybe someone like me is from multiple origins and lives in a cosmopolitan metropolis.

Now, remember the World Values ​​Survey we talked about earlier?

It showed another interesting discovery. Seventy-one percent of the world's population agreed with the statement "I am a citizen of the world."

do you know what that means?

Most of us are proud of our country and the people of the world at the same time.

And even better.

Citizens of the world who participated in the survey demonstrate a higher level of national pride than those who rejected the label.

So being a globalist does not mean betraying the country.

It means you have enough social empathy and project some of it outside your borders.

Now, delving into my own nationalistic feelings, I find that one of my anxieties about the globalized world is national identity. How do we maintain what makes us special, what sets us apart, what unites us?

And when I started thinking about it, I realized something really strange. Many of the key elements of our national identity actually come from outside our borders.

For example, think about the letters we use every day.

I don't know if you've noticed, but the Latin alphabet that we use, the Latin alphabet, originated near the Nile River thousands of years ago.

It all started with a scribe capturing such a cow and turning it into an elegant hieroglyph.

The hieroglyph was transcribed into the letter Aleph by the Sinai Peninsula.

Aleph traveled with the Phoenicians and reached the European shores of Greece, where he became Alpha, the mother of the letter A.

Thus the Egyptian cow became our letter "A".

(Laughter.) And the same thing happened with the Egyptian house that became Bet, Beta, and B.

And the Egyptian fish that became Dulles, Delta, and D.

Our most basic texts are full of Egyptian cows, houses and fish.

(Laughter) There are many other examples.

Consider Britain and its monarchy.

Queen Elizabeth II?

German ancestry.

What is the motto of the royal coat of arms?

Written entirely in French, not a single word of English is included.

Take France for example, it's the iconic Eiffel Tower.

What is your inspiration?

United States -- I'm not talking about Las Vegas, I'm talking about 19th-century New York.

(Laughter) This was the tallest building in New York in the mid-19th century.

do you remember anything?

And you might think of China as a self-contained civilization guarded behind the Great Wall of China.

But think twice.

China's official ideology?

Marxist, made in Germany.

One of China's largest religions

Buddhism imported from India.

What is your favorite pastime in India?

cricket.

I love these words of Asiz Nandi. ``Cricket is an Indian game that was accidentally discovered by an Englishman.''

(Laughter.) These are good reminders that much of what we love about our national traditions actually came from the previous wave of globalization.

And beyond individual symbols, there are whole national traditions that could not exist without globalization.

And the example that comes to my mind is Italian cuisine, a national tradition that is loved all over the world.

My friends, if you have the chance to go to a super authentic Italian restaurant that serves only ancient Roman recipes, my advice is: don't go.

(Laughter) You will be very, very disappointed.

No spaghetti or pasta. It actually started in Sicily in the 8th century, when it was under Arabian rule.

No perfect espresso or creamy cappuccino. It came from Abyssinia via Yemen in the 17th century.

And, of course, there is no such thing as a perfect pizza napoletana. How would you make it without New World tomatoes?

No, instead, you'll probably be served a ton of porridge, some vegetables (mostly cabbage), some cheese, and perhaps, if you're lucky, an absolute delicacy at the time, umm, fattened dormouse cooked to perfection.

(Laughter.) Thankfully, it wasn't a strict tradition followed by fanatical watchdog groups.

No, it was an open process fed by explorers, traders, street vendors and innovative home cooks.

And in many ways, globalization is an opportunity for our national traditions to be questioned, regenerated and reinterpreted, to attract new converts and to remain vibrant and relevant for the long term.

So keep this in mind. Most of us nationalists in the world are globalists, and most globalists in the world are nationalists.

Much of what we love about our national traditions comes from outside our borders.

And the reason we go outside our borders is to discover the traditions of other countries.

So the real question should not be whether to choose between nationalism and globalism.

The real question is, how can we do both better?

This is a complex problem for a complex world that demands creative, non-binary solutions.

What are you waiting for?

thank you.

(applause)

The Chronicles of the ancient Egyptian king Thutmose III describe an amazing foreign bird that "giving birth every day." Zoroastrians viewed them as spirits whose cries spoke of the cosmic struggle between darkness and light.

The Romans brought them into military campaigns to predict success in future battles.

And even today, the bird still occupies an important, if not honorable, place on our dinner plates.

Modern chickens are primarily descended from the Red Junglefowl and some from three other closely related species native to India and Southeast Asia.

The bamboo in this area bears a large amount of fruit only once every few decades.

The junglefowl's ability to lay eggs every day may have evolved to take advantage of these unusual delicacies, increasing populations when food was plentiful.

This was continuously available to humans, and the birds' weak flight abilities and limited space needs made capture and containment easy.

The earliest domesticated chickens, dating back at least 7,000 years, were bred not for food, but for what is considered less palatable today.

The aggressiveness of breeding males, armed with natural leg spurs, made cockfighting a popular pastime.

By the 2nd millennium BC, chickens had spread from the Indus Valley to China and the Middle East, occupying royal farms and being used in religious ceremonies.

But it was in Egypt that the next chapter in the history of this bird began.

When hens naturally warm their eggs, they stop laying new eggs and will "hold" 6 or more eggs for 21 days.

By the middle of the 1st millennium BC, the Egyptians had learned to artificially incubate chicken eggs by placing them in baskets over hot ashes.

This allowed the chickens to continue laying eggs every day, and what was once a royal feast or religious offering became a common diet.

Around the same time that the Egyptians were warming eggs, Phoenician traders introduced chickens to Europe, where they quickly became an important part of European livestock.

But for a long time, the poultry's respected status continued to exist in parallel with its culinary status.

The ancient Greeks used the fighting rooster as an inspirational example for their young soldiers.

The Romans used chickens as oracles.

And by the late 7th century, the rooster was considered a symbol of Christianity.

Over the next few centuries, chickens accompanied humans wherever they went, spreading around the world through trade, conquest, and colonization.

After the Opium Wars, Chinese breeds were brought to England and crossed with local chickens.

This gave rise to a phenomenon known as 'hen fever' or 'fancy', with farmers across Europe trying to breed new varieties with specific combinations of traits.

This trend caught the attention of Charles Darwin, who wondered if a similar selective breeding process was taking place in nature.

Darwin observed hundreds of chickens while completing his historic work introducing the theory of evolution.

But the chicken's greatest contribution to science was still ahead.

In the early 20th century, three British scientists conducted a large-scale breeding of chickens, based on Gregor Mendel's genetic inheritance studies.

With their high genetic diversity, many traits, and only seven months between generations, chickens were perfect subjects.

This research gave birth to the famous Punnett square, which is used to indicate the genotype resulting from breeding a particular combination.

Since then, numerous breeding efforts have allowed chickens to grow larger and more fleshy, allowing them to lay more eggs than ever before.

Meanwhile, chicken production has moved to an industrial, factory-like model, and birds have been raised in spaces with footprints as small as a sheet of paper.

In addition, although the shift to free-range chickens is progressing due to animal welfare and environmental concerns, most of the more than 22 billion chickens in the world are currently raised in factories.

From gladiators and gifts to the gods to traveling companions and objects of study, chickens have served a variety of roles over the centuries.

And while the chicken may not have pre-dated the proverbial egg, the chicken's fascinating history can tell us a lot about ourselves.

Once upon a time there was a star.

She was born, like everything else. It grew to about 30 times the mass of the Sun and lived a very long time.

People don't really know exactly how long.

Like everything in life, she met the end of her usual stardom when her heart, the core of her life, ran out of fuel.

But it didn't end there.

She transformed into a supernova, releasing an enormous amount of energy in the process, surpassing the rest of the galaxy, releasing as much energy in one second as the Sun does in 10 days.

And she has evolved into another role in our galaxy.

Supernova explosions are very extreme.

But those that emit gamma rays are even more extreme.

In the process of becoming a supernova, the star's interior collapses under its own weight and begins spinning faster and faster, like an ice skater bringing his arms closer to his body.

In doing so, it begins to rotate at a very high speed and the magnetic field increases strongly.

Matter around the star is dragged and some of the energy from its rotation is transferred to that matter, further increasing the magnetic field.

Thus, our star had additional energy over the rest of the galaxy in brightness and gamma-ray emission.

My star, the star of my story, became what is known as a magnetar.

For reference, the magnetar's magnetic field is 1,000 trillion times the Earth's magnetic field.

The most energetic event ever measured by astronomers is named a gamma-ray burst. This is because most of those phenomena are observed as bursts or explosions, most intensely measured as gamma-ray light.

Our star, like the magnetarized star in our story, is detected as a gamma-ray burst during the most energetic part of the explosion.

Gamma-ray bursts are the most powerful phenomenon ever measured by astronomers, but we can't see them with the naked eye.

We rely on other methods to study this gamma-ray light.

We cannot see it with our naked eyes.

We can only see a very small portion of the electromagnetic spectrum called visible light.

And beyond that, we rely on other methods.

But as astronomers, we study a broader spectrum of light and rely on other methods to do so.

It may look like this on your screen.

I see the plot.

That's the light curve.

This is a plot of light intensity over time.

This is the light curve of a gamma ray.

Sighted astronomers rely on this kind of plot to interpret how this light intensity changes over time.

The left side shows the light intensity without burst and the right side shows the light intensity with burst.

Earlier in my career, I could also see plots of this kind.

But then I lost my sight.

I lost my sight completely due to a long illness and with it the opportunity to see this plot and to do the physics.

It was a very powerful transition for me in many ways.

And professionally, we no longer have the means to do science.

I longed to access and probe this energetic light and to uncover the causes of astrophysics.

I wanted to experience the vast surprise, excitement and joy of discovering such a colossal celestial event.

I thought about it long and hard, and suddenly realized that the light curve was all a table of numbers converted into a visual plot.

So, together with our collaborators, we worked hard to convert numbers into sounds.

I have achieved access to the data and can now do the best astronomer level physics with sound.

And what people have been able to do for hundreds of years primarily visually, I now do with sound.

(Applause) Listen to this gamma ray burst you're seeing on television -- (continues applause) Thank you.

As you listen to this burst you see on your screen, you hear something beyond the obvious burst.

I will play Burst this time.

It's sound, not music.

(Digital Beep) This is scientific data converted to sound, mapped to pitch.

This process is called sonification.

So while listening to this, something else popped into my ears besides the obvious bursts.

Now I'm zooming in on the bassline when looking at the very strong low frequency region, the bassline.

We focused on resonances characteristic of charged gases such as the solar wind.

And I want you to hear what I heard.

It sounds like a sharp decrease in volume.

Since you are sighted, it shows you a red line that indicates how much light intensity is converted to sound.

(digital hum and whistling) (whistling) is a frog at home, never mind.

(laughter) (digital hum and whistling) I think you heard it, right?

So what we found is that the bursts persist long enough to support wave resonance. Wave resonance is caused by energy exchange between particles that may be volumetrically excited.

Remember when I said that matter around a star is being dragged?

It transmits power with a frequency and electric field distribution determined by its dimensions.

You may remember talking about supermassive stars that have become magnetars with very strong magnetic fields.

If this is the case, an outflow from exploding stars could be related to this gamma-ray burst.

what do you mean?

That star formation could be a very important part of a supernova explosion.

Hearing this gamma-ray burst led us to the idea that using sound as a supplemental visual display might also help sighted astronomers explore more information in the data.

At the same time, they also worked on analyzing measurements from other telescopes, and experiments demonstrated that using sound as a supplemental visual display enabled astronomers to find more information from this more accessible data set.

This ability to convert data into sound gives astronomy tremendous transformative power.

And the fact that highly visual areas could be improved to engage everyone interested in understanding what's in the heavens is uplifting.

When I lost my sight, I realized that I didn't have access to the same amount and quality of information as a sighted astronomer.

I regained my hopes of being a productive member of a field that I had been passionate about until I innovated with the sounding process.

However, information access is not the only area of ​​astronomy where it is important.

The situation is systemic and the scientific field has not caught up.

The body is mutable and anyone can develop a disability at any time.

For example, consider a scientist who has already reached the pinnacle of his career.

What if they have a disability?

Do they feel excommunicated as I do?

Access to information enables us to thrive.

It gives us an equal opportunity to play to our talents and choose what we want to do with our lives based on interests rather than potential barriers.

Giving people unlimited opportunities to succeed leads to personal fulfillment and a rich life.

And I think the use of sound in astronomy helps us achieve that and contribute to science.

Other countries have told me that the study of perceptual techniques to study astronomical data is not relevant to astronomy, as there are no blind astronomers in the field, but South Africa said it "wants people with disabilities to contribute to this field".

Currently, I work at the South African Observatory's Department of Development Astronomy.

So we are working on acoustical technology and analytical methods to influence students at the Athlon School for the Blind.

These students will study radio astronomy and sonification techniques to study astronomical phenomena such as the massive release of energy from the Sun known as coronal mass ejection.

What we learn from these students is that they have multiple disabilities and coping strategies. What we learn from these students has a direct impact on how we do things at the professional level.

I humbly call this evolution.

And this is happening right now.

I believe science is for everyone.

It belongs to the people and should be available to everyone. Because we are all nature explorers.

I believe that limiting the participation of people with disabilities in science cuts them off from history and society.

I dream of a level scientific playing field that encourages people to respect each other, exchange strategies and discover together.

I am convinced that there will be an explosion of knowledge, a huge explosion, if people with disabilities are allowed into the scientific field.

(digital beep) That's the Titanic Burst.

thank you.

thank you.

(applause)

A shabby man named Estragon sits near a tree at dusk, struggling to remove his boots.

Soon his friend Vladimir joins them, reminding his worried companions that they must wait here for a man named Godot.

Thus begins a vexing cycle in which the two argue about when Godot will come, why he is waiting, and whether he is in the right tree.

From here, Waiting for Godot becomes even stranger, but it is considered a play that changed the face of modern theater.

Written by Samuel Beckett between 1949 and 1955, it poses simple yet provocative questions about what the characters should do.

Estragon: Don't do anything. Safer.

Vladimir: Let's wait and see what he says.

Estragon: "Who?"

Vladimir: Godot.

Estragon: Good idea.

Such cryptic dialogue and circular reasoning are key features of theater of the absurd. Theater of the Absurd emerged after World War II and found artists struggling to find meaning in devastation.

Absurdists deconstructed plots, characters and words to question their meaning and shared their deep uncertainty on stage.

It may sound cruel, but the absurdity combines its sense of hopelessness with humor.

This is reflected in Beckett's unique approach to the genre of Waiting for Godot, which Beckett dubs "a tragedy in two acts."

Tragically, the characters are trapped in an existential conundrum. They wait in vain for some unknown person who gives them a sense of purpose, but their only sense of purpose comes from the act of waiting. While waiting, they become bored, express religious fears, and contemplate suicide.

Comically, however, there is a serrated humor to their predicament, which is reflected in their language and actions.

Their exchanges are full of bizarre wordplay, repetition, and duality, as well as physical clowning, singing and dancing, and frantic hat swaps.

It is often unclear whether the audience should laugh or cry, or whether Beckett saw any difference between the two.

Born in Dublin, Beckett studied English, French and Italian before moving to Paris, where he spent most of his life writing plays, poetry and prose.

While Beckett has loved language throughout his life, he also created spaces of silence by incorporating moments of gaps, pauses and emptiness into his work.

This was a key feature of his trademark uneven tempo and black humor, which became popular throughout Absurd Theater.

He also cultivated a mystical personality, rejecting any speculation, affirmation or denial of the meaning of his work.

This kept viewers guessing and added to his fascination with his surreal world and enigmatic characters.

The lack of a clear meaning leaves Godot endlessly open to interpretation.

Critics have proposed a myriad of interpretations of the play, resulting in cycles of ambiguity and speculation that mirror the plot of the drama itself.

The work has been read as an allegory of the Cold War, the French Resistance and the British colonization of Ireland.

The power relationship between the two main characters also caused heated debate.

They have been read as apocalypse survivors, an old married couple, two helpless friends, and even Freudian personifications of the ego and the id.

Famously, Beckett said the only thing he could be sure of was that Vladimir and Estragon were "wearing bowler hats."

Like critical speculations and insane plots, their words often go in circles, losing their train of thought and picking up where they left off, like quarrels and jokes between two people. Vladimir: We might start all over again Estragon: It would be easy Vladimir: The hard part is the start Estragon: You can start with anything Vladimir: Yes, but you have to decide.

Beckett is a reminder that, much like our everyday lives, the world on stage doesn't always make sense.

You can explore both reality and fantasy, familiar and strange.

An orderly narrative is still captivating, but the best theater makes us think and wait.

I could never have imagined that a 19-year-old suicide bomber could actually teach me a valuable lesson.

But he did.

He taught me never to guess about people I don't know.

One Thursday morning in July 2005, the bomber and I unknowingly entered the same vehicle at the same time, apparently standing several feet apart.

i didn't see him

I didn't actually meet anyone.

I know no one should be watching on Tube, but he must have seen me.

He probably looked at us all as he held his hand over the detonator switch.

I often wonder, "What was he thinking?"

Especially in the final seconds.

I know it wasn't personal.

He never meant to kill or hurt me, Gil Hicks.

I mean, he didn't know me.

no.

Instead, he put an unfair and undesirable label on me.

They have become enemies.

To him, I was not 'us', but 'others' and 'them'.

By labeling us “enemies,” he was able to dehumanize us.

Thanks to that he was able to press the button.

And he was not selective.

Twenty-six precious lives were lost in my carriage alone, and I was almost one of them.

As we took a breath, we plunged into a vast darkness that was almost visible. I imagine what it would be like to walk in tar.

We didn't know we were enemies.

We were just a bunch of commuters following subway etiquette a few minutes ago. That means no direct eye contact, no conversation, and no conversation at all.

But as the darkness cleared, we were reaching out.

we were helping each other.

We called out names like roll call and waited for an answer.

"I'm Gil. I'm here.

i'm alive.

OK。"

"I'm Gil.

here.

alive.

OK。"

I didn't know Allison.

But I heard her check in every few minutes.

I didn't know Richard.

But it was important to me that he survived.

All I shared with them was my name.

They didn't know I was the head of the Design Council.

And here is my beloved briefcase. It was also rescued that morning.

They didn't know that I published architecture and design magazines, that I was a Fellow of the Royal Society of Arts, that I wore black (which I still do), that I smoked cigarillos.

I don't smoke cigarillos anymore.

I was drinking gin and watching TED talks, but I never dreamed that one day I would be able to stand and speak while balancing on my prosthetic leg.

I was a young Australian woman doing extraordinary things in London.

And I wasn't ready for it all to end.

I was so determined to survive that I used a scarf to tie a tourniquet around the top of my foot to block everything, shut everything out, focus, listen to myself, and let my instincts guide me.

I lowered my breathing rate.

I made my thighs taller.

I fought the urge to sit up and close my eyes.

I spent almost an hour pondering my life up to this point.

Maybe I should have done more.

Perhaps I could have lived longer and seen more.

Maybe I should have started running, dancing, or doing yoga.

But my priority and focus has always been work.

I lived to work

Who I was on my business card mattered to me.

But inside the tunnel it didn't matter.

When I felt the first touch from one of my rescuers, I couldn't speak, not even a small word like "gil".

I surrendered my body to them.

I did all I could, and now I'm in their hands.

When I first saw the ID tag I was given when I was admitted to the hospital, I understood who and what a human being is.

And there was written "1 unknown presumed female".

1 unknown presumed female.

These four words were a gift from me.

They made it very clear to me that my life was saved because I was human.

Differences of any kind made no difference that rescue workers had prepared extraordinary lengths to save my life, to save as many unknowns as possible, and to risk their own lives.

It didn't matter to them whether I was rich or poor, the color of my skin, male or female, sexual orientation, who I voted for, educated or not, religious or not.

Nothing mattered except that I was a precious human life.

I see myself as a living fact.

I am proof that unconditional love and respect can not only save a person, but can change lives.

This is a great image that one of my rescuers, Andy, and I took last year.

Ten years after that event, we are here arm in arm.

My hand was held tight throughout the confusion.

He gently stroked my face.

what did i feel

I felt loved.

It was love that protected me from hatred and desire for retaliation, and gave me the courage to say, "This is the end for me."

I was loved

I know what we can do, and I believe that the potential for far-reaching positive change is absolutely enormous.

I know how great humans are.

This leaves me with some big questions to ponder and some questions for all of us to consider. Isn't what unites us much more than what divides us?

Is tragedy and disaster necessary for us to feel deeply connected as a species and as human beings?

And when will we embrace the wisdom of the times to move beyond mere tolerance to accepting all those who are just labels until we know them?

thank you.

(applause)

Ichthyology, the study of fish.

It looks like a big, boring word, but it's actually very exciting. Because ichthyology is the only "science" that includes "YOLO".

(Laughter) Okay, cool kids in the room, as you probably already know, YOLO stands for "you only live once." You only have one life, and I'm going to spend it doing what I've always dreamed of: seeing the hidden wonders of the world and discovering new species.

And that's what I should do.

Well, in recent years I have focused more on caves for discovering new species.

And it turns out that there are many new species of cave fish there.

You should know where to look and maybe a little skinny.

(Laughter) Well, cave fish can teach us a lot about biology and geology.

They tell me how being trapped in these tiny holes changed and shifted the land around them. It also tells us about the evolution of vision due to being blind.

Well, fish eyes are essentially the same as our eyes.

All vertebrates do so, and as fish species begin to adapt to this dark and cold cave environment, they lose their eyes and vision over generations until they end up looking like eyeless cave fish like this one.

Now each species of cave fish has evolved slightly differently, each with its own unique geological and biological story to tell us. That's why I get so excited when I discover a new species.

So this is a new species from southern Indiana that we have described.

We named it Amblyopsis hoosieri, or Hoosier cave fish.

(Laughter) Its closest relative is the cave fish in Kentucky's Mammoth Cave System.

And they begin to diverge when the Ohio River divides them millions of years ago.

And in the meantime, they've developed subtle differences in the genetic makeup behind their blindness.

There is a gene called rhodopsin that is very important for vision.

We have it, and these species have it too, except that one species has lost all function of that gene and the other has kept it.

This sets up this beautiful natural experiment that allows us to examine the genes behind our vision, and the very roots of how we look.

But the genes of these cave fish can also tell us about the deep geological age. Probably similar to the genes of this species living here.

This is a new species we have described from Madagascar and named Typhleotris mararybe.

It means "great sickness" in Malagasy, and refers to how sick people were while trying to collect this species.

Now, believe it or not, swimming around sinkholes full of dead things and caves full of bat droppings isn't the wisest thing to do in life, but YOLO.

(Laughter) Well, I love this species, even though they tried to kill us. That's because it has the closest relatives of this species, which lives in Madagascar, and cave fish in Australia, 6,000 kilometers away.

Now, since a 3-inch-long freshwater cave fish cannot swim across the Indian Ocean, a comparison of the DNA of these species reveals that they have been separated for more than 100 million years, the last time the southern continents came together.

In fact, these seeds did not move at all.

It was the continent that moved them.

And they give us, through DNA, a precise model and scale of how to identify the dates and times of these ancient geological events.

Now, this species here is so new that we're not even allowed to say its name yet, but we can say that it's a new species from Mexico and is probably already extinct.

It probably went extinct because the only known cave system from which it originated was destroyed when a dam was built nearby.

Unfortunately for cave fish, their groundwater habitat is also our primary source of drinking water.

Now, in fact, the closest relatives of this species are still unknown.

There doesn't seem to be anything else in Mexico, so maybe it's something in Cuba, Florida, or India.

But whatever it is, it may tell us something new about Caribbean geology, or biology regarding how to better diagnose certain types of blindness.

However, we hope that this species will also be discovered before it goes extinct.

And I will spend my one and only life as an ichthyologist trying to discover and save this humble little blind cave fish that can tell us a lot about the geology of our planet and the biology of our perception.

thank you.

(applause)

Hi. My name is Aparna.

I'm a shopaholic -- (Laughter) and obsessed with online returns.

(Laughter) Well, at least I did.

At one point, two or three pieces of clothing were being delivered every other day.

I didn't know what I really wanted, so I purposely bought the same item in different sizes and colors.

So I over-ordered, tried on and sent back the ones that didn't fit.

One time, my daughter was watching me return some packages and she said, "Mom, there seems to be a problem."

(Laughter) I didn't think so.

That means free shipping and free returns, right?

(Laughter) I didn't give it much thought until I heard a shocking statistic at work.

As you know, I'm a Global Solutions Director for a leading retailer, and I was in a meeting with one of our biggest customers to discuss how we could streamline costs.

One of their biggest concerns was managing returns.

In the last holiday season alone, 7.5 million items of clothing were returned.

I couldn't help but think about it.

What happens to these returned clothes?

So I went home and checked it out.

And I learned that £4 billion of returned clothing goes to landfills each year.

It's like every US resident hung out a load of laundry last night and decided to throw it in the trash today.

surprised.

I'm thinking, "Above all, I should be able to help prevent this."

(Laughter) My job is to find solutions to these logistical problems, not to create them.

So this issue has become very personal to me.

I said, "Did you know? This has to be resolved."

You can do that by using some of the existing systems that are already in place.

And I started to wonder, "How did I get here?"

So, just six years ago, a study was published showing that customers spend more when they offer free online returns.

We are increasingly seeing companies offering free online returns to increase sales and provide a better experience.

We didn't know that this would lead to more items being returned.

In the US, companies lost $351 billion in revenue in 2017 alone.

Retailers are scrambling to recoup their losses.

They try to resell the returned items online or sell them to discount partners or liquidators.

Essentially, if a company can't find a place to put this item quickly and economically, that place becomes garbage.

Suddenly I felt very guilty for being a shopper and someone contributing to this.

Who would have thought that my innocent shopping behavior would harm not only me but our planet as well.

And I kept thinking, wondering what to do. Why would you have to return an item to a retailer in the first place?

What if there was another way to win everyone?

What if a person is about to return something, and the item may not reach the retailer, but the next shopper who wants it?

What if, instead of returning it, you could do what I call a "green turn"?

Consumers can use the app to take pictures of products and check their condition when returning them.

An artificial intelligence system can sort these clothes by condition (new or slightly used) and then send them to the right person.

Like-new garments are automatically passed on to the next buyer, while slightly used garments are discounted and may be offered online again.

Retailers can determine business rules for how many times a particular product can be resold.

All a consumer needs to do is grab a mobile code, take it to their nearest shipping location, pack it up, and ship it out to the next buyer instead of the landfill.

Now you might ask, "Do people really go through such difficulties?"

I think they would if they had incentives like loyalty points or cash back.

Let's call it "green cash".

There will be entirely new opportunities to monetize this new customer base looking to purchase these returns.

This system will turn fun things like shopping into spiritual experiences that save the planet.

(Applause.) This is doable, and it would probably take six months to incorporate some existing systems and run a pilot.

Even before these logistics systems are in place, we shoppers can act now if every adult in the United States makes a few small changes to our shopping behavior.

Take some time to research and think -- do you really need this item?

No: Do ​​you really want this item? -- BEFORE YOU BUY.

And if all of us American adults returned five fewer items this year, 240 million pounds of clothing would not end up in landfills.

6% reduction, that's right.

This environmental problem we have caused is not thousands of years away. It's happening today and must stop now to prevent the expansion of landfills around the world.

I want to leave my daughter and her daughter's daughter a better and cleaner place than the one I found, so not only have I stopped over-ordering, but I'm also recycling in faith.

You can do it too. It's not difficult.

Before you fill your shopping carts and dumpsters with unwanted items, stop next time you shop online and think again about what we all really want: a beautiful planet to call home.

thank you.

(applause)

So, imagine for a moment that you are a soldier in the middle of a battle.

Perhaps you are a Roman infantryman or a medieval archer or even a Zulu warrior.

There are things that remain the same regardless of time or place.

Adrenaline rises, and your actions stem from these deeply ingrained reflexes, reflexes rooted in the desire to protect yourself and your allies and defeat your enemies.

So now I want you to imagine playing an entirely different role: that of a scout.

A Scout's job is not to attack or defend.

A Scout's job is to understand.

Recon goes out and maps the terrain and identifies potential obstacles.

And scouts might want to know, for example, that there is a bridge in a convenient location to cross the river.

But above all, Scouts want to know as accurately as possible what's actually out there.

And in a real army, both soldiers and scouts are essential.

But we can also think of each of these roles as a way of thinking, a metaphor for how we all process information and ideas in our daily lives.

My point today is that good judgment, accurate predictions, and good decisions depend largely on the way you think.

To illustrate how these ideas work in practice, we return to 19th-century France, where this seemingly harmless piece of paper sparked one of the greatest political scandals of all time.

It was discovered in 1894 by an officer of the French General Staff.

It had been torn up in a wastepaper basket, but when it was put back together, it turned out that someone in our ranks had sold military secrets to Germany.

So they launched a massive investigation, but their suspicions soon turned to this man, Alfred Dreyfus.

He had a great career, no previous history of cheating, and had no motives as far as they could tell.

However, Dreyfus was the only Jewish officer of that rank in the army, and unfortunately the French army at the time was highly anti-Semitic.

They compared Dreyfus's handwriting with that of the note and concluded that they were a match. Even if outside professional handwriting experts aren't very confident about the similarity, don't worry about it.

They searched Dreyfus' apartment for signs of espionage.

They looked through his files, but found nothing.

This further convinced them that Dreyfus was not only guilty, but despicable. Because apparently he hid all the evidence before they managed to get to it.

They then went through his personal history for incriminating details.

When they spoke to his teachers, they found that he had studied foreign languages ​​at school, which clearly indicated a desire to collude with foreign governments in the future.

Your teacher also said that Dreyfus is known for having a good memory, which is highly questionable, isn't it?

Because a spy has to remember a lot of things.

The case was then brought to trial, and Dreyfus was found guilty.

Afterwards, they took him out into this public square and ceremoniously tore the insignia from his uniform and broke his sword in two.

This was called the Dreyfus degradation.

And they sentenced him to life imprisonment on this barren rock off the coast of South America, just named "Devil's Island."

So he went there, where he spent his days alone, continuing to write letters to the French government begging him to reopen the case in order to prove his innocence.

But France, for the most part, thought the problem was settled.

One of the things that is so interesting to me about the Dreyfus case is this question of why the cops were so convinced that Dreyfus was guilty.

I mean, you might even think that they were framed for him, that they were putting him down on purpose.

But historians don't think it happened.

As far as we know, the officers genuinely believed the case against Dreyfus was strong.

Here you will wonder. What does it mean for the human mind that we can find such scanty evidence to be convincing enough to convict a person?

Well, this is an example of what scientists call "motivated reasoning."

It is this phenomenon where our unconscious motives, desires and fears shape the way we interpret information.

Some information and some ideas feel like we're on our side.

We want them to win. we want to protect them.

And other information and ideas are enemies and want to shoot them down.

This is why I call motivated reasoning "soldier thinking."

Most of you probably haven't persecuted a French Jewish officer for high treason, but if you've been watching sports or politics, you may have noticed, for example, that when a referee decides your team has committed a foul, you're more motivated to find out why the referee is wrong.

But if he decides that the opposing team has committed a foul, that's great.

that's a good decision. Don't look too closely.

Or maybe you've read articles or studies that explore controversial policies such as the death penalty.

And, as researchers have demonstrated, if you support the death penalty and studies show it doesn't work, there's a strong incentive to find all the reasons why the study was poorly designed.

But if the death penalty is shown to work, it would be good research.

And vice versa. The same is true if you do not support the death penalty.

Our decisions are strongly influenced, subconsciously, by which side we want to win.

And this is everywhere.

This shapes our health, our relationships, how we decide how to vote, how we think about fairness or ethics.

To me, the scariest thing about motivated reasoning and soldier thinking is how unconscious it is.

Even if we think we are objective and impartial, we can end up ruining the lives of innocent people.

But luckily for Dreyfus, his story isn't over yet.

Colonel Piccard.

He, too, was a high-ranking officer in the French army and, like many, thought Dreyfus was guilty.

Also, like most people in the military, he was at least casually anti-Semitic.

But at some point, Piccard began to wonder, "What if we're all wrong about Dreyfus?"

What happened was that he found evidence that spying for Germany continued after Dreyfus was imprisoned.

They also found that the handwriting of another officer in the army matched the notes perfectly, much closer than Dreyfus's.

So he reported these findings to his superiors, but unfortunately they either didn't care or came up with elaborate theories to explain his findings. "Well, all you really showed was that there was Piccard, another spy who learned how to imitate Dreyfus's handwriting, and he picked up the spy's torch after Dreyfus left.

But Dreyfus is still guilty. ”

In the end, Piccard succeeded in winning Dreyfus' acquittal.

But it took ten years, during which he himself was imprisoned for treason.

Many people feel that Piccard cannot be the hero of this story because he is anti-Semitic and that is bad, and I agree with that.

But personally, for me, the fact that Piccard was an anti-Semite actually makes his actions more admirable. For though he had the same prejudices and the same reasons for prejudices as his fellow officers, his motivation to find out the truth and stand by it prevailed over them all.

So for me the picard is a symbol of what I call the "Scout mentality".

It's not about one idea winning and another losing, but a willingness to look as honestly and accurately as possible at what's really there, even if it's not beautiful, convenient, or comfortable.

This idea is something I am personally passionate about.

And I have spent the last few years investigating and trying to understand the causes of Scout thinking.

Why are some people able, at least sometimes, to overcome their own prejudices and prejudices and motives and try to look at the facts and evidence as objectively as possible?

And the answer is an emotional one.

So, just as the soldier's mindset is rooted in feelings such as defensiveness and tribalism, so is the scout's mindset.

It's just rooted in different emotions.

Scouts, for example, are curious.

They are more likely to say that they feel a sense of joy when learning new information or that they are itching to solve a puzzle.

They feel more intrigued when they encounter something that goes against their expectations.

Scouts also have different values.

They are more likely to say they think testing their beliefs is a virtue, and less likely to say that those who change their minds look weak.

And above all, because Scouts are down to earth, their self-esteem as a person has nothing to do with being right or wrong about a particular subject.

That's why they can believe the death penalty works.

If research shows otherwise, they can say, "Hmm, apparently I'm wrong. It doesn't mean I'm bad or stupid."

This set of features, which researchers have discovered, and which I have discovered anecdotally, predicts correct decisions.

And the important thing I want to tell you about these traits is that they aren't primarily about how smart or knowledgeable you are.

In fact, they don't correlate well with IQ.

They are a matter of how you feel.

There is a quote by Saint-Exupéry that I always remember.

He is the author of "The Little Prince".

He said, "If you want to build a ship, don't gather your men to gather wood, give orders, and distribute the work.

Instead, tell me about your longing for the vast and endless ocean. ”

In other words, if we really want to improve our judgment as individuals and as a society, I argue that what we need most is not more instruction in logic and rhetoric, probability and economics, even if they are very valuable.

But what is most needed to successfully apply these principles is the Scout mindset.

We have to change the way we feel.

We need to learn how to be proud instead of ashamed when we realize we may have been wrong about something.

We need to learn how to be intrigued rather than defensive when confronted with information that contradicts our beliefs.

So the question I'd like to leave you with is, "What do you crave most?"

Want to defend your beliefs?

Or do you want to see the world as vividly as possible?

thank you.

(applause)

Free America took a listen-and-learn tour.

We visited not only prosecutors, but members of Congress, and inmates from state and local prisons.

We went to the immigration center.

We met many people.

And we have seen salvation and change in prisons, detention centers and immigration camps, giving hope to those who want to build a better life after serving time.

Imagine if we also considered the front end of this prison pipeline.

What if we intervene with rehabilitation as a core value, love and compassion as core values?

We will have a safer, healthier, and better society to raise our children.

I would like to introduce James Cavitt.

James has served 12 years in San Quentin State Penitentiary and will be released in 18 months.

Now James, like you and me, is more than the worst he's done.

He is a father, husband, son and poet.

he committed a crime He works hard to pay off his debts and acquire the skills to return to a productive life when he becomes a civilian again.

James, like millions of people in prison, is an example of what happens when you believe that your failures don't define you, that we all deserve salvation, and that by helping those affected by mass incarceration, we can all recover together.

I would like to introduce James now. He will verbally share his journey of salvation.

James Cavitt: Thank you, John.

Welcome to TED, San Quentin.

Talent abounds beyond the prison walls.

Future software engineer, entrepreneur, craftsman, musician, artist.

This piece is inspired by all the hard work men and women do inside to build a better life and future for themselves after being incarcerated.

The title of this work is "Where I Live".

I live in a world where most people are too scared to go.

Surrounded by high concrete walls and rebar, razor needles cut hopes for a brighter tomorrow.

I live in a world that kills people who kill people to teach them that killing people is bad.

Imagine.

Even better, imagine a world where the healed help the wounded heal and become stronger.

Perhaps, at that time, we may all be singing "Song of Redemption" together.

The world I live in is called "hell on earth" by those who are trapped.

However, I was keenly aware that prisons are truly self-made.

Despite the harshness of my reality, I can see that there are bright spots.

I knew it was only a matter of time before freedom would come.

So I treated the first step as if it were the last step and realized that you don't have to be free to experience freedom.

And just because it's free doesn't mean it's free.

Many of us have been fighting our own inner demons for years.

We walk around with smiles on our faces, but in our hearts we really are screaming “Freedom!”

Don't you understand?

We are all in prison. We are just in different places.

For me, I chose to break free from the prison I made.

Forgiveness is the key.

Action is my witness.

If you want freedom, you have to think differently.

Because you are free...

it's not the place.

It's a setting of the heart.

thank you.

(Applause) (Piano) John Legend: Old pirates, yes they rob me.

sold me to a merchant ship.

Minutes after they took me out of the bottomless pit.

My hand has been strengthened by the hand of the Almighty.

We will move forward triumphantly in this generation.

Will you help me sing the song of freedom?

'Cause all I ever had was a song of salvation.

song of redemption.

Free yourself from mental slavery.

Only we ourselves can free our minds.

Don't be afraid of nuclear power, you can't stop time.

How long will they kill our prophet while we stand aside and watch?

Some say it's only part and we have to finish the book.

Will you help me sing the song of freedom?

'Cause all I ever had was a song of salvation.

song of redemption.

(Piano) Free yourself from mental slavery.

Only we ourselves can free our minds.

Don't be afraid of nuclear power, you can't stop time.

How long will they kill our prophet while we stand aside and watch?

Some say it's only part and we have to finish the book.

Will you help me sing the song of freedom?

'Cause all I ever had was a song of salvation.

song of redemption.

These songs of freedom.

'Cause all I ever had was a song of salvation.

song of redemption.

song of redemption.

(Piano) (Applause) Thank you.

thank you.

(applause)

I once had a recurring dream in which I walked into a room full of people, but I tried not to make eye contact with anyone.

Until someone noticed me and panicked.

Then he walked up to me and said, "Hello, my name is someone.

so what's your name ”

And I just keep silent and can't answer anything.

After an awkward silence, he said: "Forgot your name?"

And I'm still quiet

And then, slowly, everyone else in the room started turning to me and almost in unison asked (voice over, several voices), "Did you forget your name?"

As the chant gets louder, I want to respond to it, but I can't.

I'm a visual artist.

Some of my works are humorous, and some are a little funny but sad.

And one of the things I really enjoy doing is creating little animations that can be narrated for all kinds of characters.

I have become a bear.

(Video) Bear (voiced by Safwat Saleem): Hello.

(laughter) Safwat Saleem: I was a whale.

(Video) Whale (SS Voice): Hello.

(laughter) SS: I've been doing greeting cards.

(Video) Greeting Card (SS Voice): Hello.

(laughs) SS: And my personal favorite is Frankenstein's Monster.

(Video) Frankenstein's Monster (SS voice): (groans) (laughter) SS: I had to moan quite a bit over that.

A few years ago I made this educational video about the history of video games.

So I ended up voicing Space Invaders.

(Video) Space Invaders (SS Voice): Hello.

SS: A dream come true, really (laughs) And when the video was posted online, I was sitting at my computer, hitting 'refresh', and seeing the reaction, I was so excited.

Contains the first comment.

(Video) Comments: Great job.

SS: Yes!

I hit "update".

(Video) Comments: Great video. looking forward for next time.

SS: This is just the first part of a two-part video.

I was planning on working on the second one.

I hit "update".

(Video) Comment: Where's Part 2? Where? I need it now!: P (laughter) SS: People other than my mother said good things about me on the internet.

It felt like we had finally arrived.

I hit "update".

(Video) Comments: His voice is annoying. No offense.

SS: Okay, no offense. Please refresh.

(Video) Comments: Can you remake this without the peanut butter in your mouth?

SS: Ok, at least the feedback is somewhat constructive. Press "Update".

(Video) Comments: Never use this narrator again. I can hardly understand him.

SS: Please refresh.

(Video) Comments: Couldn't follow due to Indian accent.

SS: OK, OK, OK, there are two.

First, I have a Pakistani accent, not an Indian one, okay?

And second, I clearly have a Pakistani accent.

(Laughs) But I kept getting comments like that, so I thought I'd just ignore them and move on to the second half of the video.

I recorded audio, but every time I sat down to edit it, I couldn't edit it.

Each time it takes me back to my childhood. It was much more difficult to speak then.

I have been stuttering for as long as I can remember.

I was the kid in class who never raised his hand when he had a question or when he knew the answer.

Every time the phone rang, I ran to the bathroom to avoid having to answer.

If it were me, my parents would say I'm missing.

I spent a lot of time on the toilet.

And I hated introducing myself, especially in groups.

I always stumbled on my name and always had someone say, "Did you forget your name?"

Then everyone laughs.

That joke never got old.

(Laughter) When I was a kid, I felt that if I talked about it, it would show that something was wrong with me, that something was wrong with me.

So I mostly kept quiet.

And finally being able to use my voice at work was a big step for me.

Each time I record an audio, I feel each sentence over and over again, then go back and pick the one I think is the worst.

(Narration) SS: Audio editing is like Photoshop for voices.

You can slow it down, speed it up, deepen it, add echoes, and more.

If you stumble along the way, just go back and fix it.

It's magic.

SS: Using my highly edited voice in my work finally made it sound normal to me.

But after the video was commented on, it didn't feel normal anymore.

So I stopped using my voice at work.

Since then, I've thought a lot about what it means to be normal.

And I've come to understand that "normal" has a lot to do with expectations.

Let's take an example.

I came across this story about the ancient Greek writer Homer.

Now, Homer barely mentions color in his book.

And even if he does, he seems to misunderstand them quite a bit.

For example, the ocean can be wine red, people's faces can be green, and sheep can be purple.

But it's not just Homer.

If you look at all the ancient texts, from ancient Chinese, Icelandic, Greek, Indian, and even the original Hebrew Bible, color is barely mentioned.

And the most popular theory as to why this is the case is that a culture begins to perceive a color only after it has the ability to create it.

Basically, if you can make a color, you can see it for the first time.

Colors like red were very easy to make for many cultures. They started noticing the color quite early on.

However, colors like blue are much more difficult to make, and it wasn't until much later that many cultures began to learn how to make that color.

It wasn't until much later that they began to realize it.

So, until then, they just didn't have the ability to see color, even if it was around them.

It was invisible.

It wasn't part of their routine.

And that story helped put my own experience into context.

So when I first read the comments on the video my first reaction was to take the whole thing very personally.

But the people who commented didn't realize how self-conscious I was about my voice.

They mostly reacted to my accent and said it was not normal for the narrator to have an accent.

But what is normal in the first place?

We know that your writing will be more misspelled if the reviewer thinks you are black.

We know professors are less likely to help women and minority students.

And resumes with white-sounding names have been found to get more callbacks than those with black-sounding names.

why is that?

Because we expect normal things.

We believe that it is normal for black students to have misspellings.

We believe it is normal for women and underrepresented students to not succeed.

And we think it's normal for white employees to be better hires than black employees.

However, research has shown that this kind of discrimination is almost always just favoritism and stems from a desire to help those who can, rather than a desire to hurt those who can't.

And not getting involved with people starts at an early age.

Let's take an example.

A library that tracks characters in its children's book collection annually found that in 2014, only about 11 percent of books had characters in color.

And while half of America's children today are of minority backgrounds, the year before that number was about 8 percent.

half.

So there are two big problems here.

First, most of the stories children of color consume are about people who are not like them, even though they are taught that they can be and can be anything.

Second, the majority group does not realize how similar they are to the minority in our daily experiences, hopes, dreams, fears, and mutual love of hummus.

that's delicious!

(Laughter) Much like the ancient Greeks were blue, minorities are not part of what we consider normal. Because normal is simply a construction of what we've been exposed to and how visible it is around us.

And this is where things get a little more difficult.

I can accept the existing notion of what is normal. In other words, normal is good, and anything that falls outside the very narrow definition of normal is bad.

Or you can challenge existing notions of normality with your job, your voice, your accent, and being here on stage, even if you're fucking scared and want to go to the bathroom.

(laughter) (applause) (video) Sheep (SS voice): I'm slowly starting to use my voice again at work now.

And it feels good.

The next time dozens of people mutter like I have peanut butter in my mouth, it doesn't mean I won't break down.

(laughter) SS: It's about having a better understanding of what's at stake and how giving up is not an option.

The ancient Greeks didn't wake up one day to find the sky was blue.

It took centuries for humans to realize what they had long neglected.

Therefore, we must continually challenge our notion of normalcy. By doing so, society will finally be able to see the sky as it is.

(Video) Characters: Thank you. thank you. thank you. thank you. thank you.

Frankenstein's Monster: (grunts) (laughter) SS: Thank you.

(applause)

(bass guitar) (bass guitar and accordion) ♫ You're older than ever ♫ ♫ And now you're even older ♫ ♫ And now you're even older ♫ ♫ And now you're even older. ♫ ♫ You're older than you used to be ♫ ♫ And now you're even older ♫ ♫ And now you're even older. ♫ ♫ Time ♫ ♫ is marching ♫ ♫ And time ♫ ♫ is still marching. ♫ ♫ The day is almost over ♫ ♫ And now it's even faster ♫ ♫ And now it's even faster ♫ ♫ And now it's even faster. ♫ ♫ The day is almost over ♫ ♫ And it's even sooner now ♫ ♫ And it's even sooner now. ♫ ♫ You're older than ever ♫ ♫ And now you're even older ♫ ♫ And now you're even older ♫ ♫ And now you're even older. ♫ ♫ You're older than ever ♫ ♫ And now you're even older ♫ ♫ And now you're even older. ♫ Thank you.

Good morning everybody.

We think they might be giants.

(Applause.) I'm wearing Al Gore's in-ear monitors, which he wore on the Larry King show, and I'm hearing that transmission, not mine.

But I'm pretty sure that's it, so folks, let's move on to the PowerPoint presentation.

This is a brand new song.

In the spirit of TED, we bring you something that hasn't been released yet.

John, would you like to introduce that song?

This is a song about a creature called a hummingbird that mimics another creature.

It's a complete mess and can only be explained in a song.

Everyone cries to the fearful hypnotic flight of the moth bird bee ♫ ♫. ♫ ♫ Don't walk, don't roam ♫ ♫ 'Cause from the bees of moth birds ♫ ♫ 'Cause I have to roam. ♫ ♫ Catbird is a cat ♫ ♫ But he has worms in his veins. ♫ ♫ Manhaus lives within himself ♫ ♫ He has a thoughtful human brain. ♫ ♫ Neither are equal ♫ ♫ To the challenge of the weirdo, we ♫ ♫ call the moth bird the bee. ♫ ♫ Moths ♫ ♫ now defeat mice and humans. ♫ ♫ Your plans are ruined. ♫ ♫ I can't believe it ♫ ♫ Because the hummingbird moth ♫ ♫ thinks it's a bee that's behaving like a bird. ♫ ♫ A brand new package has arrived ♫ ♫ Electrical equipment ♫ ♫ Destination is the bottom of the ocean. ♫ ♫ Orange ♫ ♫ Nuclear Submarine ♫ ♫ Please send with a sticker that says STP. ♫ ♫ Windshield wiper washer fluid ♫ ♫ Spray in the air... ♫ ♫ Headlights under head lice ♫ ♫ Under hats everywhere. ♫ ♫ subatomic waves ♫ ♫ moths birds bees into underwater caves ♫ ♫ ♫ ♫ Well, moths defeat mice and humans. ♫ ♫ Your plans are ruined. ♫ ♫ I can't believe it ♫ ♫ Because it's a hummingbird moth. ♫ ♫ Is it us or is this messed up? In front of a moth bird bee swarm ♫ ♫, ♫ ♫ everyone is deformed. ♫ ♫ Protozoa, Snakes and Horses ♫ ♫ have joined forces with Moth Birds and Bees ♫ ♫. ♫ ♫ Catbug is a cat ♫ ♫ But he has bugs in his veins. ♫ ♫ Manhaus lives within himself ♫ ♫ He has a thoughtful human brain. ♫ ♫ Neither are equal ♫ ♫ To the challenge of the weirdo, we ♫ ♫ call the moth bird the bee. ♫ (Applause) Thank you very much.

thank you very much.

So, we have passed the 1,000th performance.

I think it's probably around 1,500.

It's hard to know.

I've only done two shows in 2007 so far, but the first show was actually the coldest performance I've ever had.

About a month ago it was 19 degrees in St. Louis, and I'm happy to report that this performance you're seeing today is the fastest performance we've ever done.

thank you.

Ladies and gentlemen, we are cultural test pilots.

How many minutes before the rock performance can I start?

The 8:30am performance doesn't tell all the facts.

I can say that the temperature of 19 degrees was wonderful.

have understood.

So while I don't know much about violinist history, I do know that violence is on the rise as we enter New Jersey.

The song is called "Asbury Park".

It's based on real experience.

♫ I was ♫ ♫ beaten ♫ ♫ kicked ♫ ♫ kicked in the head ♫ ♫ Behind the scenes at Stone. ♫ ♫ Stone pawn. ♫ ♫ Stone pony. ♫ ♫ I got kicked in the head ♫ ♫ Backstage at Stone Pony ♫ ♫ That's where I swore to a man ♫ ♫ I swore I wasn't the man who stole his beer. ♫ ♫ Kicked ♫ ♫ Kicked ♫ ♫ Kicked in the head ♫ ♫ Stone backstage. ♫ ♫ Stone pawn. ♫ ♫ Stone pony. ♫ ♫ I got kicked in the head ♫ ♫ Behind the scenes at Stone Pony ♫ ♫ That's where I swore to a man ♫ ♫ The man who stole the beer ♫ ♫ is a man who looks just like me. ♫ ♫ Not me! ♫ ♫ Not me! ♫ ♫ Not me! ♫ Thank you.

Marty Beller on drums over there.

(Applause) We want to put as many songs as possible in the short time we have here, so this is the song we play.

This song is called "Finger Chips".

♫ Everything is on fire ♫ ♫ Yes, everything is on fire ♫ ♫ Yes, everything is on fire. ♫ ♫ Fingertips ♫ ♫ Fingertips ♫ ♫ Fingertips ♫ ♫ I hear the wind blowing ♫ ♫ I hear the wind blowing ♫ ♫ ♫ ♫ Hello ♫ ♫ Hello ♫ ♫ I love you. ♫ ♫ Come on, everyone, come on. ♫ ♫ Come on guys now ♫ ♫ Come on guys now ♫ ♫ Who's standing at the window ♫ ♫ Standing at the window ♫ ♫ I found a new friend under my pillow Isn't there? ♫ ♫ Wasn't it you who punched me in the eye? ♫ ♫ Put some milk on it. ♫ ♫ Put some milk on it. ♫ ♫ Put some milk on it. ♫ ♫ Leave me alone, leave me alone. ♫ ♫ Who's knocking on the wall? ♫ ♫ Alone, alone. ♫ ♫ All by myself. ♫ ♫ What is that blue thing doing here? ♫ ♫ Something grabbed my hand ♫ ♫ I didn't know what grabbed my hand ♫ ♫ But that's when all my troubles started. ♫ ♫ I don't understand you ♫ ♫ I don't understand you ♫ ♫ I can't understand you ♫ ♫ I can't understand you ♫ ♫ I don't understand what you're saying ♫ ♫ I can't understand a single word ♫ ♫ I can't understand you ♫ ♫ I can't understand you No ♫ ♫ I don't understand ♫ ♫ I turn around ♫ ♫ See the sound ♫ ♫ Turn around and see what made the noise ♫ ♫ ♫ ♫ Mysterious whispers ♫ ♫ Mysterious whispers ♫ ♫ Mysterious whispers ♫ ♫ Mysterious whispers ♫ ♫ The day love came to play. ♫ ♫ I'm having a heart attack ♫ ♫ I'm having a heart attack ♫ ♫ I'm having a heart attack ♫ ♫ I'm... ♫ ♫ Fingertips ♫ ♫ Fingertips ♫ ♫ I walk down a dark hallway ♫ ♫ And I walk down a dark hallway ♫ Thank you -- Fingertips.

(Applause) ♫ We are getting calls from the dead. ♫ ♫ We are getting calls from the dead. ♫ ♫ We are getting calls from the dead. ♫ ♫ They are calling from beyond the grave. ♫ ♫ Beyond the grave. ♫ ♫ They have some questions ♫ ♫ And they want to share ♫ ♫ From under the cold cold ground. ♫ Solicit calls from deceased people as a special TED presentation.

We're taking calls live on stage at TED in Monterey.

I think someone called here.

Hello.

Live now.

Hello. who is there?

am i on air?

Hi.

You are in They Might Be Giants.

Eleanor Roosevelt.

Hi Eleanor, please...

I want to talk...

Turn off the radio, Eleanor.

I want to talk to Randy.

I have a question for Randy.

Do you have any questions?

I want to talk to the wonderful Randy.

Eleanor, do you have laminated badges?

I want a million dollars

Eleanor, excuse me, do you have laminated badges?

No, I don't have a badge.

Well, I'm going to drop that part of the show.

This is the song we like to think of as the future anthem of TED.

It's actually a nursery rhyme, but like many children's projects, it's really just a Trojan horse for adults.

This song is called "Alphabet".

of the nations! ”

♫ Algeria, Bulgaria, Cambodia, Dominica, ♫ ♫ Egypt, France, Gambia ♫ ♫ Hungary, Iran, Japan, Kazakhstan, ♫ ♫ Libya, Mongolia. ♫ ♫ Norway, Oman, Pakistan, ♫ ♫ Qatar, Russia, Suriname, ♫ ♫ Turkey, Uruguay, Vietnam, ♫ ♫ West Xylophone, Yemen, Zimbabwe. ♫ ♫ Algeria, Bulgaria, Cambodia, Dominica, ♫ ♫ Egypt, France, Gambia, ♫ ♫ Hungary, Iran, Japan, Kazakhstan, ♫ ♫ Libya, Mongolia. ♫ ♫ Norway, Oman, Pakistan, ♫ ♫ Qatar, Russia, Suriname, ♫ ♫ Turkey, Uruguay, Vietnam, ♫ ♫ West Xylophone, Yemen, Zimbabwe. ♫ ♫ Azerbaijan, Bolivia, Canada, ♫ ♫ Australia, Belgium, Chad, ♫ ♫ Afghanistan, Brunei, China, Denmark, ♫ ♫ Ecuador, Fiji, Guatemala, ♫ ♫ Algeria, Bulgaria, Cambodia, Dominica, ♫ ♫ Egypt, France, Gambia, ♫ ♫ Hungary, Iran, Japan, Kazakhstan, ♫ ♫ Libya and Mongolia. ♫ ♫ Norway, Oman, Pakistan, ♫ ♫ Qatar, Russia, Suriname, ♫ ♫ Turkey, Uruguay, Vietnam, ♫ ♫ West Xylophone, Yemen, Zimbabwe. ♫ Thank you very much.

It was a great audience at 8:30.

Have a great session.

Thank you everyone.

Imagine that you are part of a crew of astronauts traveling to Mars or some distant planet.

Travel time can take up to a year or more.

Space and resources on board are limited.

So you and your crew need to figure out how to produce food with minimal inputs.

What if you could carry just a few bags of seeds and grow a crop in a matter of hours?

And what if those crops produced even more seed, and just a few sacks of seed could feed the entire crew for the duration of the trip?

NASA scientists have actually figured out how to do this.

What they came up with was actually very interesting.

It involved microbes, which are single-celled organisms.

It also used hydrogen from water.

The type of microbes they used are called hydrogenotrophs, and with these hydrogenotrophs they can create a favorable carbon cycle that sustains life inside the spacecraft.

Astronauts exhale carbon dioxide, which is captured by microbes and transformed into nutritious, carbon-rich crops.

The astronauts would then eat the carbon-rich crops, exhale the carbon in the form of carbon dioxide, which the microbes would capture and produce nutritious crops, which the astronauts would exhale in the form of carbon dioxide.

Thus, a closed-loop carbon cycle is formed.

So why is this important?

We need carbon to survive as humans, and we get it from food.

On long space trips, carbon cannot be recovered en route, so we have to come up with ways to recycle carbon on board.

This is a smart solution, isn't it?

But the problem is that the research didn't really yield any results.

We haven't been to Mars yet. We haven't been to other planets yet.

And this actually happened in the 60's and 70's.

So my colleague Dr. John Reid and I were really interested in global carbon recycling.

We wanted to come up with technical solutions to combat climate change.

And we discovered this research by reading some papers published in the 60's, articles on this research from 1967 onwards.

And we thought it was a really good idea.

So we said that the Earth is actually like a spaceship.

Our space and resources are limited, and the planet needs to find ways to recycle carbon more effectively.

So we came up with the idea of ​​taking NASA-like ideas and applying them to the global carbon problem.

Could we grow these NASA-type microbes to make valuable products on Earth?

We started a company to make that happen.

And it was at that company that we discovered that these hydrotrophic organisms (which I would actually like to call nature's supercharged carbon recyclers) are a powerful class of microbes that has been largely ignored and understudied until now, and that they could make some really valuable products.

So we started growing these products and microorganisms in the lab.

I discovered that these microorganisms can be used to make essential amino acids from carbon dioxide.

In addition, we created a protein-rich diet that mimics the amino acid profile found in some animal proteins.

When I started cultivating more, I found out that I could make oil.

Petroleum is used in the manufacture of many products.

We created an oil that resembles citrus oil. It can be used as a flavoring and air freshener, but it can also be used as a biodegradable cleaner and jet fuel.

And made an oil similar to palm oil.

Palm oil is used in the manufacture of a wide range of consumer and industrial products.

We have started working with manufacturers to expand this technology and are now working with them to bring some of these products to market.

We believe that this kind of technology can certainly help us profitably recycle carbon dioxide into valuable products. Not only is this good for the planet, it's good for your business.

That's what we do today.

But tomorrow, this type of technology and the use of these types of microbes could help us achieve even greater things if we actually take it to the next level.

We believe that this kind of technology can actually help address the problems of agriculture and create a type of agriculture that is sustainable and can be scaled to meet future demands.

And why do we need sustainable agriculture?

In fact, the population is estimated to reach about 10 billion by 2050, and it is projected that food production will need to increase by 70%.

In addition, more resources and raw materials are needed to make consumer and industrial goods.

So how do you scale to meet that demand?

Modern agriculture cannot be sustainably scaled up to meet that demand.

There are several reasons.

One is that modern agriculture is one of the largest emitters of greenhouse gases.

In fact, they emit more greenhouse gases than cars, trucks, planes and trains combined.

Another reason is that modern agriculture simply occupies large tracts of land.

We have cleared 19.4 million square miles for crops and livestock.

what does it look like?

Well, it's about the size of South America and Africa combined.

Let's take a concrete example.

Between 2000 and 2012, a total of about the size of Ireland's virgin rainforest was cleared in Indonesia.

Think of all the species, diversity, removed in the process, be it plants, insects or animals.

Also the natural carbon sink was removed.

So let's make this a reality.

This clearing occurred primarily to make room for palm plantations.

As mentioned earlier, palm oil is used in the manufacture of many products.

In fact, it is estimated that over 50% of consumer products are manufactured using palm oil.

That includes ice cream, cookies, etc...

It also contains edible oil.

It also includes detergents, lotions and soaps.

You and I probably have many products made with palm oil in our kitchens and bathrooms.

So you and I are direct beneficiaries of deforested rainforests.

Modern agriculture has several problems and needs solutions to scale sustainably.

I believe microbes could be part of the answer. Specifically, these powerful carbon recyclers.

These powerful carbon recyclers, like plants, act as natural recyclers in the ecosystems in which they thrive.

And they thrive in exotic places on Earth, such as hydrothermal vents and hot springs.

Those ecosystems take carbon and recycle it into the nutrients they need.

And they are rich in nutrients such as oils, proteins, minerals and carbohydrates.

And indeed, microbes have already become an integral part of our daily lives.

If you're enjoying a glass of Pinot Noir on a Friday night after a long, hard work week, you're enjoying microbial products.

If you enjoy a beer from a local microbrewery, it's microbial.

Bread, cheese, yogurt.

These are all products of microorganisms.

But the beauty and power of these supercharged carbon recyclers lies in the fact that they can actually be produced in hours instead of months.

That means we can produce crops much faster than we can now.

Since it grows even in the dark, it can grow regardless of the season, geography, or place.

Can be propagated in containers that require minimal space.

And we can reach a kind of vertical farming.

Instead of traditional horizontal farming, which requires so much land, we can scale up vertically, resulting in much more production per square foot.

By adopting this kind of approach and using these carbon recyclers, we no longer need to cut down rainforests to make the food and goods we consume.

Because at scale, using soybeans, for example, you can actually produce 10,000 times more production per acre than if you planted soybeans on the same acreage for a year.

10,000 times in one year.

This is a new type of farming.

This means developing a system that can sustainably scale to meet the demand of 10 billion.

And what will be the product of this new type of agriculture?

Well, we already make protein meals, so you can imagine something similar to soybean meal, even cornmeal, wheat flour.

We already make oils, so imagine something similar to coconut oil, olive oil, soybean oil.

So this kind of crop can actually produce a wide variety of nutritious nutrients for us, such as pasta, bread, and cakes.

In addition, petroleum is used to make multiple other commodities, industrial and consumer products, so you can imagine using these types of crops to make detergents, soaps, lotions, and more.

Not only is there a lack of space, but if we continue with modern agriculture as we are now, we risk depriving our descendants of our beautiful planet.

But it doesn't have to be this way.

We can imagine a prosperous future.

Let us not only build systems that will not crash our spacecraft, Earth, but develop systems and ways of life that will benefit ourselves and the 10 billion lives on this planet by 2050.

thank you very much.

(applause)

Hi. My name is Marwa and I am an architect.

I was born and raised in Homs, a city in the Midwestern part of Syria, and have lived here all my life.

After six years of war, Homs is now a half-destroyed city.

My family and I were lucky. Our place is still there.

For two years, though, we were like prisoners at home.

Outside there were demonstrations, fighting, bombing, snipers.

My husband and I ran an architectural studio in the central square of the old town.

Like much of the Old Town itself, it has disappeared.

Another half of the city is now reduced to rubble.

Since the ceasefire at the end of 2015, much of Homs has been more or less quiet.

The economy has completely collapsed and people are still fighting.

Merchants who used to set up stalls in the old town markets now do business in huts on the streets.

Below our apartments are carpenters, confectioners, butchers, print shops, workshops, and more.

I started teaching part-time and opened a small bookstore with my multi-job husband.

Some people work all sorts of jobs to survive.

Of course, when I look at destroyed cities, I ask myself. What caused this senseless war?

Syria is largely a tolerant place, historically accustomed to diversity and open to a wide range of beliefs, origins, customs, goods and foods.

My country, a country where communities can coexist in harmony and discuss their differences, how did it degenerate into civil war, violence, forced migration and unprecedented sectarian hatred?

There were many reasons for the war, social, political and economic.

They all played their part.

But I believe there is one important reason that is overlooked and important to analyze. Because it really depends on whether we can prevent this from happening again.

The reason is architecture.

Architecture in my country has played a key role in creating, directing and amplifying conflicts between opposing powers, and perhaps this is true in other countries as well.

There is a definite correspondence between the architecture of a place and the character of the community that settles there.

Architecture plays a key role in whether communities fall apart or come together.

Syrian society has long coexisted with different traditions and backgrounds.

Syrians have experienced open trade and a thriving sustainable community.

They have enjoyed the true meaning of belonging to a place. And that was reflected in the architectural environment, in the mosques and churches built back to back, in the interwoven souks and public spaces, in proportions and sizes based on the principles of humanity and harmony.

This mixed architecture can still be read on the ruins.

Syria's old Islamic cities are built on a multilayered past, embracing it and embracing its spirit.

So did the community.

People lived and worked together in places that gave them a sense of belonging and made them feel at home.

They shared a remarkably unified existence.

Over the past century, however, this delicate balance of these places has been eroded. First, by colonial-era city planners, the French worked hard to transform what was thought to be a non-modern Syrian city.

They blew up the streets of the city and relocated monuments.

They called them improvements, and they were the beginning of a long, slow unraveling.

The traditional urbanism and architecture of our cities ensured identity and belonging not by separation but by intertwining.

But over time, the old became worthless and the new coveted.

The harmony between the built and social environment has been trampled by modern elements such as brutal and unfinished concrete blocks, neglect, aesthetic devastation and divisive urbanism that compartmentalizes communities by class, creed and wealth.

And the same thing was happening in the community.

As the shape of the built environment changed, so did the lifestyle and sense of belonging of the community.

From a record of oneness and belonging, architecture became a means of differentiation, and communities began to move away from the very structures that once held them together and the soul of the place that expressed their common existence.

There were many reasons for the Syrian war, but it should not be underestimated that urban zoning and false and inhumane architecture contributed to the loss of identity and self-esteem, fostering sectarian divisions and hatred.

Over time, this united city transformed into an urban center with a ghetto surrounding it.

And in turn, coherent communities have become distinct social groups, alienated from each other and from the place.

From my perspective, the loss of a sense of belonging to a place and of sharing it with others made the place vulnerable to destruction.

A clear example of this can be seen in the informal housing system that housed more than 40 percent of the population before the war.

Yes, before the war almost half of Syria's population lived in slums, remote areas without proper infrastructure. The slums were made up of endless rows of bare-block boxes housing people who belonged to mostly the same group, whether based on religion, class, place of origin, or all of the above.

This ghettoized urbanism turned out to be a clear precursor to war.

Conflicts are much more likely to occur between pre-classified areas, or areas inhabited by 'others'.

The ties that once bound cities, whether social through coherent architecture, economic through trade in the souks, or religious through coexistence, have all been lost in the misguided and visionless modernization of the built environment.

Let me digress.

When we read about heterogeneous urbanism in other parts of the world, including British cities and the ethnic districts around Paris and Brussels, we recognize the onset of instability like the one we have had here in Syria.

We have severely destroyed Homs, Aleppo, Deraa and many other cities, and now displaced almost half of the country's population.

I hope the war is over, but as an architect the question I have to ask is: How do we rebuild?

What are the principles to adopt to avoid repeating the same mistakes?

From my perspective, the main focus should be on creating a place where employees feel like they belong.

Architecture and planning must recapture some of the traditional values ​​that have done just that, create the conditions for coexistence and peace, aesthetic values ​​that indicate friendliness and comfort rather than exaggeration, moral values ​​that promote generosity and acceptance, architecture that can be enjoyed by everyone as well as the elite, such as once found in the shady alleyways of Islamic old towns, mixed design that encourages a sense of community.

Here in Homs there is a region called Baba Amr that has been completely destroyed.

Nearly two years ago, I introduced this design to the UN-Habitat Reconstruction Competition.

The idea was to create a tree-inspired urban fabric that grows and spreads organically, mirroring traditional bridges over old alleys and incorporating apartments, private courtyards, shops, workshops, parking lots and places for play and leisure, trees and shaded areas.

Clearly far from perfect.

I drew it during the few hours when electricity was available.

And there are many ways to express belonging and community through architecture.

But compare it to the free-standing detached blocks proposed by the official project for the reconstruction of Baba Amr.

Architecture is not the axis on which all human life revolves, but it has the power to suggest and even direct human activity.

In that sense, settlement, identity, and social integration are all producers and products of effective urbanism.

For example, the coherent urbanism of Islamic old towns and many European old towns promotes integration, while soulless housing and skyscrapers, even lavish ones, tend to promote isolation and 'otherness'.

Even simple things like a shady spot in the city, an orchard, drinking water can make a difference in how people feel about a place and whether they consider it a generous place to give, a place worth maintaining, a place worth contributing to, or an alienating place full of anger.

For the place to give, it must also give its architecture.

Our built environment is important.

The structure of our cities is reflected in the structure of our soul.

And the modern urban archetypes that have emerged across the Middle East—informal concrete slums and crumbling public housing, trampled old towns and forests of skyscrapers—are partly responsible for the alienation and division of our communities.

We can learn from this.

We can learn how to rebuild in a different way, how to create architecture that contributes not only to the practical and economic aspects of people's lives, but also to their social, spiritual and psychological needs.

These needs were completely ignored in Syrian cities before the war.

We need to recreate cities shared by the communities that live in them.

Then everyone will feel at home and will not feel the need to search for an identity that conflicts with other identities around them.

Thank you for listening.

I am English.

(Laughter.) (Applause.) Never before has the phrase "I'm British" been so sympathetic.

(Laughter) I'm from an island, and I believe many of us have had a lot of continuity over the last millennium.

We have historically tended to impose change on others, much less so ourselves.

So when I woke up on the morning of June 24th to find out that my country had voted to leave the EU, the Prime Minister had resigned and Scotland was considering a referendum that could end the very existence of the UK, it came as a huge shock to me.

So it was a huge shock to me and a huge shock to a lot of people. But it was also what caused utter political turmoil in my country in the days that followed.

Calls for a second referendum arose, like asking the opposition to vote again after a sports game.

Everyone was blaming others.

People blamed the prime minister for holding the referendum in the first place.

They accused opposition leaders of not fighting hard enough.

Young people blamed old people.

The educated condemned the uneducated.

Its utter collapse was compounded by its most tragic element. It is a level of xenophobia and racist abuse in the UK streets that I have never seen in my life.

People are now talking about my country becoming Little England, or, as one of my colleagues put it, a nostalgic 1950s theme park in the Atlantic Ocean.

(Laughter.) But my question is, should we really be as shocked as we have been since then?

Did it happen overnight?

Or are there deeper structural factors that have brought us to where we are today?

So let me step back and ask two very basic questions.

First, what does Brexit mean for all of us, not just in our country, but around the world?

And second, what can we do about it?

What should you do?

First of all, what does Brexit mean?

Hindsight is a wonderful thing.

Brexit can teach us a lot about our society, and societies around the world.

It highlights in a way that embarrassingly we seem oblivious to how divided society is.

Votes were split along age, education, class and geography.

Many of the young people did not vote, but those who did wanted to stay.

Older people really wanted to leave the European Union.

Geographically, the strongest commitments to joining the European Union were in London and Scotland, but there was much greater ambiguity elsewhere in the country.

These divisions are what we really need to recognize and take seriously.

But deeper down, voting can tell us something about the nature of politics today.

Modern politics is no longer just a matter of right or left.

It's no longer just about taxes and spending.

It's about globalization.

The rift in contemporary politics lies between those who embrace globalization and those who fear it.

(Applause.) If you look at why those who wanted to leave — we call them “leavers” rather than “remainers” — leave, there are two factors that really matter in the polls.

The first is immigration and the second is sovereignty, which express people's desire to regain control of their lives and the feeling that they are not represented by politicians.

But those thoughts mean fear and alienation.

They represent a retreat into nationalism and borders in a way many of us would reject.

My point is that the big picture is more complicated than that. Liberal internationalists like myself, and myself firmly in that picture, need to write ourselves back into the picture in order to understand how we got to where we are today.

Looking at voting patterns across the UK, the division is visible.

Blue areas indicate retention and red areas indicate withdrawal.

What struck me personally when I saw this was how little time I actually spent in many of the red parts of my life.

Looking at the top 50 regions with the most Brexit votes in the UK, I suddenly realized that I spent a total of four days in those regions in total in my life.

In some places I didn't even know the name of the precinct.

It was a real shock to me. And I suggested that people like myself who think of themselves as inclusive, open and tolerant probably don't know as much about their countries and societies as we do.

(Applause.) The challenge that arises is that we need to find new ways to talk about globalization to those people. For people who didn't necessarily go to college, didn't necessarily grow up with the internet, and didn't have the opportunity to travel, we need to recognize that the narratives we think are compelling in a liberal bubble may not be persuasive.

(Applause.) That's what we need to reach out and understand more broadly.

Minorities have propagated the politics of fear and hate in the Brexit vote, creating lies and distrust around, for example, the idea that votes on Europe could reduce the number of refugees and asylum seekers coming to Europe, even though the vote had nothing to do with immigration from outside the European Union.

But disillusionment with the political system was a concern for the majority of Leave voters.

This was a protest vote for many, a feeling that no one represented them, that they could not find a party to represent them, and therefore rejected the political system.

This is the same in Europe and much of the liberal democratic world.

We see it in the rising popularity of Donald Trump in the United States, the rising nationalism of Victor Orban in Hungary, and the rising popularity of Marine Le Pen in France.

Brexit fears are present in all of our societies.

So what I think we need to ask is the second question. This is how we should collectively respond.

For all of us interested in building liberal, open and tolerant societies, we urgently need a new vision, a vision of a more tolerant and inclusive globalization – one that brings people together rather than leaves them behind.

A vision of globalization must begin with recognizing the positive benefits of globalization.

The consensus among economists is that free trade, the movement of capital, and the movement of people across borders collectively benefit everyone.

The consensus among international relations scholars is that globalization leads to interdependence, which leads to cooperation and peace.

But globalization also has a redistributive effect.

It creates winners and losers.

Taking immigration as an example, we know that immigration is net positive for the economy as a whole under almost all circumstances.

But we must also be cognizant of the effects of redistribution and, importantly, that low-skilled immigrants can lead to lower wages for the poorest in society and put pressure on housing prices.

It doesn't detract from the fact that it's positive, but it does mean that more people need to share and recognize those benefits.

In 2002, former United Nations Secretary-General Kofi Annan spoke at Yale University on the topic of inclusive globalization.

That was the speech in which he coined the term.

And he said, and I paraphrased, 'The glass house of globalization has to be open to everyone in order to stay safe.

Prejudice and ignorance are the ugly side of exclusionary and hostile globalization. ”

The idea of ​​inclusive globalization was briefly revived in 2008 at a conference on progressive governance attended by many leaders of European countries.

But in the midst of austerity and the 2008 financial crisis, the notion vanished almost without a trace.

Globalization has been done to support neoliberal policies.

It is perceived as part of an elite stratum of planning, not for everyone's benefit.

And it needs to be collected on a much more comprehensive basis than it does today.

So the question is, how can we achieve that goal?

How do we strike a balance between dealing with fear and alienation on the one hand and resolutely refusing to give in to xenophobia and nationalism on the other?

That's the question for all of us.

And as a social scientist, I believe that the social sciences provide some starting points.

Our transformation must be about both ideas and material changes. I would like to offer four ideas as a starting point.

The first concerns the concept of civic education.

What stands out about Brexit is the gap between public perception and empirical reality.

It has been suggested that we are moving into a post-fact society, where evidence and truth no longer matter, and lies have equal status with the clarity of evidence.

So what do we do -- (Applause) How do we rebuild respect for truth and evidence in liberal democracy?

It has to start with education, but it has to start with the realization that there is a big gap.

In 2014, the polling firm Ipsos MORI released a survey on immigration attitudes, which showed that as the number of immigrants increased, so did the public's interest in immigration. However, no clear causal relationship has been elucidated. This is because it may have something to do with the politics and media discourse around it, not the numbers.

But the same survey also uncovered major misinformation and misconceptions about the nature of immigration.

For example, this attitude in the United Kingdom led the public to believe that asylum levels were a higher proportion of immigrants than they actually were, but they also believed that education immigration as a proportion of all immigration was much lower than they actually were.

Therefore, we must address this misinformation, the gap between perceptions and reality regarding key aspects of globalization.

It's important to start at an early age, but you can't leave it up to school.

It must be about the lifelong civic participation and public engagement we all encourage as a society.

The second opportunity I see is the idea of ​​facilitating interaction between diverse communities.

(Applause.) One of the things that strikes me the most about immigration attitudes in the UK is that, ironically, the most tolerant areas of my country have the highest numbers of immigrants.

For example, London and the South East have the highest numbers of immigrants and are also the most tolerant regions.

In fact, the areas of the country with the lowest levels of immigration are the most exclusionary and intolerant of immigration.

Therefore, exchange programs should be encouraged.

We need to make internet accessible to older generations who may not be able to travel.

We need to encourage more movement, more participation, and more interaction with people we don't know or whose opinions we don't necessarily agree with, even at the local and national level.

But the third thing I think is important, and this is really basic, is that we need to make sure that everyone shares the benefits of globalization.

This illustration from the Financial Times after Brexit is truly impressive.

This tragically shows that those who voted to leave the EU are in fact those who have benefited most materially from trade with the EU.

The problem, however, is that the people in those areas did not perceive themselves as beneficiaries.

They did not believe that they were actually reaping the material benefits of increased trade and increased movement around the world.

Although I work primarily with refugee issues, one of the ideas I have spent a lot of time preaching, mostly to developing countries around the world, is that promoting refugee integration must not only benefit the refugee population, but also address the concerns of local host communities.

But, as it turns out, one of the policy prescriptions is that immigrant areas must be provided with disproportionate access to educational, health and social services to address the concerns of local residents.

But while developing countries encourage it, they don't take the lessons home and incorporate them into their societies.

Moreover, if we are serious about the need to ensure that people enjoy economic benefits, we need a model of globalization that recognizes that we must bring people with us as well.

The fourth and final idea I would like to propose is that we need more responsible politics.

There is little social scientific evidence comparing attitudes to globalization.

However, what the research does show is that attitudes and tolerance towards issues such as immigration and migration on the one hand, and free trade on the other, vary greatly across countries and over time.

But one hypothesis that emerges from a quick look at the data is the idea that polarized societies are far less tolerant of globalization.

In societies like Sweden once and Canada today, there are centrist politics, right and left working together, encouraging a supportive stance on globalization.

And what we see around the world today is a tragic polarization, a failure of dialogue between political extremes, and a gap in the liberal center of communication and common understanding.

We may not be able to achieve that today, but we must at least call on politicians and the media to stop using scare words and be more tolerant of each other.

(Applause.) These ideas are very tentative, partly because we need this to be a comprehensive, shared project.

I'm still British

I'm still European.

I am still a global citizen.

Those of us who believe our identities are not mutually exclusive must all work together to ensure that globalization takes everyone and leaves no one behind.

Only then can we truly reconcile democracy and globalization.

thank you.

(applause)

200 years of modern science.

We have to admit that we performed poorly.

The machines we build continue to suffer from mechanical failures.

The houses we build cannot withstand violent earthquakes.

But we shouldn't criticize scientists so much. The reason is simple. because they didn't have much time.

200 years is not a very long time, but it took nature 3 billion years to perfect the most amazing substances that we would ever want to have.

Remember, these materials have a 3 billion year warranty.

For example, consider the sequoia tree.

Hundreds of tons of cargo for hundreds of years in cold, warm and UV light.

But when you look at its structure with a high-resolution electron microscope and ask yourself what it's made of, surprisingly, it's made of sugar.

Well, it's not quite the same as we drink in tea.

It's actually a nanofiber called nanocrystalline cellulose.

And this nanocrystalline cellulose is very strong, about 10 times stronger than steel on a weight basis.

However, it is made of sugar.

As such, scientists around the world believe nanocellulose will become one of the most important materials for the entire industry.

But here's the problem. Let's say you want to buy 0.5 tons of nanocellulose to make boats and planes.

Google, eBay, even Alibaba can do it.

you won't find it.

Of course, you will find thousands of scientific papers. You'll find great papers where scientists say this is a great material and there are so many things you can do with it.

But there are no commercial sources.

So we at the Hebrew University decided to focus on developing an industrial-scale process to produce this nanocellulose in collaboration with our Swedish partners.

And of course we didn't want to cut the tree.

So we were looking for another source of raw material and actually found sludge from the paper industry.

Reason: Because it's too much.

Europe alone produces 11 million tonnes of the substance annually.

This is equivalent to a 3-kilometer-high mountain on a soccer field.

And we produce this mountain every year.

So for everyone this is an environmental problem, for us it is a gold mine.

So now we are actually producing nanocellulose on an industrial scale in Israel, and soon in Sweden.

You can do a lot with materials.

For example, I've shown that adding just a few percent of nanocellulose to the same cotton fiber as my shirt dramatically increases strength.

This means it can be used to make amazing things like industrial and medical super fabrics.

But that's not all.

For example, self-supporting and self-supporting structures, such as the shelters you see today, are actually currently on display at the Venice Architecture Biennale.

Indeed, the wonders of nature in the plant kingdom did not stop.

Consider insects.

For example, cat fleas have the ability to jump about 100 times their height.

It's amazing.

This is equivalent to standing in the middle of Liberty Island in New York and climbing to the top of the Statue of Liberty in one leap.

I'm sure everyone would like to.

So the question is, how do cat fleas arise?

It turns out that they make this wonderful material called Resilin, after all.

Simply put, resilin, a type of protein, is the most elastic rubber on earth.

When stretched or crushed, it loses very little energy to the environment.

When you let go—snap!

It brings back all the energy.

So I'm sure everyone would love to get their hands on that material.

But here's the problem. Cat fleas are difficult to catch.

(laughter) Why? Because they are scared.

(Laughter) But now it's enough to catch one.

We can now extract that DNA, study how cat fleas make resilin, and clone it into less-hopping organisms like plants.

That's exactly what we did.

We are now able to produce large amounts of resilin.

Well, my team decided to do something great in college.

They decided to combine the strongest materials produced by the plant kingdom with the most elastic materials produced by the insect kingdom: nanocellulose and resilin.

And the results are astonishing.

In fact, this material is strong, elastic and transparent.

So there are many things you can do with this material.

For example, next-generation sports shoes that help you jump higher and run faster.

The touch screens of computers and smartphones are also unbreakable.

The problem is that we continue to have synthetic implants implanted in our bodies, glued and screwed.

And I would like to say that this is not a good idea.

why? because they fail.

This synthetic, much like this plastic fork, fails if it's not strong enough for its performance.

However, in some cases they are too strong and their mechanical properties do not match the surrounding tissue.

But in fact, the reason is much more fundamental.

The reason is that no one in nature would actually take my head and screw it around my neck, or take my skin and glue it to my body.

In nature, everything self-assembles.

Therefore, all living cells, whether from plants, insects, or humans, have DNA that encodes nanobio components.

Often they are proteins.

They can also be enzymes that make other substances such as polysaccharides and fatty acids.

And the common feature of all these materials is that they do not require a person.

They recognize each other and self-assemble into structures, scaffolds on which cells proliferate and form tissues.

They grow into organs and together they give life.

So about ten years ago, we at the Hebrew University decided to focus on perhaps the most important biomaterial for humans: collagen.

Why Collagen?

Because collagen makes up about 25 percent of our dry weight.

In our body, besides water, there is only collagen.

So I always like to say, anyone in a human replacement site wants to take collagen.

Indeed, before we started the project, there were already more than 1,000 medical implants made of collagen.

As you know, there are simple things like dermal fillers to reduce wrinkles and augment lips, and other more advanced medical implants like heart valves.

So where is the problem?

Now the problem is the source.

The source of collagen actually comes from dead bodies: dead pigs, dead cows, and even human corpses.

So safety is a big issue.

But that's not all.

Also, quality.

Well, here I have a personal interest.

This is my father, Zvi, at a winery in Israel.

A heart valve similar to the one I showed you seven years ago was implanted in his body.

The scientific literature now suggests that these heart valves begin functioning 10 years after surgery.

No wonder. Made of old used tissues, just like a battered brick wall.

Yes, of course, you can also use bricks to build new walls.

But it's not the same.

So the US Food and Drug Administration issued a notice already in 2007, asking companies to start looking for better alternatives.

That's exactly what we did.

We decided to clone all five human genes involved in the production of human type I collagen into transgenic tobacco plants.

This means that the plant has the ability to create a completely new and untouched version of human collagen.

This is great.

In fact it's happening now.

Today in Israel it is grown in 25,000 square meters of greenhouses throughout the country.

Farmers receive small tobacco seedlings.

It looks exactly like a regular cigarette, except it has 5 human genes.

They are responsible for the production of type I collagen.

After 50 to 70 days of cultivation, the leaves are harvested and transported to the factory by cooling truck.

This is where the process of extracting collagen begins.

Now, if you've ever made pesto, it's essentially the same thing.

(Laughter) When you crush the leaves, you get a juice that contains collagen.

We concentrate the protein and transfer the protein to the clean room for final purification. And what you end up with is collagen, the same as in our bodies. A variety of medical implants, such as bone void fillers for severe fractures and spinal fusion, are manufactured from virgin collagen.

More recently, we were able to bring to market here in Europe a fluid gel used for diabetic foot ulcers and is now approved for use in the clinic.

This is not sci-fi.

This is happening now.

We use plants to manufacture medical implants that serve as replacement parts for humans.

In fact, just recently we were able to create collagen fibers that are six times stronger than the Achilles tendon.

It's amazing.

Together with our Irish partners, we have considered: That was to add resilin to these fibers.

By doing so, we were able to make a super fiber with about 380% strength and 300% elasticity.

Curiously, in the future, implanting patients with artificial tendons and ligaments made of these fibers will make them perform better after surgery than they did before the injury.

So what does the future hold?

I believe that in the future we will be able to make many of the nano-bio building blocks that nature has provided us, such as collagen, nanocellulose, and resilin.

And with that comes better mechanical and even better heart performance.

Now, this heart is not the same as the one you get from a donor.

It will get better.

It actually performs better and lasts longer.

My friend Zion Suliman once said something nice to me.

He said, "If you want new ideas, open an old book."

And I'm going to say that the book was written.

It was written after three billion years of evolution.

And text is the DNA of life.

All we have to do is read this text, accept the gift of nature, and start progressing from here.

thank you.

(applause)

I am very happy to be here.

It's going to be a bit strange, so I'd be happy if you could come.

I am happy that everyone is here.

"Here" doesn't mean here.

Or here.

But here.

That is the earth.

And by "we" I don't mean us in this auditorium, but life, all life on earth. (Laughter) From complex to single-celled, from molds to mushrooms to flying bears.

(Laughter) The interesting thing is that Earth is the only place we know of that has life. There are 8.7 million species of organisms.

We looked elsewhere, perhaps not as keenly, or we looked as much as we could and couldn't find it. Earth is the only place we know that life exists.

Is the Earth special?

This is a question I've wanted to know the answer to since I was a little kid, and I'm guessing 80% of the people in this room thought the same thing and wanted to know the answer.

To understand whether there are planets in or outside our solar system that can sustain life, the first step is to understand what life needs here.

It turns out that out of 8.7 million species, only three are necessary for life.

On the one hand, all life on Earth requires energy.

Complex life like us gets energy from the sun, but life deep underground can get energy from chemical reactions and so on.

All planets have different energy sources.

On the other hand, all life needs food and nourishment.

And if you want a particularly juicy tomato, this seems like a tall order.

(Laughter.) But all life on Earth is nourished by just six chemical elements, and these elements are present in every planetary body in the solar system.

So the one in the middle remains the tallest pillar to achieve.

It's water, not moose.

(laughs) Moose would be pretty cool though.

(Laughter) And it's not frozen water, it's not gaseous water, it's liquid water.

This is what all life needs to survive.

And since many solar system bodies don't have liquid water, we don't focus on them.

Other solar system bodies may have even more abundant liquid water than Earth, but it's trapped under an ice shell that makes it hard to access, hard to reach, and even hard to see if there's life there.

So there are still some bodies left to consider.

So let's make the matter easier for ourselves.

Consider only the liquid water on the surface of the planet.

There are only three bodies in our solar system to consider when it comes to liquid water on the surface of a planet. Venus, Earth, and Mars, in order of distance from the Sun.

An atmosphere is required for water to be liquid.

You have to pay close attention to the atmosphere.

You can't have too much air, too thick, or too warm. Because the atmosphere becomes too hot, like Venus, for liquid water to exist.

But if the atmosphere is too thin, too thin, and too cold, it will be too cold, like Mars.

So Venus is too hot, Mars is too cold, and Earth is just right.

If you look at these images behind me, you automatically know where in the solar system life can survive.

This is a Goldilocks-like problem, simple enough for a child to understand.

However, I would like to remind you of two things from the story of Goldilocks that you may not think of often, but which I think are very important here.

Part 1: If Mama Bear's bowl is too cold when Goldilocks walks into the room, does that mean it's always too cold?

Or would other times have been just right?

When Goldilocks enters the room determines the answers we get in the story.

And the same applies to planets.

they are not static. they change.

they vary. they evolve.

And so is the atmosphere.

Now let's take an example.

This is one of my favorite Mars pictures.

It's not the highest resolution image, the sexiest image, or the newest image, but it does show riverbeds cut into the surface of the Earth. The bed of a river eroded by flowing liquid water. Riverbeds are formed over hundreds, thousands, and tens of thousands of years.

That's not possible on Mars today.

The current Martian atmosphere is too thin and too cold for water to be stable as a liquid.

From this single image, we can see that the atmosphere of Mars has changed and changed significantly.

And since the three requirements for life have long existed, they have changed from what we define as habitable.

Where did the atmosphere that could liquefy water at the surface go?

Well, one idea is that they escaped into space.

Particles in the atmosphere gained enough energy to break free from the planet's gravitational pull, escaping into space never to return.

And this happens with any object that has an atmosphere.

Comets have incredibly visible tails that remind us of their escape from the atmosphere.

But Venus also has an atmosphere that escapes over time, as do Mars and Earth.

It's a matter of degree, it's a matter of scale.

Therefore, we want to know how much has escaped over time so that we can explain this transition.

How does the atmosphere get the energy to escape?

How do particles get enough energy to escape?

There are two ways to reduce things.

Number one, sunlight.

Light emitted by the sun can be absorbed by particles in the atmosphere and heat them.

Yes, I'm dancing, but they -- (laughter) hey, they're not dancing at my wedding.

(Laughter) They gain enough energy to escape and release from Earth's gravity just by warming up.

A second way to get energy is from the solar wind.

These are the particles, mass, and matter expelled from the surface of the Sun, which can scream through the Solar System at 400 kilometers per second, even faster during solar storms, and blaze through interplanetary space toward planets and their atmospheres, also providing energy for atmospheric particles to escape.

I'm interested in this because it has to do with habitability.

I mentioned two things about the story of Goldilocks that I wanted to draw your attention to and remind you of, but the second one is a little more subtle.

If Papa Bear's bowl is too hot and Mama Bear's bowl is too cold, why not follow the trend and have Baby Bear's bowl even colder?

This thing you've accepted all your life might not be so simple when you think about it a little more.

And of course, the distance of the planet from the Sun determines its temperature.

This should affect livability.

But maybe there are other things to think about.

Perhaps the bowl itself also helps determine the end of the story, what is right.

I could talk about the different features of these three planets that could affect habitability, but for selfish reasons related to my own research and the fact that I'm standing here with a clicker and you're not (laughter).

Earth has it. Venus and Mars are not.

The magnetic field is generated deep inside the planet by the churning of electrically conductive fluid matter that creates this large ancient magnetic field that surrounds the Earth.

If you have a compass, you can tell which way north is.

Venus and Mars don't have it.

If you have a Venus and Mars compass, congratulations! you are lost

(laughs) Does this affect livability?

Well, what about it?

Many scientists believe that the planet's magnetic field acts as an atmospheric shield, deflecting particles in the solar wind around the planet, something like a force field-type effect related to the charge on the particles.

I like to think of it as a planetary salad bar sneeze guard.

(Laughter) And yes, my colleagues who watch this later will realize that this is the first time in the history of our community that the solar wind has been equated with mucus.

(Laughter.) Well, the result is that the Earth has had a magnetic field, which could have protected it for billions of years.

I can't escape the atmosphere.

Mars, on the other hand, is unprotected by its lack of a magnetic field, and has probably been stripped of enough atmosphere over billions of years to explain the transition from a habitable planet to the one we see today.

Other scientists think the magnetic field could act like the sails of a ship, allowing the planet to interact with more energy from the solar wind than it could on its own.

Sails may collect energy from the solar wind.

The magnetic field collects energy from the solar wind and may even allow it to escape into the atmosphere.

This is an idea that needs to be tested, but the effect and how it works seems obvious.

That's because we know that energy from the solar wind is released into the Earth's atmosphere.

Its energy travels along magnetic field lines to the poles, resulting in incredibly beautiful auroras.

If you've experienced them, that's great.

You can see the energy coming in.

We're trying to measure how many particles are out and whether the magnetic field has any effect on this.

So I raised an issue here, but no solution yet.

No solution.

But we are working on it. How are you doing?

Well, we sent spacecraft to all three planets.

Some of which I am involved with, including the MAVEN spacecraft currently orbiting Mars, are led here from the University of Colorado.

Designed to measure atmospheric escape.

Similar measurements have been obtained from Venus and Earth.

Once we have all the measurements, we can combine them all to understand how all three planets interact with their space environments and surroundings.

Then we can determine whether the magnetic field is important for habitability.

Given that answer, why should you care?

I mean, I really value...

Economically, but also in a deeper sense.

(Laughter) First of all, the answer to this question is not only how the three planets Venus, Earth and Mars relate to today's environment, but also how they existed billions of years ago and whether they were habitable long ago.

It tells us about the close atmosphere that surrounds us.

But what we learn from these planets is also applicable to atmospheres everywhere, including the planets we currently observe around other stars.

For example, the Kepler spacecraft, built and operated here in Boulder, has been observing a region the size of a postage stamp in the sky for the past few years, and thousands of planets have been discovered within that region of the sky, which appears to be no different than the rest of the sky.

In 20 years, we've gone from zero planets outside our solar system to now so many that we don't know which planets to investigate first.

Any lever will work.

In fact, based on observations made by Kepler and others like it, it is now believed that there are 200 billion stars in the Milky Way galaxy alone, and on average every star has at least one planet.

In addition, it is estimated that there are somewhere between 40 billion and 100 billion planets that can be defined as habitable in our galaxy alone.

We are making observations of those planets, but we don't yet know which planets are habitable.

It's kind of like being stuck in the red spot -- (laughs) on stage, knowing there's another world out there and desperately wanting to know about that world, interrogating them to see if only one or two of them look a little like you.

You can't do that. I can't go there yet.

Therefore, we need to be able to use the tools we developed for Venus, Earth, and Mars, apply them to other situations, and make rational inferences from the data to determine the best candidates for habitable and non-habitable planets.

After all, this is our red dot, at least for now.

This is the only habitable planet we know of, but we may soon learn more.

But for now, this is the only habitable planet, and this is our red spot.

I am very happy to be here.

thank you.

(applause)

This is an artificial forest.

It can spread over many acres or fit in a space as small as your garden.

The trees in this forest are only two years old.

I have a forest in my backyard.

Attracts a lot of biodiversity.

(Birds chirping) I wake up to this every morning, like a Disney princess.

(Laughter) I'm an entrepreneur who professionally promotes these forests.

We have helped factories, farms, schools, homes, resorts, apartment complexes, parks and even zoos have such forests.

Forests are not isolated lands where animals live together.

Forests can be an integral part of our urban life.

For me, a forest is a place where trees grow thickly and you can't enter on foot.

Big or small, it doesn't matter.

Most of the world we live in today was forest.

This was before human intervention.

And we built cities on forests like São Paulo, forgetting that we belong to nature, just like 8.4 million other species on earth.

Our habitat is no longer a natural habitat.

But for some of us that is no longer the case.

Me and a few others are now professionally planting these forests everywhere, everywhere.

I'm an industrial engineer.

We specialize in making cars.

In my previous job at Toyota, I learned how to transform natural resources into products.

An example would be dripping sap from a rubber tree, turning it into raw rubber, and then making a tire, a product.

But these products cannot become natural resources again.

We disconnect the elements from nature and transform them into irreversible states.

That's industrial production.

Nature, on the other hand, works quite the opposite.

Natural systems are produced by combining elements atom by atom.

All natural products become natural resources again.

This is what I learned when I planted a forest in my own backyard.

And this was the first time I worked with nature rather than against it.

Since then, we have created 75 such forests in 25 cities around the world.

Every time I work in a new location, I find all the elements I need to create a forest right next to me.

All we have to do is put these elements together and let nature take its course.

To create a forest, you start with soil.

We touch it, feel it, taste it and identify the properties it lacks.

If the soil consists of small particles, the soil is dense. It is so dense that water cannot penetrate it.

We mix in locally available biomass that can help porosify the soil.

Water can now enter.

If the soil does not have the ability to hold water, it is further mixed with biomass, a water-absorbing material such as peat or bagasse. This allows the soil to retain this water and stay moist.

Plants need water, sunlight and nutrients to grow.

What would happen if the soil had no nutrients?

We don't just feed the soil directly.

That would be the industrial way.

It goes against nature.

Instead, add microorganisms to the soil.

They naturally produce nutrients in the soil.

They eat the biomass that we mix into the soil, so they just eat and multiply.

And when that number increases, the soil begins to breathe again.

It comes alive.

Investigate native tree species in the area.

How do we determine what is native or not?

Anything that existed before human intervention is native.

That's the simple rule.

We survey national parks to find the last remnants of natural forests.

Investigate the sacred grove surrounding the old temple, the sacred grove.

And if I can't find anything, I go to the museum to see the seeds and logs of trees that used to be there.

Investigate old paintings, poems, literature, etc. in the area to identify the tree species that belong there.

Once you know the trees, divide them into four different layers: shrub layer, subtree layer, tree layer, and canopy layer.

Fix the ratio of each layer and determine the proportion of each tree species in the mix.

If you create a fruit forest, increase the percentage of fruit-bearing trees.

It may be a forest of flowers, a forest of birds and bees, or simply a wild, primeval evergreen forest.

Seeds are harvested and seedlings are sprouted from them.

Avoid planting trees belonging to the same layer next to each other. Otherwise, the trees will compete for the same vertical space as they grow taller.

Plant the saplings close to each other.

A thick layer of mulch will keep the soil moist even when it's hot outside.

When it's cold, frost formation occurs only on top of the mulch, so the soil can breathe even if it's freezing outside.

The soil is very soft, soft enough for roots to penetrate easily and quickly.

At first glance, the forest doesn't look like it's growing, but beneath the surface it's growing.

In the first three months the roots reach a depth of one meter.

These roots form a mesh and hold the soil tightly.

Microbes and fungi live throughout this root network.

Therefore, if some nutrient is not available near the tree, these microbes will try to deliver that nutrient to the tree.

When it rains, mushrooms magically appear all night long.

This means there is a healthy fungal network under the soil.

Once these roots are established, the forest begins to grow to the surface.

As the forest grows, we keep watering it. We will continue to water the forest for the next 2-3 years.

We want to keep all the water and soil nutrients in the trees, so weeds on the ground are removed.

As this forest grows, it blocks the sunlight.

Eventually the forest will become so dense that sunlight will not reach the ground.

Weeds also need sunlight, so they can't grow now.

At this stage, not a single drop of water that falls on the forest evaporates back into the atmosphere.

This dense forest condenses moist air and keeps it moist.

We will gradually reduce and eventually stop watering the forest.

And even without watering, the forest floor remains moist and sometimes even dark.

Now, as soon as a leaf falls on this forest floor, it begins to rot.

This rotting biomass forms humus, which feeds the forest.

As the forest grows, more leaves fall to the surface. That means more humus is produced, which means more food, allowing the forest to grow even bigger.

And this forest continues to grow rapidly.

Once established, these forests will regenerate many times, possibly forever.

In such natural forests, no management is the best management.

It's a little jungle party.

(Laughter) This forest grows as a collective.

If the same tree, the same kind, had been planted separately, it would not have grown so quickly.

In this way, a 100-year-old forest can be created in just 10 years.

thank you very much.

(applause)

"Mom, who are these people?"

It was an innocent question when my daughter Aria was three years old.

We were walking with my husband through one of the big luxury malls in Abu Dhabi.

Aria stares at a giant poster towering in the middle of the mall.

It featured three rulers of the United Arab Emirates.

As she hugged my side, I crouched down and explained that these were the rulers of the UAE who had worked hard to develop the nation and maintain unity.

She asked, "Mom, why can't you see pictures of strong women on the walls here, where we live, or in Lebanon, where our grandparents live?"

Is it because women don't matter? ”

This is probably the hardest question I've had to answer as a parent and in my 16+ years of professional life.

I grew up in my hometown in Lebanon, the youngest of two daughters of a very hard working pilot and head of operations for Lebanese Airlines and a very supportive stay-at-home mom and grandmother.

At the time, my father encouraged my sister and me to get an education, even though our culture emphasized that it was the son, not the daughter, who should be professionally motivated.

I was one of the few girls of my generation who left home at the age of 18 to study abroad.

My father never had a son, so in a way I became his son.

Fast forward a few decades and wish I hadn't done so badly when it came to making my father proud of his future son.

With a Bachelor's and PhD in Electrical Engineering, R&D in the UK and then consulting in the Middle East, I've always been in a male-dominated environment.

To tell you the truth, I've never found a role model that I can really relate to.

My mother's generation was not interested in professional leadership.

There were a few men along the way who encouraged me, but no one knew the demands and pressures I was facing. That pressure became especially acute when I had two beautiful children.

And while Western women love to give advice to us poor oppressed Arab women, they live different lives under different constraints.

Therefore, Arab women of my generation had to become role models for ourselves.

We have had to juggle more than Arab men and face more cultural rigidities than Western women.

As a result, I'd like to think that we poor, oppressed women actually have a useful and certainly hard-earned lesson to share, a lesson that might be useful to anyone who wants to succeed in modern society.

Here are my three.

["Turn their shit into your fuel."] (Laughter) (Applause) There's a phrase everyone touts as the key to success. It's resilience.

So what exactly is resilience? Also, how do you cultivate it?

I believe resilience is simply the ability to turn shit into fuel.

At my previous job, long before I joined my current company, I worked with a man called John.

I teamed up with John and worked hard in the hopes that he would see how great I was and come help me with my case to become a partner in the company.

In addition to carrying out consulting projects, I was an avid writer on the subject of women's economic empowerment.

One day, I had to present my research to a roomful of MBA students.

John was one of the first people in the audience to hear the details of my research.

During the presentation, I saw John in the corner of my eye.

He turned dark pink and slid under his chair in obvious embarrassment.

After finishing the presentation in front of an applauding audience, we hopped in the car.

There he exploded.

"What you did there is unforgivable!

You are a consultant, not an activist! ”

I said, "John, I don't understand.

I have presented some gender equality indices and some conclusions about the Arab world.

Yes, it happens to be at the bottom of the index today, but what did I say or present that isn't true?"

“The whole premise of your research is wrong,” he replied.

What you are doing is dangerous and destroys the social fabric of our society. ”

He paused for a moment, then added, "When women give birth, their place is at home."

Time stood still for so long that all I could think and repeat in my confused mind was, "You can forget about that partnership, Layla.

it will never happen. ”

It took me several days to fully understand this incident and its implications, but after doing so, I came to three conclusions.

One, these were his problems and his complexes.

There may be many people like him in our society, but I'm not going to own their problems.

Second, we needed another sponsor immediately.

(Laughter.) By the way, I got it and, well, he was great.

And the third is being able to teach John what women with children can do.

I apply this lesson to my personal life as well.

As I have progressed in my career, I have received many words of encouragement, and I have often met women, men, and couples who clearly had issues with me and my husband choosing the dual-income path.

So there are well-meaning couples who tell you bluntly at family gatherings and friends gatherings that they should know you're not a great mother given how invested you are in your career, right?

I'd be lying if I said these words didn't hurt.

My children are the most precious thing to me and I can't bear to think that I might be betraying them in some way.

But, just like I did with John, I was quickly reminded that these were their problems, their complexes.

So instead of replying, I gave my best smile when I saw the following sign in my mind's eye in a flashing light.

[Be happy, it drives people crazy. ] (Applause) You know, young women in this situation have two options.

You can take in the negative messages that are being thrown at you and make you feel like a failure or too difficult to succeed, or you can take other people's negativity as your own problem and turn it into your own fuel instead.

I learned to always choose the second option and found it made me stronger and stronger.

And it is true that success is the best revenge.

Some women in the Middle East are lucky enough to marry someone who supports their careers.

Correction: I should have said "clever enough". Who you marry is your own choice, and if you plan to build a long-term career, it is better to marry someone who is supportive.

Even today, Arab men do not contribute equally to the household.

It is not expected at all by our society and is even frowned upon as not very masculine.

When it comes to Arab women, our society still believes that her main source of happiness should be the well-being and prosperity of her children and husband.

She exists primarily for her family.

Things are changing, but it will take time.

For now, that means that professional Arab women must somehow maintain the perfect home, take care of their children's every need, and manage a demanding career.

I realized that the hard way to achieve this was that I needed to apply my hard-earned professional skills to my personal life.

You have to work all your life.

Here's how I do this in my personal life.

One thing to know about the Middle East is that affordable domestic assistance is available to nearly every family.

The challenge, then, is how to effectively recruit talent.

Just as I do in my business life, I chose people to support my children during my work based on strong referrals.

Christina had worked with my sister for four years and the quality of her work was established.

Aria has been with us since she was 6 months old and is now an integral part of our family.

While I'm at work, she makes sure that the house is on track and that I'm empowered in an environment that's optimal for her and my children, just as I am at my best at work.

This lesson applies regardless of whether you're in a shared parenting situation, whether you're an au pair, a day care center, or a part-time nanny.

Choose carefully and empower.

Looking at my calendar, I see that an hour and a half from 7pm to 8:30pm each working day is blocked in UAE time and called "family time".

This is a sacred time.

I've been doing it since Aria was a baby.

I will do my best to keep this time. By then, go home and spend some quality time with your kids, asking them about their day, checking homework, reading them bedtime stories, lots of kisses and cuddles.

When traveling, use Skype to connect with your kids, regardless of time zone or miles apart.

Our son Burhan is 5 years old and learning to read, write and do basic math.

Here is another confession. I found that our daughter was actually more successful in teaching him these skills than I was.

(Laughter) It started as a game, but Aria loves to tutor her little brother and it turns out that these sessions actually improve Burhan's literacy, Aria's sense of responsibility, strengthens the bond between the two, and it's all a win-win.

The successful Arab women I know have their own approach to living their lives, shouldering most of the household responsibilities.

But this doesn't just mean surviving the dual role of career woman and mother.

This is also about living in the present.

When I am with my children, I try to separate work from my life.

Instead of worrying about how many minutes I can spend with my children each day, I focus on turning those moments into memorable moments, moments of meeting, listening to, and connecting with them.

[“Let’s work together, don’t compete.”] Arab women of my generation didn't get much publicity as they grew up.

I think this partly explains why there are so few women in politics in the Arab world.

But the upside of this is that we've spent a lot of time behind the scenes, in coffee shops, in living rooms, on the phone, developing a social skill that's so important to success: networking.

I think the average Arab woman has a large network of friends and acquaintances.

Many of them are also women.

In the West, ambitious women seem to compare themselves to other women and expect to be seen as the most successful among them.

This leads to the often-mentioned competitive behavior among professional women.

If you only have one woman at the top, you can't make room for other women, much less lift them up.

Arab women in general have never fallen into such a psychological trap.

Faced with a patriarchal society, they realized that by helping each other, they could all benefit.

In my previous job, I was the oldest woman in the Middle East. As such, some may think that investing in a network of female co-workers will not provide much benefit and that time should be invested in building relationships with male seniors and co-workers instead.

But two of my biggest breaks came with the support of other women.

It was the head of marketing who first suggested that I be considered as a young global leader at the World Economic Forum.

She was very knowledgeable about my media work and publications and emphasized my name when asked for her opinion.

It was a Saudi woman and friend, a young consultant, who helped me sell my first project in Saudi Arabia. Saudi Arabia has been a difficult market for me as a woman to gain support.

She introduced me to a client. And that introduction led me to the first of so many projects in Saudi Arabia.

I now have two older women on my team, and I consider making them successful is key to my own success.

Women's advancement continues, not fast enough, but we are making progress.

The Arab world, too, continues to make progress despite many recent setbacks.

Just this year, the UAE appointed five new female ministers to its cabinet, bringing the total to eight female ministers.

That's nearly 28 percent of ministers, more than many developed countries can claim.

This is my daughter Aria's favorite photo of the day.

This is undoubtedly the result of good leadership, but also the result of a strong Arab woman who never gave up and continued to push the boundaries.

It is the result of Arab women, like me, working their lives to turn shit into fuel and keep work out of their lives, determined every day to work together instead of competing.

Looking to the future, I hope that 20 or 30 years from now, when my daughter stands on this stage, she will be proud to be her mother's daughter, just like her father's daughter.

My wish for my son is that by then the expressions 'son of a mother' or 'mother's boy' will have taken on a completely different meaning.

thank you.

(applause)

So this is my niece.

Her name is Yari.

She is 9 months old.

Her mother is a doctor and her father is a lawyer.

By the time Yaali goes to college, her parents' jobs will have changed dramatically.

In 2013, researchers at the University of Oxford conducted a study on the future of work.

They concluded that nearly 1 in 2 jobs are at high risk of being automated by machines.

Machine learning is the technology causing most of this confusion.

It is the most powerful field of artificial intelligence.

This will allow machines to learn from data and mimic some of what humans can do.

My company, Kaggle, operates at the cutting edge of machine learning.

We bring together hundreds of thousands of experts to solve critical problems in industry and academia.

This gives you a unique perspective on what machines can do, what they can't do, and which jobs could be automated or intimidated.

Machine learning started to enter the industry in the early 90's.

I started with a relatively easy task.

It began by assessing credit risk from loan applications and sorting mail by reading handwriting from zip codes.

Over the past few years we have made dramatic progress.

Machine learning can now perform much more complex tasks.

In 2012, Kaggle challenged the community to build an algorithm that could grade high school essays.

The winning algorithm was able to match the grades given by the human teacher.

Last year we put out an even tougher challenge.

Can images of the eyes be taken to diagnose an eye disease called diabetic retinopathy?

Again, the winning algorithm was able to match the diagnosis by a human ophthalmologist.

With the right data, machines can outperform humans on such tasks.

A teacher may read 10,000 essays in a 40-year career.

An ophthalmologist may examine 50,000 eyes.

Machines can read millions of essays and see the eyes of millions within minutes.

Machines don't have a chance to compete with frequent, high-volume tasks.

However, there are things that we can do that machines cannot.

Where machines have made little progress is in tackling new situations.

They can't deal with something they've never seen before.

A fundamental limitation of machine learning is the need to learn from large amounts of historical data.

Well, humans are not.

We have the ability to connect seemingly disparate threads to solve problems never seen before.

Percy Spencer was a physicist working on radar during World War II when he noticed a magnetron melting chocolate bars.

He was able to combine his understanding of electromagnetic radiation with his knowledge of cooking to invent. Any guesses? -- Microwave.

Well, this is a particularly notable example of creativity.

But this kind of cross-pollination happens thousands of times a day in small forms to each of us.

Machines cannot match us when it comes to coping with new situations, and this places fundamental limitations on the human tasks they automate.

So what does this mean for the future of work?

The future state of a single job lies in the answer to a single question. To what extent can that work be reduced to frequent, high-volume tasks, and to what extent does it involve tackling new situations?

Machines are getting smarter for high-volume tasks that occur frequently.

Today they grade essays. They diagnose certain diseases.

Over the next few years, they will be conducting audits of us and reading the boilerplate text of legal contracts.

Accountants and lawyers are still needed.

These will be required for complex tax structures and landmark litigation.

But machines will shrink the jobs and these jobs will be harder to find.

Now, as I said earlier, the machine has not made progress in the new situation.

The copy behind your marketing campaign should grab the consumer's attention.

You have to stand out in the crowd.

Business strategy means finding gaps in the market, things no one else is doing.

Humans create the copy behind marketing campaigns, and humans develop business strategies.

So, Yarley, whatever you decide to do, take on a new challenge every day.

That way you can stay ahead of the machine.

thank you.

(applause)

Imagine you are a product designer.

And you designed a new type of product called the human immune system.

You are pitching this product to a skeptical and strictly serious manager.

Let's call him Bob.

Everyone knows at least one Bob, right?

what will it be?

Bob, I have a great idea for a whole new type of personal health product.

It is called the human immune system.

I can tell by the look on your face that something is wrong with this.

do not worry. I know it's very complicated.

I don't want to go into detail. I would like to tell you about some of the great features of this product.

First of all, it takes advantage of redundancy by keeping millions of copies of each component, such as white blood cells, before they are actually needed, creating a massive buffer against the unexpected.

And we skillfully utilize diversity by having not only white blood cells but also B cells, T cells, natural killer cells, and antibodies.

Components are not particularly important.

Importantly, this combination of diverse approaches can address anything more or less that evolution brings.

And the design is fully modular.

Human skin has a surface barrier, an innate immune system that responds very quickly, and a highly targeted adaptive immune system.

The point is that if one system fails, another system can take over, creating a virtually foolproof system.

I know I'm going to lose you, Bob, but hang in there because there's a really killer feature here.

This product is fully adaptable.

In fact, we can develop targeted antibodies against threats never encountered before.

In practice, it does this remarkably carefully, detecting and responding to every small threat, and even remembering all previous threats in case you encounter them again.

What I'm presenting today isn't really a standalone product.

The product is integrated into the larger system of the human body and works in perfect harmony with that system to deliver an unprecedented level of biological protection.

So Bob, be honest, what do you think of my product?

And Bob might say something like, "I really appreciate the effort and passion you put into your presentation, blah blah -- (Laughter) But honestly, that's utter nonsense.

You seem to be saying that the key selling points of your product are inefficiency and complexity.

Didn't you teach 80/20?

Furthermore, it says that this product is siled.

It overreacts, hoaxes things along the way, and is really designed for someone else's benefit.

Sorry for the ramblings, but I don't think this is a winner.

I think following Bob's philosophy actually results in a more efficient immune system.

And efficiency always matters in the short term.

Reduced complexity, increased efficiency, and more cost-effectiveness.

Who can say no to that?

Unfortunately there is one very small problem. That means that if you or I, who use this product, come across a new flu virus next winter, we could probably die within a week.

My interest in biology and business, and longevity and resilience, came when I was asked a very unusual question by the CEO of a global tech company.

And the question was, "What must we do to ensure that our company continues for 100 years?"

A seemingly harmless question, it's actually a bit trickier than it sounds, given that the average US public company lifespan is now only 30 years.

That's less than half of an employee's lifespan.

Now, if you're the CEO of such a company, and you're under the scrutiny of investors and plagued by change, you might be forgiven for not worrying too much about what's going to happen in 30 years.

But here you can also lose sleep at night. The odds that your company won't exist in five years are now averaging a staggering 32%.

That means your company has a 1 in 3 chance of being taken over or bankrupt within just 5 years.

Back to the tech CEO question.

Having been in the business of life and death longer than any company, where better to turn for advice?

As a frustrated biologist, I immediately decided to call a real biologist, my friend Simon Levin, professor of biology and mathematics at Princeton University.

Together we explored a variety of biological systems, from natural rainforests to managed forests and fisheries.

And we asked ourselves, "What makes these systems more resilient and durable?"

And what we found was that the same six principles that underpin the miracle of the human immune system actually reappear, from redundancy to implantation.

In fact, believe it or not, I also found these principles to be very characteristic not only of biologically perpetuating systems, but of long-lived social systems like the Roman Empire and the Catholic Church.

We also investigated businesses and found that these exact same qualities are also the hallmarks of resilient and long-lasting businesses, noting that they are absent in short-lived businesses.

First, let's see what happens when the corporate immune system collapses.

This beautiful building is part of Shitennoji Temple in Osaka.

In fact, it is one of the oldest temples in Japan.

At that time, temples had not yet been built in Japan, so they were built by Korean craftsmen.

This Korean craftsman then set up a temple construction company.

Amazingly, his company, Kongo Gumi, survived some 1,428 years later.

In fact, the company has become the oldest continuously operating company in the world.

By the way, how is the Kongo-gumi today?

Unfortunately not very good.

During the bubble period of the Japanese economy, I borrowed a large amount of money for real estate investment.

And when the bubble burst, they couldn't refinance their loans.

The company went bankrupt and was taken over by a major construction company.

Tragically, after 40 generations of meticulous management by the Kongo family, the Kongo-gumi succumbed to a spectacular failure in its ability to apply the principles of prudence.

Speaking of corporate failures, everyone is familiar with the failure of Kodak, a company that declared bankruptcy in January 2012.

More interesting, however, is the question of why Fujifilm was able to survive and thrive under the same pressure from the same products, the same digital technology, and the same era.

Leveraging its strengths in chemistry, materials science and optics, Fujifilm has diversified into many fields, from cosmetics to pharmaceuticals, medical systems to biomaterials.

Some of these diversification attempts have failed.

But overall, the company has been able to adapt its portfolio well enough to survive and thrive.

The strategy worked because, as CEO Komori puts it, it "had more pockets and drawers" than its rivals.

Of course, it means that we were able to create more options than our rivals.

Fujifilm survived because it applied the principles of prudence, diversity and adaptation.

A catastrophic factory fire like the one seen here completely destroyed the one and only factory that supplied Toyota with valves for automotive braking systems overnight.

The ultimate test of resilience.

Auto production screeches to a halt.

So why was Toyota able to revive car production?

Can you imagine how long it took?

Only 5 days.

5 days after the brake valve is gone until it is fully recovered.

How is this possible?

Toyota has managed its network of suppliers in a very collaborative way and has been able to work very quickly and smoothly with them to reuse production, supplement the missing brake valve capacity and resume car production.

Toyota has applied the principle of modularization of the supply network, integration into integrated systems and functional redundancy that allows for the smooth reuse of existing production capacity.

Fortunately, few companies today suffer from devastating fires.

But we read in the newspapers every day about companies succumbing to technological disruption.

So how can consumer optics giant Essilor avoid, or even profit from, technology disruption?

Certainly, technology disruption isn't just a big problem in software and electronics.

Essilor carefully examines the competitive landscape for potentially disruptive technologies.

Companies acquire these technologies very early on, before they become expensive or before competitors start moving around them, and develop them themselves, even at the risk of failure or self-destruction.

Using the principles of prudence and adaptation, Essilor has always been ahead of its game, delivering stellar performance for over 40 years.

If these principles are so powerful, you may wonder why they are not common in business.

Why don't we use these words every day?

Well, change must first begin in the heart.

Reflecting on my pitch to Bob, applying the principles behind the miracle of the human immune system first requires thinking about your business differently.

Now, we usually use what I call "mechanical thinking" when we think about business.

We set goals, analyze problems, build plans, adhere to them, but above all focus on efficiency and short-term performance.

Don't get me wrong. This is a very practical and effective way of dealing with relatively simple challenges in a relatively stable environment.

This is how most of the business problems that Bob, and probably myself, and most of the people face every day are handled.

In fact, until about the mid-1980s, this was a pretty good mental model for business as a whole, when globalization combined with revolutions in technology and telecommunications made business more dynamic and unpredictable.

But what about the more dynamic and unpredictable situations we face today?

We believe that in addition to mechanical thinking, we need to master the art of biological thinking, embodied in six principles.

In other words, we need to think more subtly and nuanced about when and how we can shape rather than control unpredictable and complex situations.

It's a bit like the difference between throwing a ball and releasing a bird.

A ball will probably head in a straight line toward its intended target, but a bird never does.

So what do you think?

It may sound a little unrealistic and a little theoretical.

Not at all.

All small entrepreneurial companies naturally think and act biologically.

why?

Because we lack the resources to shape the environment by brute force.

Lacking the scale to buffer change, we are constantly thinking about how start-ups may find it difficult to survive.

Now, ironically, of course, all big companies started out as small, entrepreneurial companies.

But along the way, many people lose this ability to think and act biologically.

To survive and thrive in today's environment, we need to rejuvenate our ability to think biologically.

So don't just think about short-term performance.

Every company I know spends a lot of time thinking about the central question of their strategy: how good are we competitively?

In addition, consider a second, more biological and equally important question. "How long will the game last?"

thank you very much.

(applause)

The first thing I would like to say is that I am here by chance.

And what I'm trying to say is that at this point in my life, rather than speaking at TED, it's a situation where I really think it's an accident.

But what I want to talk to you about today is perhaps how technology can be used to make these accidents more frequent.

Looking back on how I actually got into this accident, I truly believe that technology played a big role.

So what I want to do today is tell you a little bit about myself. Because I want to explain what I'm going to talk about in context.

And you can see why my two biggest passions in life today are children and education.

Once I put that into context, I'd like to talk a little bit about technology. Why I believe technology offers tremendous possibilities. It's a very powerful tool that can help address some of these challenges.

Next, Chris mentioned an initiative that AMD decided to launch called 50x15.

Then I'll go back to the first story and go into a little more detail, hopefully you'll understand. In today's world, I believe it's very important for business leaders to not only have an idea of ​​what their business is about, but also be passionate about something meaningful.

With that in mind, let me first say that I am one of five children. I am the oldest and the other 4 are women.

So I grew up in a female family.

I learned a lot about how to deal with that part of the world.

(Laughter.) And, as you can imagine, I was born in a very small village in Mexico, unfortunately in very poor conditions and my parents did not have a college education.

But I was lucky enough to get one and so did my four sisters.

This tells me a little bit about my parents' emphasis on education.

My parents were eager to learn. We'll get to that later.

But it was the technology on the screen, Victrola, that awakened me to learning from an early age and exposed me to the immense curiosity that was instilled in me as a child.

My father found it in a junkyard and fixed it up for use. And somehow - to this day, frankly, I don't know how he was so aware of what was going on in the world, he invited me to sit with him when I was only a few years old, put on this Victorola record of Mozart, and told me how Mozart was the most romantic of all classical composers ever, and how one of his favorites, Moonlight, gave me a real introduction to classical music.

He explained about Johann Strauss and how he created the world famous waltz.

And he also told me a bit of history when he played Tchaikovsky's 1812 Overture in this little Viktorola. And he told us about Russia and everything that was going on in Russia at the time and why this music somehow represents a part of that history.

And even as a child, he was able to instill a lot of curiosity in me.

And while this product probably doesn't look high tech to you, if you can imagine the time when this happened -- it was the mid-40's -- it was, in his view, a pretty high tech product indeed.

One of the really important things to try to extract from that experience, in addition to that, is that people ask me, "So how did your parents treat you when you were a child?"

And they always said they were really tough on me.

And it's not as harsh as most people think, like a parent yelling and hitting.

As I grew up, my father and mother were always strict in the sense that they always told me, "It's really important to always remember two things."

First and foremost, when you go to bed at night, you need to look back on the day and make sure that you feel like you contributed to something that day and that you did your best in the best possible way.

And the second thing they said: And we trust you, wherever you are, wherever you go, you will always do the right thing.

Now, I don't know how many of you have done that to your kids, but if you do, trust me, this is the biggest pressure you can put on your kids to say -- (laughter) -- we believe you always do the right thing.

Whenever I went out for a beer with my friends, I was very conscious of that -- (laughter) -- and very cautious. One thing that's happened with technology is that, of course, it's only useful if it's useful, but it's only useful if it's accessible, and it's only useful if it's affordable.

And in today's world, convenience, affordability, and accessibility are not always the case with many of the technologies we have today.

So one of our passions at our company, and now one of my personal passions, is to be able to get serious about making technology convenient, accessible, and affordable.

And for me, it's very, very important.

Today, technology has changed a lot since the days of Victrola.

Of course, we now have incredibly powerful computers.

The tremendous thing that people call killer apps is called the Internet.

Frankly, we don't think the internet is the killer app.

We believe, frankly, that the Internet is about connecting people and ideas.

The Internet just happens to be the medium through which those people and ideas connect.

And the power of connecting people and ideas can be so amazing.

Therefore, we believe we are facing a great opportunity today through all the changes that have happened so far.

If people and ideas could be more strongly connected, I think we would have seen a vast myriad of products on the market today, but what is important to me is how many of these products can provide connectivity in a convenient way, accessibility in an easy way, and affordability that will give people the opportunity to purchase this technology regardless of their economic status.

So looking at it, we said we wanted to enable it a little bit. I would like to take action.

And a few years ago, AMD had an idea of ​​what it would be like to launch this effort called 50x15. Our ambition is that by 2015, half the world will be connected to the Internet, connecting people and ideas.

We knew we couldn't do it alone, but we never meant to imply that AMD could do it alone.

We have always felt that this could be achieved through partnerships with governments, industry, educational institutions, countless other companies and, frankly, our competitors.

So while this is actually a pretty lofty undertaking if you want to think so, we felt we had to make a real bet in the years to come. This is bold and courageous enough and will force us all to think of ways to do things differently.

I'll get back to you on this subject soon. Because I think the results so far have been amazing. As we head into the 2015 effort, I can only hope and get excited about what I think will happen over the next eight years.

where are you today

It's year after year. This is information from our friends at Gapminder.com.

If you haven't seen the website, please take a look. It's really impressive. And you can see how the spread of the Internet has changed over the years.

So when we gave ourselves this scorecard to articulate what our goals were for 2015, three parts became apparent.

One is that the Western world, defined primarily by Western Europe and the United States, has come a long way.

The connectivity in these parts of the world is truly staggering and continues to grow.

In fact, we think it's quite possible to reach 100% even before the 2015 deadline. Elsewhere in emerging markets such as India and China, progress is good, solid and good. But in Africa, Latin America and other less developed parts of the world, progress has been much slower. Actually, I had just recently visited South Africa.

I had the opportunity to speak with President Mbeki. One of the things we talked about was what's holding us back from moving quickly toward this connectivity goal.

One reason is that a broadband connection costs $100 per month in South Africa.

Even the United States cannot, at its cost, enable the connectivity that we are all trying to reach.

So we discussed how we could partner to bring down the cost of this technology.

If you look at this graph, you can see the last part -- this is a horizontal logarithmic graph -- and you can see the last part. We have a long way to go to reach our 2015 target of 50%.

But we are excited internally. we are motivated

We truly believe that forcing things to do differently is a tremendous force that drives things forward, and indeed we look forward to working with many partners around the world to achieve that goal.

Now, one thing I want to say about 50x15, which I think is very important, is that this is not a charity.

It's actually a venture business.

Let's take a small part of this disconnected world and call it the education market.

When we look at children in elementary school, there are hundreds of millions of children around the world who could greatly benefit from being connected to the Internet.

So once we understand that, we think we have an opportunity to do business that caters to the needs of that segment.

And when we embarked on this effort, we made it clear from the beginning. This is not charity.

This is really a business venture, one that tackles a very difficult area of ​​the market.

What we've learned over the last three years is that this market segment, be it education or backwards, is a segment that demands incredibly high quality, incredibly high reliability, ridiculously low cost and access, and frankly a lot of challenges that are very hard to understand without actually doing it. More on that later.

This is an effort focused on simple, accessible, and human-centric solutions.

What this means is that, frankly, the PC was invented in 1980 and has remained largely unchanged for over 20 years.

It's still a gray or black box in most places and looks the same.

Frankly, I know that saying this might offend some customers, but I really mean it. Even if you could get the computer's name off the top, it would be very difficult to determine who made it. Because they're all highly commoditized, but they're all different.

Therefore, a human-centric approach to addressing this market segment has never existed before, and we believe it is very important to consider it.

I am reminded of a story I heard this morning about a machine in an operating room specifically designed for Africa.

We are talking about something very similar here.

And it should be based on an approach that considers geographic impacts.

This means that in some parts of the world, governments play an important role in the development of technology.

Other parts are not.

Other parts of the world have the infrastructure to make manufacturing possible.

Other parts are not. And we have to be sensitive about how this technology can be developed and put to practical use in those regions.

And the last part is very important. This is our opinion, not shared by many, and although we seem to be isolated on this one, we truly believe that the greatest success of this effort will come from facilitating a locally integrated end-to-end ecosystem.

To see what this means, let me take South Africa as an example. I was just there so I know a little bit about some of the challenges they have.

It is a country of 45 million people. It's an emerging economy.

We are starting to grow at a tremendous rate.

They have the objective of reducing connection costs.

They have a computer company in South Africa that manufactures computers.

They are developing a software training environment within the university.

What an ideal place to build an ecosystem where you can build the hardware and software your school needs. And to my surprise, I learned that South Africa has 18 dialects. I always thought there were only two, English and Afrikaans, but it turns out there are actually 18 dialects.

And meeting the needs of this rather complex education system could only be done from within.

I don't think this market segment can be addressed by a company that just parachutes in from another part of the world and dumps their product onto the market.

Therefore, in regions of the world with large populations and the infrastructure to serve it, we believe that a local, integrated end-to-end system is critical to its success.

Here is a picture of a classroom with computers in my home country of Mexico.

This particular classroom happened to be in Michoacan.

For those familiar with Mexico, Michoacan is a very colorful state.

Children wear very colorful and colorful clothes, but it's incredible to see the power this has in the hands of children, in a computer. And it must be said that it is very easy to understand the impact of access to technology and connectivity on the lives and education of these children.

We just recently opened a learning laboratory at a school called the Nelson Mandela School in the Western Cape Province of South Africa. It's just amazing to see the faces and activities of children with access to computers.

And recently they wrote to us telling us how excited they are about the impact this has had on their lives, their educational dreams and their abilities, and it's just amazing.

We now have 30 different technicians in 18 countries and have been able to connect with millions of people to keep learning what this particular segment of the market needs and wants.

And while the million number doesn't seem like much in terms of the billions that need to be connected, I have to tell you it's just the beginning. And we are learning a lot.

And we're learning a huge amount about what we think this segment needs to be effective.

One example is one laptop per child.

Some of you may know.

It's a partnership between MIT and a group of companies (with Google and Red Hat involved), with AMD being a major player.

The electronics behind One Laptop per Child are based on AMD technology. it's a microprocessor.

But to give you an idea of ​​how creative this group of people can be, one of the goals of “one laptop per kid” is to be able to achieve 10 hours of battery life.

A school day was supposed to be at least eight hours long, so I wanted my kids to be able to use their laptops for at least one day without having to recharge them.

Engineers have done an incredible amount of innovation in this area and the product currently has 15 hours of battery life. It is the result of a lot of innovative work done by people with passion and drive to make this happen.

We expect this to be introduced towards the end of this year and we are very excited about the opportunities this offers for the education sector.

This is a very focused product that is strictly targeted to the education market in developed regions, in fact, not just developing countries. Because there are also regions in the United States that can have a big impact on our ability to make education more enjoyable and more efficient.

The project has also partnered with TED, Architecture for Humanity, to host a contest with the architectural community to find the best design for a computer lab in an emerging region, along with TED Award winner Cameron Sinclair.

And we are really excited about the opportunity to be a part of this and can't wait to see what comes out of this exciting and exciting activity.

I would like to end this presentation by going back to the beginning.

One of the things that I feel is really important in industry and business is whether you are passionate about solving these problems.

I don't think it's enough to put these things together in a spreadsheet and look at the numbers and say, "Yes, this is good business."

I really think you have to have passion.

And one of the things I learned from my parents, to give you a little anecdote, especially from my dad.

It took me a while to figure it out, but when I went to college, he said, "You're the first in my family to go to college.

And it is very important to understand that for civilization to progress, each generation must do better than the previous generation.

So this is your chance to outperform my generation. ”

Frankly, I'm not sure I really understood what he said to me at the time.

I went to college, found a girl to study with, was eager to find a girl to study with, but fell in love after college.

i graduated decided to get married.

And on my wedding day my father came to me again and said:

You have to be a better husband than I am, because that's the way to progress. ”And now he began to make sense.

Because I knew what a great husband he was. And now he started putting pressure on me again. Just like I did when I was a kid. A few years later, I had my first child. Then my father came to the hospital again. We looked through the glass and saw all the children on the other side. And my father said, “I want you to remind me again that for each generation to be better, you have to be a better father than I am.”

It was then that I realized the tremendous challenge he was setting me. because he was a great father.

But most importantly, he instilled in me a passion to wake up every morning and want to be better, to really get up and think that my role in life wasn't just about being the CEO of a Fortune 500 company.

Someday I should be able to look back and perhaps through some small contributions that each of us could make, this place would really get better.

thank you very much.

(applause)

Is there life beyond Earth in our solar system?

Wow, what a powerful question.

As scientists, planetary scientists, we didn't take it too seriously until recently.

Carl Sagan always said, "Extraordinary claims require extraordinary evidence."

And the claim that extraterrestrial life exists needs to be conclusive, it needs to be claimed loudly and exist everywhere so that we can believe it.

So how do we make this journey?

What we decided to do was first look for materials that last a lifetime.

The ingredients of life are: Liquid water -- requires a solvent. It should not be ice, it should be liquid.

We need energy too.

Also, we need organic matter, that is, not only what makes us up, but also what we need to consume.

Therefore, these elements need to be present in the environment for long periods of time in order to be confident that they can shine, grow and evolve the moment life begins.

Now, when I observed these three elements early in my career, I didn't believe they were beyond the Earth in any length of time or in any real amount.

why? We observe the inner planets.

Venus is too hot and has no water.

Mars -- dry and arid.

I have no water.

And beyond Mars, all the water in the solar system will freeze.

But a recent observation changed everything.

Our attention is now in the right place for us to look deeper and begin to really answer life's questions.

So where are the possibilities when we look to our solar system?

We are focusing on four locations.

Mars and its three moons of the outer planets: Titan, Europa, and tiny Enceladus.

But what about Mars?

Let's see the evidence.

Well, we originally envisioned Mars as a moon-like, cratered, dry, dead world.

So, about 15 years ago, we started a series of missions to go to Mars and see if there was water on Mars in the past that changed its geology.

we should be able to notice it.

And indeed, we soon began to be amazed.

Our high resolution images show past deltas, river valleys and canyons.

And indeed, Curiosity, which has been roaming the surface for about three years, has shown us that it inhabits ancient riverbeds where water was flowing rapidly.

Not for a while, but perhaps for hundreds of millions of years.

And if everything was there, including the organic matter, life would probably have begun.

Curiosity also excavated its red soil and unearthed other material.

And when we saw it, we were really excited.

Gray Mars because it was gray material, not red Mars.

We took it to the rover and tasted it, what do you think?

We tasted organic matter, carbon, hydrogen, oxygen, nitrogen, phosphorus, sulfur, and they were all present.

So, in the past, Mars had plenty of water, and perhaps life could have existed, sparked, and grown if given enough time.

And does that life still exist?

I don't know.

A few years ago, however, we started observing numerous craters.

Black lines appear on the flanks of these craters during the summer.

The more I looked, the more craters I saw and the more of these features.

We now know more than a dozen of them.

A few months ago, that fairy tale became a reality.

We announced to the world that we know what these stripes are.

It's liquid water.

During the summer, these craters shed tears.

Liquid water flows down these craters.

So what are we going to do when we see water?

Well, it turns out that Mars has all the necessary elements for life.

Perhaps two-thirds of the northern hemisphere was once covered by ocean.

Weeping water is flowing now.

liquid water on the surface.

Contains organic.

All conditions are met.

So what next?

We will launch a series of missions to begin the search for life on Mars.

And now it's more attractive than ever.

As we move into our solar system, we can see the tiny moon Enceladus here.

This is not what we traditionally call the habitable zone, the region around the sun.

This is farther away.

This object should be ice on a silicate core.

But what did we find?

Cassini has been there since 2006, flew by Enceladus and surprised us all before looking back years later.

Enceladus blew a layer of water across the solar system, raining down on the moon's surface.

What a wonderful setting!

Cassini, just a few months ago, also passed through the plume and measured silicate particles.

Where did silica come from?

It must be coming from the bottom of the sea.

Tidal energy is produced by Saturn, pulling and compressing the moon, melting its ice and creating oceans.

But it goes to the core.

Now, the only thing we can think of is a metaphor for it on this planet...

It's a hydrothermal vent.

A deep hydrothermal vent in our ocean was discovered in 1977.

Oceanographers were completely amazed.

And now there are thousands of these under the sea.

What will you find?

When oceanographers observe these hydrothermal vents, they are teeming with life, whether the water is acidic or alkaline. it doesn't matter.

Hydrothermal vents are therefore excellent homes for life on Earth.

What about Enceladus?

Well, there's water there, and it's been there for quite some time, and we believe it's a possible place for life because it probably has hydrothermal vents that contain the right organic matter.

It's probably more complicated because it's not just microbes that have had time to evolve.

Another satellite that is very similar is Europa.

Galileo visited the Jupiter system in 1996 and made spectacular observations of Europa.

Europa is also known to have crustal oceans beneath its ice.

The Galileo mission found that, but never saw the plume.

But we didn't look for them.

Just a few years ago, Hubble was observing Europa and saw a plume of water erupting from a fissure in the southern hemisphere, just like Enceladus.

These moons outside our solar system have liquid water, not what we traditionally call the habitable zone.

And if there is organic matter there, there may be life.

This is a great series of discoveries, as these moons have been in such environments for billions of years.

We believe that life began on this planet and first appeared after about 500 million years. And look at where we are now.

These months are great months.

Another satellite we're keeping an eye on is Titan.

Titan is a giant satellite of Saturn.

Probably much bigger than Mercury.

It has a spacious atmosphere.

It's so widespread, it's mostly nitrogen, with small amounts of methane and ethane, so it should be peered on radar.

Cassini found liquid on the surface.

You can see the lake...

In fact, in some places it is almost as big as the Black Sea.

And this area is not liquid water. it's methane.

If there was a place in the solar system where life wasn't like ours and instead of water there was another solvent, it might be methane, but it might be Titan.

So, does life exist in a solar system beyond Earth?

I don't know yet, but I am eagerly pursuing it.

The data we are receiving is really exciting and forces us to think about this in new and exciting ways.

We believe we are on the right track.

Within the next decade, that question will be answered.

And if we answer it in the affirmative, then there is life everywhere in our solar system.

Think about it.

we may not be alone.

thank you.

(applause)

We are stealing nature from our children.

Now, when I say this, I don't mean that we are destroying nature they would have wanted us to preserve, but unfortunately that is also the case.

What I am saying here is that we are beginning to define nature in such a pure and rigid way that no nature will remain under the definitions we make for ourselves when our children grow up.

But there is a solution for this.

Now let me explain.

Humans now live in half the world and use it to grow crops, wood, and pasture animals.

All humans combined weigh ten times the weight of all mammals in the wild.

We cut our way through the woods.

We added small plastic particles to the sand of the sea beach.

We changed the soil chemistry with artificial fertilizers.

And, of course, it also changed the chemistry of the air.

So in your next breath, you'll be breathing in 42% more carbon dioxide than you were breathing in 1750.

All these changes and many others have therefore come to be lumped together under this rubric of the Anthropocene.

And this is the word some geologists have suggested should be given to the current era given how far-reaching human influence has been.

This is still only at the proposed stage, but I think it's a useful way of thinking about the magnitude of human impact on the planet.

So where does this put nature?

What is nature in a world where everything is influenced by humans?

So 25 years ago, environment writer Bill McKibben said that nature is over because it has moved away from humans and climate change means that every centimeter of the earth has been altered by humans.

In fact, he named his book The End of Nature.

I do not agree with this. I just disagree with this.

I disagree with this definition of nature. Because we are basically animals.

right? Similarly, we have evolved here on Earth in the context of all other animals, all other plants, and all other microbes that share the same planet.

Therefore, I believe that nature is not untouched by humans, whether male or female.

I think nature is wherever life thrives, where multiple species exist together, where it thrives green and blue and grows full of life.

And under that definition, things look a little different.

Now it turns out that there is a part of this nature that speaks to us in a special way.

Places like Yellowstone, Mongolian Steppe, Great Barrier Reef and Serengeti.

A place that we think of as a representation of nature, like some kind of Garden of Eden, before it all fell apart.

And in a way they are less affected by our daily activities.

Many of these places have no roads, few roads, etc.

But ultimately, this Eden is also deeply influenced by humans.

Let's take North America as an example. Because North America is our meeting place.

So, about 15,000 years ago, when people first came here, the process of interacting with nature began. That led to the extinction of many large animals, from mastodons to giant sloths to saber-toothed tigers. All these cool animals are unfortunately not with us anymore.

And when those animals went extinct, the ecosystem didn't stand still.

Large-scale ripple effects have transformed grasslands into forests and forest composition from one tree to another.

So even in these Gardens of Eden, even in perfect-looking places that seem to remind us of our pre-human past, we are looking at landscapes that are inherently humanized.

It includes not only these prehistoric humans, but also historical humans, the indigenous peoples right up to the moment when the first settlers appeared.

And so do other continents.

Humans have been involved with nature in very influential ways for a very long time.

Well, just recently someone said to me, "Oh, but there are still wild places out there."

And I said, "Where? Where? I want to go."

And he said, "Amazon."

And I thought, "Oh, it's the Amazon. I was just there."

It is amazing. National Geographic took me to Manu National Park on the Amazon River in Peru, a vast rainforest, remote, roadless, protected national park, and in fact one of the most biodiverse parks in the world.

And when I went in there by canoe, what I found was people.

People have lived there for hundreds and thousands of years.

People live there, and it's not just floating over the jungle.

They have a meaningful relationship with the landscape.

they hunt. they grow crops.

they grow crops.

They use natural resources to build and thatch their homes.

They even have animals that we consider wild as pets.

These people are out there interacting with the environment in really meaningful ways, and you can see it in the environment.

Now, on this trip, I was with an anthropologist, and as we were going down the river he said, "There is no population void in the Amazon."

These words left a deep impression on me. Because what that word means is the whole Amazon is like this.

There are people everywhere.

And not just tropical forests, but many other tropical forests as well.

Humans have impacted ecosystems in the past, and they continue to do so today, even in less noticeable places.

Therefore, if all the definitions of nature we want to use include the absence of human intervention, or the absence of humans there, and all of them result in the fact that nature does not exist, then perhaps they are wrong definitions.

Perhaps we should define it by the existence of multiple species, the existence of thriving life.

So what do you get by doing so?

I see, it's such a miracle.

Suddenly nature is all around us.

Suddenly we saw this monarch butterfly munching on this plant and realized it was in this glade in Chattanooga.

And look at this empty lot.

So perhaps a dozen species of minimal plants grow there, supporting all kinds of insect life, and this is a completely unmanaged, completely wild space.

This is like wild nature in front of us, of which we are unaware.

And there is also an interesting little paradox.

This kind of wild and untended part of nature, the unobtrusive agricultural presence of our cities, suburbs and suburbs, is arguably more wild than national parks. Because national parks are very carefully managed in the 21st century.

The closest national park to me, Crater Lake in southern Oregon, is an example of a beautiful landscape that seems to have emerged from the past.

But they manage it carefully.

One of their current problems is the death of Japanese white pines.

White bark pine is a beautiful and charismatic plant. It can be said to be a charismatic giant plant that grows in highlands, but it is currently suffering from problems such as disease.

It is bark beetle, rust of blisters that we introduced.

To address this problem, the Park Service is planting rust-resistant white bark pine saplings in parks, even in areas that are otherwise managed as wilderness.

And as I saw last time I went hiking there, they also have beetle repellent spray installed in key areas.

And this kind of thing is actually a lot more common than you might think.

National parks are strictly managed.

Wildlife is kept in a constant population and structure.

Fire is suppressed.

A fire will occur.

Exotic species are removed.

Native species are reintroduced.

In fact, according to my research, Banff National Park is doing all of the above: fire suppression, fire starting, wolves radioing, bison reintroduction.

A lot of work goes into keeping these places pristine.

(Laughter) (Applause) And even more ironically, these places that we love the most are sometimes the ones that we love a little too much.

Many of us like to go there, but as we manage to remain stable in the face of a changing planet, they often become more vulnerable over time.

I mean, absolutely the worst place to take your kids on vacation because you can't do anything there.

Trees cannot be climbed.

You cannot catch fish.

Campfires are not permitted in secluded areas.

Pine cones cannot be taken home.

Too many rules and restrictions and from a child's perspective this is like the worst nature ever.

Because kids don't want to hike for 5 hours in beautiful scenery and then see beautiful scenery.

That might be what we want to do as adults, but what kids want to do is hunker down in one place and just tinker, just work, just pick up, build houses, build forts, things like that.

Moreover, this kind of Garden of Eden-like place is often far away from where people live.

And they are expensive to obtain. Difficult to visit.

This means it's only available to the elite, which is a big deal.

A conservation group surveyed young people and asked them how often they spend time outdoors.

And only two in five spend time outdoors at least once a week.

The remaining three of the five simply stayed indoors.

And when asked why and what are the barriers to going out, 61% answered that there is no natural area near their home.

this is crazy. This is clearly incorrect.

That means 71% of people in the US live within a 10 minute walk of a city park.

And I think this number is similar in other countries.

And that doesn't even take into account your backyard, urban stream, or vacant lot.

We all live close to nature.

All children live close to nature.

We somehow forgot how to look at it.

We spend way too much time watching David Attenborough documentaries where nature is so sexy (laughs), and we forget how to see the nature that is literally right outside our homes: the nature of the street trees.

Here's an example from Philadelphia.

There is a cool abandoned elevated railway that can be seen from the ground.

Now, this might sound like the beginning of Manhattan's High Line story, but they're developing this as a park, but it's very similar, except they haven't yet.

So for now, this is a little secret wilderness in the heart of Philadelphia, and if you know where the hole in the chain link fence is, you can clamber up to the top and find this totally wild prairie hovering above the city of Philadelphia.

All of these plants grew from seeds planted there.

This is a completely autonomous and self-willed nature.

And it's in the middle of the city.

They've sent people there to do some kind of biological research, and there are over 50 species of plants there.

And it's not just plants.

This is an ecosystem, a functioning ecosystem.

I am making soil. It sequesters carbon.

Pollination is progressing.

So this is just an ecosystem.

So scientists started calling such ecosystems "new ecosystems" because they are often dominated by alien species and are so bizarre.

They are unlike anything we have seen before.

For too long we ignored all these new ecosystems as garbage.

We are talking about regrown agricultural land, timber plantations that are not routinely managed, secondary growth forests in general, and the entire East Coast where forests emerged after agriculture moved west.

And, of course, for most of Hawaii, new ecosystems are the norm, with exotic species completely predominating.

The forests here have Queensland maples and sword ferns from Southeast Asia grow.

You can also create your own new ecosystem.

It's very simple.

Just stop mowing the lawn.

(Laughter) Iruka Hanski, an ecologist from Finland, did this experiment himself.

He stopped mowing the lawn. A few years later, I had some graduate students come over and do something like a backyard bioblitz, and I found 375 plant species, including two endangered species.

So when you're on Philadelphia's future High Line, surrounded by this nature, surrounded by this diversity, this abundance, this vibrancy, you look to the side and you see the playground of your local school. That's how it looks.

These kids have it. By my definition, there are many places on Earth that are considered natural, but this is one of the few that is not.

There is nothing there but humans, other plants and other animals.

And what I really wanted to do was throw the ladder to the side and have all my kids come with me to this cool prairie.

In a way, I feel like this is the choice we have to make.

If we dismiss these new qualities as unacceptable, crappy, or useless, we may just pave them.

And in a world where everything is changing, we have to be very careful about how we define nature.

In order not to steal it from our children, we must do two things.

First, nature cannot be defined as pristine.

This didn't mean anything anyway.

Nature has remained untouched for thousands of years.

And most of the nature that most people can visit and relate to is excluded, and only nature that children should not touch is included.

So remember the second thing we have to do. It means that children must be exposed to nature. Because untouched things are not loved.

(Applause.) We're facing some pretty tough environmental challenges on this planet.

Climate change is among them.

We have others, too. Habitat loss is my favorite thing to freak out about in the middle of the night.

But to solve them, we need smart and dedicated people who care about nature.

And the only way to raise a generation that cares about nature is to get them in contact with it.

I have a bastion theory of ecology, a bastion theory of conservation.

Every ecologist, conservation biologist, conservation professional I know built a fort as a child.

If one generation does not know how to build a fort, another generation will not know how to take care of nature.

And I don't want to be the one who tells this kid who is in a special program that takes children from poor neighborhoods in Philadelphia to the city's parks that the flower he has is an alien invasive weed and should be thrown out in the garbage.

Rather, I would like to learn from this boy that wherever this plant comes from, it is beautiful and worthy of being touched and appreciated.

thank you.

(applause)

There is a fact I read somewhere that I really like. One of the things that contributed to Homo sapiens' success as a species is the lack of body hair. Our hairlessness, nudity, combined with the invention of clothing, gives us the ability to regulate our body temperature and thus survive in any climate we choose.

And now we have evolved to the point where we cannot live without clothes.

And it's not just practical, it's also communicative.

Everything we choose to wear is a story, a story about where we've been, what we're doing, and who we want to be.

I was a lonely child

Finding friends to play with was not easy, and I ended up creating a lot of the games myself.

I made many toys by myself.

It started with ice cream.

There was a place called Baskin Robbins in my hometown that served ice cream in giant 5 gallon cardboard tubs behind the counter.

And someone told me, when I was eight years old, that when I was done using that tub, I would wash it and put it in the back so that I could borrow it if I asked.

It took me a few weeks to muster up the courage, but I did, and so did they.

They gave it to me - I went home with this beautiful cardboard tub.

I was wondering what I could do with this exotic material: metal rings on the top and bottom.

As I started flipping it around in my head, I realized, "Wait a minute, my head actually fits inside this thing."

(Laughter) Yeah, I drilled a hole and put acetate in there and made a space helmet.

(Laughter) I needed a place to put my space helmet on, so I found a refrigerator box a few blocks from my house.

I pushed it home and turned it into a spaceship in my parents' guest room closet.

I started by making a control panel out of cardboard.

I cut a hole for the radar screen and put a flashlight under it to light it up.

I installed the viewscreen off the back wall. This is where I thought I was very smart. Without permission, I painted the wall behind my closet black, put up a starry sky, lit it with Christmas lights I found in my attic, and went on a few space missions.

A few years later, the movie "Jaws" was released.

I was too young to see it, but like everyone else in America at the time, I was caught up in the "Jaws" fever.

The store windows in my town were decorated with "Jaws" costumes. My mother must have heard me talking to someone about how great this costume is. A few days before Halloween, my mom gave me this Jaws costume and it blew my mind.

Okay, I know it's a bit of a metaphor for people of a certain age to complain that kids these days don't know how good they are, but here's a random sample of entry-level kids' costumes you can buy online right now...

...and this is the "Jaws" costume my mom bought me.

(Laughter) It's a paper-thin shark face and a vinyl bib with a Jaws poster on it.

(Laughter) And I loved it.

A few years later my father took me to a movie called "Excalibur".

I actually had him take me there twice, which is no big deal. Because this movie is R-rated hard movie.

But it wasn't the blood, guts, or boobs that made me want to go see it again.

They helped -- (laughter) it was the armor.

The armor of "Excalibur" was mesmerizingly beautiful.

They were literally knights in mirror-polished armor.

In addition, the knights of "Excalibur" wear armor everywhere.

I always wear it when I have dinner and when I go to bed.

(Laughter) I thought, 'Are they reading my mind?'

I want to wear armor all the time! ”

(Laughs) So I went back to my favorite material, cardboard as a starting point, and made my own armor with a neck shield and a white horse.

I sold too much, so here is a picture of the armor I made.

(Laughter) (Applause) Well, this is just the first Excalibur-inspired armor I made.

Years later, I persuaded my father to set about making me a suitable armor.

Over the course of about a month, he graduated me from cardboard to roofing aluminum called flashing to one of my favorite mounting materials: POP rivets.

We spent that month carefully constructing an armored articulated suit made of intricately curved aluminum.

I cut a hole in my helmet so I could breathe, finished it in time for Halloween, and wore it to school.

Now, this is the only part of this talk that I can't show you the slides for. Because no photo of this armor exists.

I wore it to school. A yearbook photographer was patrolling the hallways, but he couldn't find me. The reason will become clear later.

There were a few things I didn't expect about wearing a full suit of aluminum armor to school.

In the third math class, I stood at the end of the class, but the armor prevented me from sitting, so I stood at the back of the class.

(laughs) This is the first thing I didn't expect.

Then, about halfway through the class, the teacher looked at me worriedly and said, "Are you feeling okay?"

I'm thinking, "Are you kidding me? Am I feeling okay?"

I'm wearing armor! I'm having my time—" And just as I was about to tell her how wonderful I was feeling, the classroom began to tilt to the left, disappearing into this long tunnel, and then I woke up in the infirmary.

I fainted from heat stroke while wearing my armor.

And when I woke up, I wasn't ashamed of passing out in front of class thinking, "Who took my armor? Where is my armor?"

OK, fast forward many years, some colleagues and I were hired to create a show called "MythBusters" for the Discovery Channel.

And over the course of 14 years, I learned on the job how to build an experimental methodology and how to tell a story about it on television.

We also learned early on that costumes can play an important role in this storytelling.

We use costumes to add humor, comedy, color, and narrative clarity to the stories we tell.

Then I do an episode called "Trash Diving" where I learned a little more about the deeper meaning of what the costume means to me.

In the episode "Trash Diving," the question we were trying to answer was, "Is jumping into trash cans as safe as the movies make you believe?"

(Laughter) This episode was going to have two different parts.

One was where stuntmen were trained to jump off buildings into airbags.

And the second was graduation to experimentation. I filled the trash can with the ingredients and jumped into it.

I wanted to visually separate these two elements, so I said, 'In the first part, you're training, so you should be wearing a sweat suit. Oh! Let's put 'Stunt Trainee' on the back of the sweat suit.

It's for training. ”

But for the second part, I wanted something very visually impressive. "Okay! I'm going to dress up as Neo from The Matrix." (Laughter) So I went to Haight Street.

I bought a pair of beautiful knee high buckle boots.

I found a long, flowing coat on eBay.

I got sunglasses, but I had to wear contact lenses to wear them.

The day of the experimental shoot approached, and when I got out of the car in this costume, the staff stared at me...

And begin to suppress the laughter of the church.

Like "(laughter)".

And at this moment I feel two different things.

I am completely embarrassed by the fact that it is clear to the crew that I am obsessed with wearing this costume.

(Laughs) But the producer in my head reminds myself that the coat flowing behind me would look beautiful in a high speed shot in slow motion.

(Laughter) Five years after running MythBusters, we were invited to perform at San Diego Comic-Con.

I've known about Comic-Con for years, but never had the time to go.

This was the big leagues and a mecca for costumes.

People come from all over the world to showcase their amazing work on the San Diego floor.

And I wanted to participate.

I chose to anonymously walk the floor of San Diego Comic-Con in an elaborate full-body costume.

what costume did i choose?

hell boy.

It's not my costume, it's actually Hellboy.

(Laughter.) But I spent months putting together a Hellboy costume that was as true to the screen as possible, from the boots to the belt to the pants to the Right Hand of Doom.

I found someone who artificially made Hellboy's head and chest, so I put it on.

I also got a prescription for contact lenses.

I wore this on the Comic Con floor and I can't even tell how hot it was in that costume.

(laughs) I'm sweating! I should have remembered this.

I sweat profusely and my contact lenses hurt my eyes, but that doesn't matter because I'm totally in love.

(Laughter) Not just the process of walking the floor in this costume, but the community of other costumers as well.

At Cons it's not called a costume, it's called a "cosplay".

Now, ostensibly cosplay means people dressing up as their favorite characters from movies and TV, especially anime, but it's so much more than that.

They don't just find a costume and put it on, they put them together.

They bend them to their will.

They turn them into the characters they want to be in the work.

They are so smart and talented.

They fly extraordinary flags and it's beautiful.

(Laughter) But more than that, they rehearse costumes.

Comic-Con and other conventions don't just take pictures of people walking around.

You approach and say, "Hey, I love your outfit, can I take a picture of you?"

And give them time to pose.

They practiced their poses so that their costumes would look good on camera.

And so beautiful to look at.

And I take this to heart.

Later in Cons, I learned how to stagger Heath Ledger as the Joker in The Dark Knight.

I learned how to be a scary ringwraith from "Lord of the Rings" and it actually scares some kids.

I learned "huh huh huh", that head laugh that Chewbacca makes.

Then I dressed up as No Face from "Spirited Away".

Even if you don't know about "Spirited Away" or director Hayao Miyazaki, we welcome you.

(Laughter) This is a masterpiece and one of my favorite movies.

This is a story about a young girl named Chihiro who gets lost in the spirit world of an abandoned Japanese theme park.

And she finds a way to escape again with the help of a few friends, the captured dragon Haku and the lone demon No Face.

No-Face wants to make friends because he is lonely, and thinks the way to do it is to seduce them to create money in his hands.

However, this doesn't go very well and he ends up going on a kind of rampage until Chihiro saves him.

So I made a no-face costume and wore it on the Comic-Con floor.

And I carefully practiced the no-face gesture.

I decided never to speak in this costume.

When people asked me to take their picture, I nodded and stood shyly next to them.

As they took pictures, I sneaked a chocolate coin out of the back of my robe.

And at the end of the photo process, I show it to them.

oh oh oh! ――It's like that.

And people were panicking.

"Oh my god! No face gold! Oh my god this is so cool!"

And I'm feeling and walking on the floor and it's amazing.

And something happens in 15 minutes or so.

Someone grabbed my hand and put the coin back into it.

Maybe they'll give you coins in return, but no, this is one of the coins I gave you.

i don't know why

And then keep going and take more pictures.

And the same thing happens again.

You see, I can't see anything in this costume.

I can see the inside of the mouth, I can see the person's shoes.

I can hear what they are saying and I can see their feet.

But the third time someone gives me the coin back, I'd like to know what's going on.

So when I tilted my head back to get a better view, I saw someone walking away from me like this.

And then it occurred to me that taking money from No Face is bad luck.

In the movie "Spirited Away", bad luck befalls those who steal money from No Face.

This is not a performer/audience relationship. This is cosplay.

All of us on that floor are pouring ourselves into stories that are meaningful to us.

And we make it our own.

We are connected to what is important within us.

And costumes are how we reveal ourselves to each other.

thank you.

(applause)

What do you do when you need to know, validate and understand the information behind 11.5 million documents?

That was the challenge a group of journalists had to face late last year.

An anonymous individual calling himself John Doe has somehow managed to copy nearly 40 years of records from the Panamanian law firm Mossack Fonseca.

It is one of many companies around the world that specialize in opening accounts in offshore tax havens like the British Virgin Islands for the wealthy and powerful who want to keep their secrets.

John Doe has successfully copied all the company's spreadsheets, all client files, and all emails from 1977 to the present.

It was the largest cache of insider information into a tax haven system that anyone had ever seen.

But it also poses a major challenge for investigative journalism.

please think about it. 11.5 million documents containing secrets of people in over 200 countries.

Where do you even begin with such vast resources?

Where do we begin to tell a story that spans every corner of the earth and can affect almost everyone in any language, sometimes in ways people don't yet know?

John Doe provided the information to two journalists from the German newspaper Süddeutsche Zeitung.

He said the motivation—and I quoted—is "the scale of the fraud that the documents will reveal."

But no single user can make sense of such a wealth of information.

So Süddeutsche Zeitung contacted my organization in Washington, DC, the International Union of Investigative Journalists.

We decided to do the exact opposite of everything we've been taught as journalists: share.

(Laughter) By nature, investigative reporters are lone wolves.

We keep our secrets strictly. Sometimes even our editors know that the minute we tell them what we have, they want that story right away.

And frankly, when you get a good story, you want that glory for yourself.

But there is no doubt that we live in a shrinking world, and that the media have been slow to realize this.

The problems we report are increasingly cross-border.

Giant companies operate on a global scale.

The environmental and health crisis is global.

The same goes for money flows and financial crises.

It therefore seems surprising that journalism is so late in reporting stories in a truly global manner.

It also seems surprising that journalism, far from being afraid of technology, is so slow to wake up to the possibilities it brings.

Here's why journalists fear technology. Because the industry's biggest institutions are in trouble because of changes in how people consume news.

The advertising business model that supported the press has collapsed.

And this puts journalism in crisis, forcing these institutions to rethink their functioning.

But where there is danger, there is also opportunity.

The first challenge posed by what would later become known as the Panama Papers was to make the documents searchable and readable.

There were nearly 5 million emails, 2 million PDFs that needed to be scanned and indexed, and millions of files and other types of documents.

All of these had to be stored in a safe place in the cloud.

Then we invited reporters to look at the documents.

In total, journalists from over 100 media outlets in 76 countries participate, from the BBC in the UK to Le Monde newspaper in France to Asahi Shimbun in Japan.

We named it "Native Eyes on Native Names". The idea is, wouldn't it be Nigerian journalists who best communicate who matters to Nigeria?

Who is better in Canada than Canadians?

There were only two rules for everyone invited. Everyone agrees to share whatever they find with others, and everyone agrees to publish it together on the same day.

We chose our media partners based on the trust we've built through previous small-scale collaborations and the leads out of the document.

Over the next few months, my small non-profit organization of less than 20 people was joined by over 350 other reporters from 25 language groups.

The greatest information leak in history produced the greatest journalistic collaboration in history. A group of 376 locals did what journalists don't usually do, working side-by-side, sharing information, but telling no one.

For at this point it became clear that the loudest noise first required the loudest silence.

To manage projects over the months, we built a secure virtual newsroom.

We have built a specially designed search engine using an encrypted communication system.

Inside the virtual newsroom, reporters were able to converge on the themes that emerged from the document.

For example, someone interested in blood diamonds or exotic art could share information about how the offshore world was used to hide trade in these commodities.

Those interested in sports can share information about how famous sports stars offer their likeness rights to offshore companies, thereby avoiding taxes in the countries in which they do business.

But perhaps most intriguing were the numbers of world leaders and elected politicians that the documents revealed -- such as Ukraine's Petro Poroshenko, Russia's Vladimir Putin's close associates and British Prime Minister David Cameron, who is related through his late father Ian Cameron.

Buried among the documents were clandestine overseas corporations, such as the British Virgin Islands company Wintris, which was actually owned by the sitting Icelandic prime minister.

I would like to call Johannes Kristjansson, the Icelandic journalist who invited me to participate in this project, "the loneliest man in the world."

For nine months he refused paid work and lived on his wife's earnings.

He put tarps on the windows of his home to keep prying eyes out during the long Icelandic winters.

And since I was working red-eyed every night of the month, I soon ran out of excuses to explain my frequent absences.

All the while, he stared at the information that would ultimately overthrow the country's leader.

Now, when you're an investigative reporter and you make a startling discovery that the Chancellor may be connected to a secret offshore company that has financial interests in Icelandic banks, which is exactly the question he was elected to, your instincts will make you want to shout out loud.

Instead, Johannes and I, as one of the few people who could speak to him, shared a kind of gallows humor.

"Wintris is coming," he used to say.

(Laughter.) (Applause.) We were huge Game of Thrones fans.

When a reporter like Johannes wanted to shout, we turned that shout into a story by shouting inside the virtual newsroom, going outside the docs to look up court records and official company registers, and finally asking questions of the reporters we thought we'd name.

In fact, the Panama Papers allowed reporters to see the world through a different lens than other people.

As we were researching this story, a large political bribery scandal broke out in Brazil that had nothing to do with us.

A new leader was elected in Argentina.

The FBI has launched an indictment against FIFA, the organization that oversees the professional football world.

In fact, the Panama Papers contained unique insights into each of these unfolding events.

So you can imagine the pressure and ego drama that might undermine what we were trying to do.

Any one of these journalists may have broken the pact.

But they didn't.

And on April 3rd of this year, at exactly 8 pm German time, we published simultaneously in 76 countries.

(Applause.) The Panama Papers quickly became one of the biggest stories of the year.

This is the landscape of Iceland the day after we published it.

It was the first of many protests.

The Icelandic prime minister had to resign.

It was the first of many resignations.

It put the spotlight on many celebrities, including the world's most famous footballer, Lionel Messi.

And there were some unintended consequences.

These alleged members of the Mexican drug cartel were arrested after we released the details of their hideout.

They used that address to register their offshore company.

(Laughter) There's a certain irony in what we've done so far.

The technology that disrupted business models, the internet, has allowed us to reinvent journalism itself.

And this dynamic is creating an unprecedented level of transparency and influence.

We have shown how a group of journalists can make a difference in the world by applying new methods and old-fashioned journalism techniques to the vast amounts of leaked information.

We have put very important context into the content given by John Doe.

And sharing resources allowed us to go a lot deeper, longer, and deeper than most media organizations allow these days due to financial concerns.

This is a big risk, and it doesn't work for every article, but we showed in the Panama Papers that you can write about any country from anywhere and choose your preferred battlefield to defend your work.

Try to get a court injunction that prevents you from telling the story in 76 countries.

Try to stop the inevitable.

Shortly after publication, I received a three-word text from Johannes that said, "Wintris has arrived."

(Laughter) It has arrived, and perhaps a new era of journalism has arrived.

thank you.

(Applause) Bruno Giussani: Thank you, Gerard.

You're going to give that applause to the 350 journalists you've worked with, right?

Now, I would like to ask you a few questions.

First, you've been working in secret for over a year with over 350 colleagues from all over the world, and have you ever had a moment where you thought information might be leaked or that collaboration would be broken by someone publishing an article?

Or did you publish information that someone who did not belong to the group got to know?

Gerald Lyle: We encountered a series of crises along the way. That includes when there's something big going on in the world and journalists in that country want to run a story right away.

We had to calm them down.

We sent a series of questions to Vladimir Putin officials, but instead of answering them, the Kremlin actually held a press conference to accuse us and possibly blame it all on a Western conspiracy.

At that point, Putin thought it was his problem.

And of course many editors around the world were very uneasy about this.

They thought the story would be revealed.

You can imagine the amount of time, resources and money they put into this.

So I basically had to spend the last week calming everyone down, like a general detaining an army, saying, "Calm down, calm down."

And eventually, of course, they all did.

BG: And then a few weeks ago we released a lot of the documents as an open database that basically anyone can search by keyword.

GR: We strongly believe that basic information about the offshore world should be made public.

Well, we didn't release the underlying documents of the journalists we worked with.

However, basic information such as the person's name, what the offshore company is and the name of the company are all available online today.

In fact, the largest resource of this kind is basically there right now. BG: Gerald, thank you for your work.

GR: Thank you.

(applause)

I would like to talk about the future of money.

Let's start by talking about this culture called the Yap people who lived in Micronesia in the early 1900s.

Now, I would like to talk about the Yap people. Because their form of money is very interesting.

They use these limestone discs called ryestone.

Now, the Yaps don't actually move or trade these rye stones like we do with coins, as rye stones can be quite huge.

The largest is about 4 tons and 12 feet in diameter.

So the Yaps just keep track of who owns which piece of stone.

There is a story that when sailors were carrying a stone across the sea, they ran into trouble and the stone actually fell.

The sailors returned to the main island and told everyone what had happened.

And everyone decided that, in fact, yes, the sailors had the stone, so why not? -- It still counted.

Even under the sea, it was still part of the Yap economy.

You might think this was just a small culture 100 years ago.

But things like this happen in the Western world as well, and the Yaps actually still use these stone forms to this day.

In 1932, the Banque de France asked the United States to convert its holdings from dollars to gold.

But the thought of actually shipping all that gold to Europe was too inconvenient.

So instead, someone just went to where the gold was kept and labeled it now French.

And everyone agreed that France owned the gold.

It's just like rye stone.

What I'm trying to say in these two examples is that dollars, stones, and coins have essentially nothing of value.

The only reason these things are worth it is because we all decide they should.

And because we decided so, so will they.

Money is the exchanges and transactions we make with each other.

Money is not objective.

It's the collective story we tell each other about our values.

collective fiction.

And it's a really powerful concept.

In the last 20 years we have started using digital money.

Therefore, I receive payment by direct deposit, rent is paid by bank transfer and taxes are paid online.

And every month, a small amount of money is taken out of my paycheck and invested in a mutual fund in my retirement account.

All of these interactions literally just change 1's and 0's on your computer.

Not even physical things like stones or coins.

Thanks to digital money, we can now pay people all over the world in seconds.

This works because we have a large agency that takes on the changing 1's or 0's on the computer.

And when they don't, it's often the fault of those large organizations.

At least it's up to them to solve the problem.

And in many cases it is not.

There is a lot of friction within the system.

How long did it take US credit card companies to introduce chip and pin?

Half of my credit cards still don't work in Europe.

That's friction.

Sending money across borders and currencies is very costly and frustrating.

Entrepreneurs in India can set up an online business in minutes, but getting a loan and getting paid can be difficult. In other words, there is friction.

Our access to digital money and the ability to trade freely are seized by these gatekeepers.

And the system is full of obstacles that slow things down.

Because digital money isn't really mine, it's an entry in a database that belongs to my bank, my credit card company, or my investment firm.

And these companies have the right to say no.

If I'm a PayPal merchant and PayPal mistakenly flags me as a scam, so be it.

Your account will be frozen and you will not be able to make payments.

These institutions stand in the way of innovation.

How many people use Facebook Photos, Google Photos, Instagram?

My pictures are all over the place.

They're on my phone, on my laptop, on my old phone, on Dropbox.

They exist on various websites and services.

And most of these services cannot work together.

They do not interoperate.

As a result, my photo library is a mess.

The same thing happens when financial institutions control the money supply.

Many of these services are not interoperable and as a result prevent you from doing what you can with payments.

And it raises transaction costs.

So far, we've been through two phases of money.

In the analog world, these physical objects had to be dealt with, and money moved at a constant speed, human speed.

In the digital world, money can travel farther and faster, but we are at the mercy of these gatekeepers.

Money only moves at the speed of banks.

We are entering a new phase of money.

The future of money is programmable.

Combining software and currency makes money more than just a static unit of value and eliminates the need to rely on institutions for security.

In a programmable world, humans and organizations are kept out of the loop.

And when this happens, we don't even feel like we're trading anymore.

Money is guided by software to flow safely and securely.

Cryptocurrencies are the first step in this evolution.

Cryptocurrency is digital money that is not run by a government or bank.

It is money designed to work in a world without intermediaries.

Bitcoin is the most popular cryptocurrency, but there are hundreds of different types.

Ethereum, Litecoin, Stellar, and Dogecoin are just a few of the most popular.

And these things are real money.

Bitcoin is accepted at the sushi restaurant on my street.

There is an app for buying sashimi on your mobile phone.

But it's not just small transactions.

In March, there was a transaction that moved about 100,000 bitcoins.

This is equivalent to US$40 million.

Cryptocurrencies are based on a special branch of mathematics called cryptography.

Cryptography is the study of ways to secure communications, and it covers two very important things. One is masking information to hide it from view and the other is verifying the source of the information.

Cryptography underpins many systems around us.

And it's so powerful that the US government has actually classified it as a weapon.

During World War II, cracking encryption systems like Enigma was critical to deciphering enemy communications and turning the tide of war.

Anyone with a modern web browser today runs a very sophisticated cryptosystem.

This is used to secure your interactions over the internet.

This makes it safer for you to enter passwords and send financial information to websites.

So what banks used to offer — trusted digital money transfers — can now be achieved through the clever application of encryption.

This means you no longer need to rely on your bank to secure your transactions.

We can do it ourselves.

Bitcoin is based on the exact same idea used by the Yap people: a global body of knowledge about money transfers.

With bitcoin, I pay by sending bitcoins and get rewarded when someone sends me bitcoins.

Imagine if there was this magic paper.

The way this paper works is that if I give you the sheet and write something on it, it will magically appear in my work.

Let's say you give this piece of paper to everyone and write down the money transfers they are making in the Bitcoin system.

All of these transfers are copied onto someone else's paper.

And if you look at mine, you'll get a list of all transfers going on across the bitcoin economy.

This is actually what happens in the Bitcoin blockchain, which is a list of all Bitcoin transactions.

However, it is not done through paper.

It runs through computer code and runs on thousands of networked computers around the world.

All of these computers collectively check who owns which bitcoins.

The Bitcoin blockchain is therefore the core of how Bitcoin works.

But where did Bitcoin actually come from?

This code is designed to create new bitcoins on a schedule.

And the way it works is that you have to solve a puzzle, a random cryptographic puzzle, to get Bitcoin.

Imagine you had 15 dice and you were rolling those dice over and over again.

If the dice rolls a 6, we say we win.

This is very close to what these computers actually do.

They try again and again to get to the correct number.

And when they do, we say they solved the puzzle.

A computer that solves a puzzle publishes its solution to the rest of the network and receives new bitcoins as a reward.

And in the act of solving this puzzle, these computers actually help secure the Bitcoin blockchain and add to the list of transactions.

In fact, there are people all over the world running this software and we call them Bitcoin miners.

Anyone can become a Bitcoin miner.

Download the software now, run it on your computer and start collecting bitcoins.

I cannot recommend it. The puzzles are so hard at the moment and the network is so powerful that if you try to mine bitcoin with your laptop, you probably won't find it for about 2 million years.

Professional miners use this special hardware designed to solve puzzles quickly.

Now, the amount of energy the Bitcoin network and all this special hardware uses is estimated to be the equivalent of a small country.

So the first set of cryptocurrencies is a little slow and a little unwieldy.

But the next generation will be better and faster.

Cryptocurrency is the first step towards a world of globally programmable money.

And in a world of programmable money, you can safely pay others without signing up, asking for permission, converting, or worrying about running out of money.

And you can send money all over the world.

This is really amazing.

That is the concept of permissionless innovation.

Because the Internet was built on an open architecture, it sparked an explosion of innovation.

And just as the Internet has changed the way we communicate, programmable money will change the way we pay, allocate and determine value.

So what kind of world will programmable money create?

Imagine a world where my medical data could be rented out to pharmaceutical companies.

They can perform extensive data analysis and provide me with cryptographic evidence that they are using my data only in ways we have consented to.

And they can pay me for what they discover.

What if, instead of signing up for a streaming service and receiving cable bills, my TV analyzed my viewing habits and recommended affordable content that I could enjoy on a budget?

Imagine an internet without ads. Because you don't pay attention when you watch content, you just pay.

Interestingly, things like micropayments will actually change how security works in our world. Because when people are able to allocate value better, they spend their money and energy more constructively.

If it didn't cost you a penny to send an email, would spam still exist?

We have not reached this world yet, but it is getting closer.

Right now, it's like we're in a world where cars are coming for the first time.

The first virtual currencies, like the first cars, are slow, hard to understand, and hard to use.

Digital money works just as well as horse-drawn carriages, and the entire global economy is built on it.

If you're the first person in your neighborhood to own a car with an internal combustion engine, your neighbors will probably think you're crazy. "Why would you want this big, clumsy machine that always breaks down, catches fire, and is slower than a horse?"

But we all know how that story will turn out.

We are entering a new era of programmable money.

And it's very exciting, but it's also a little scary.

Cryptocurrencies can be used for illegal transactions in the same way that cash is used for crime in today's world.

If all our transactions are done online, what does that mean for surveillance? Who can see what we do?

Who has an advantage in this new world and who doesn't?

Do I need to start paying for things I never had to pay before?

Are we all slaves to algorithms and utility functions?

All new technology comes with trade-offs.

The Internet has given us many ways to waste time.

But at the same time, productivity has increased significantly.

Cell phones are annoying because they make you feel like you have to be connected to work all the time.

But they also help us stay connected with friends and family.

Some jobs will be lost to the new sharing economy.

But it will also create new flexible forms of employment.

Using programmable money decouples the need for a large trusted authority from the architecture of the network.

And this pushes money innovation to the corner where it should be.

Programmable money democratizes money.

And because of this, things will change and unfold in ways that even we cannot predict.

thank you.

(applause)

If you can dream, you can solve the most complex problems of our time with simple techniques.

As a child, I discovered that creativity was the key to crossing from dream to reality.

I learned this from my grandmother, Dr. Ruth Tichauer, a Jewish refugee who settled in the heart of the Andes.

That's how I was raised. I was encouraged to look beyond all limits.

So part of my education involved helping her in a faraway indigenous community.

I cherish those memories because they helped me understand the language and culture of life outside the city, with many possibilities without barriers.

During these trips, my grandmother would often recite Kipling's poems. "Something is hidden. Go find it.

Go and look behind the mountain.

Something was lost beyond the mountains.

I'm lost and waiting for you go! "

A few years later, I became a medical student.

1 in 100 children born worldwide has some form of heart disease.

There are parts of this problem that I think I can solve. Part of this problem is something I've spent my life working on.

Problems begin during pregnancy.

A fetus must live inside its mother.

Survival depends on communication between systemic and pulmonary blood.

At the moment of birth, this communication must stop.

If it doesn't close, your baby's heart has a hole.

Caused by prematurity or genetic conditions.

But what we know today is that lack of oxygen is also a factor.

As can be seen from the graph, the frequency of these types of holes increases dramatically with increasing altitude.

Video: (Crying Baby) When I see patients with this condition they seem to be breathing hard.

Major surgery was once the only solution to close the hole.

One night my friend Marte was camping in the Amazon region.

The only thing that didn't burn in the fire was the green avocado branch.

Then came the moment of inspiration.

So we used that branch as the mold for our first invention.

It might fill the hole in the hearts of children.

A coil is a wire wrapped around itself.

It may not look all that flashy now, but this was our first successful attempt at creating a device for this big problem.

This video shows how a tiny catheter carries the coil to the heart.

A coil then closes the hole.

After this moment of inspiration, it took a very long time to develop the prototype.

In vitro and in vivo studies required thousands of hours of lab work.

If the coil works, it can save lives.

From Germany, I returned to Bolivia, thinking that wherever I went, I had the opportunity to make a difference.

Together with my wife and partner, Dr. Alexandra Heath, we began seeing patients.

After successfully treating a patient using our coils, we felt really enthusiastic.

But we live at an altitude of 12,000 feet.

And patients there need special devices to fix their heart conditions.

The holes in high altitude patients are different due to the larger openings between arteries.

Most patients do not receive treatment on time and die.

Only half of the Bolivian patients were successfully treated with the first coil.

The search began again.

We went back to the drawing board.

After many trials and with the help of my grandmother's indigenous friends in the mountains, we got a new device.

For centuries, indigenous women have told stories by weaving intricate patterns on looms, but unexpected skills have benefited new devices.

We took this traditional weave and crafted our designs with smart materials that record their shape.

This time, it seems that he was able to make a seamless and rust-free device because he made it in one piece with this weaving method.

A procedure that has taken decades to develop can turn itself into a very complex structure.

As you can see, the device enters the body through natural pathways.

The doctor only needs to close the catheter through the hole.

Our device is placed expanded to close the hole.

We have a beautiful delivery system that works independently and is very easy to use.

No laparotomy was required.

(Applause.) As physicians, we fight diseases that take a long time and effort to heal.

Here is the child before and after surgery.

As you can see -- (applause) As you can see, once the device is put on, the patient is 100% healed.

From start to finish, the entire procedure takes just 30 minutes.

This is very beneficial from a medical and human point of view.

We are very proud to have some of our former patients on our team. This is thanks to the close contact we have with the patients we work with.

We only have one idea together. That said, the best solutions should be simple.

No more fear of creating new things.

That way, it's not easy.

Many failures occur all the time.

But we are empowered by our patients.

Their resilience and courage inspire our creativity.

Our goal is to leave children behind, not because of cost or access.

Therefore, you should start your foundation with a one-to-one model.

We provide one free device to ensure every child gets treatment.

We are in many countries now, but we need to be everywhere.

It all really started and continues with one impossible idea: leave no child behind.

Thank you very much.

(applause)

So when I decided to create an art piece in Mansiyat Nasser, a garbage dump neighborhood in Cairo, Egypt, I had no idea that this project would be the most amazing human experience I have ever lived.

As an artist, I had a humanitarian intention to bring art to and beautify poor and neglected areas and hopefully shed some light on this isolated community.

I first heard about this Christian Coptic community in 2009 when Egyptian authorities under Hosni Mubarak decided to slaughter 300,000 pigs on the pretext of the H1N1 virus.

Originally they were pig breeders.

Their pigs and other animals are fed organic waste collected daily.

This event cost them their livelihood.

When I first entered Mansiyat Nasser, it was like a maze.

I was looking for Saint Simon Monastery on top of Mukattam Mountain.

That is, go right, then straight, then right again, then left until you reach the top.

But to get there, you have to dodge between trucks full of garbage, or slalom between tuk-tuks, the fastest vehicle to get around the neighborhood.

The smell of garbage unloaded from the truck was strong and the traffic noise was loud and loud.

Add to that the noise generated by the crusher in the warehouse along the way.

It looks chaotic from the outside, but everything is perfectly organized.

Zalayeb, as they call themselves, means pig breeders, who continue to collect Cairo's garbage and sort it in their own neighborhoods.

They have developed one of the most efficient and profitable systems in the world.

Yet the place is perceived as dirty, alienated and segregated due to its association with trash.

So my first idea was to create an anamorphic piece, a piece that can only be seen from one point of view.

I wanted to give myself an artistic challenge by painting some buildings and making them fully visible from only one point on Mount Mukattam.

Mukattam Mountain is the pride of the community.

This is where they built the Monastery of St. Simon, a 10,000-seat cave church carved into the mountain itself.

So when I stood on top of the mountain and looked around for the first time, I asked myself how could I convince all of these owners to allow me to paint the buildings.

Then Magdo came.

Magdo is a guide from the church.

He said the only person I needed to convince was the community leader, Father Samman.

But to convince Father Saman, he had to convince Mario, a Polish artist who had moved to Cairo 20 years earlier and created all the artwork for the stave church.

I am very grateful to Mario. He was the key to the project.

He managed to arrange a meeting between me and Father Samman. And surprisingly, he liked the idea.

He asked me where I had painted before and how I would make it happen.

And he was mostly worried about what I was going to write.

I write messages in the style of Arabic calligraphy on all my creations.

I make sure that those messages are relevant to the places I'm describing, but they also have a universal dimension that everyone in the world can relate to.

So I decided to write in Arabic the words of St. Athanasius of Alexandria, a 3rd-century Coptic bishop, for Manshiyat Nasser. he said: (Arabic) This means in English, "Whoever wants to see the sunshine clearly must first wipe his eyes."

It was very important to me that the community felt connected to the word.

And for me, this quote perfectly reflected the spirit of the project.

Father Samman then blessed the project and with his approval all the residents were to participate.

Hundreds of liters of paint, a dozen blue manual lifts, several round trips to Cairo, a strong and solid team from France, North Africa, the Middle East and the United States, and a year of planning and logistics, our team and members of the local community created works spread across 50 buildings, some of which fill the calligraphic spaces I traced with color.

Blue here, yellow there, and orange there.

Some people carry sandbags and secure manual lifts to the roofs of buildings, while others assemble and disassemble the same lifts to move within different buildings.

At the beginning of the project, we numbered all the buildings on sketches, but there was no real interaction with the community.

People didn't get the point of all this.

But soon those building numbers became family names.

The first building was Uncle Ibrahim's house.

Uncle Ibrahim is a very enthusiastic person.

He was always singing and joking, and it was his daughter and sons who saved me from a bull that tried to attack me on the fourth floor.

(laughs) Actually, the cow saw me through the window and came out onto the balcony.

(Laughter) Right.

While I was painting, Uncle Ibrahim would hang out on the balcony and talk to me.

I remember him saying, "I haven't been to the mountains in 10 years," and "I haven't taken a day off."

"If I stop working, who will stop the garbage?" he said.

However, at the end of the project, he came all the way to the mountains to see me.

He was really proud to see his house painted, and said that the project was a peace project and -- I'm sorry -- (applause) thank you.

He said it was a peace and unity project, bringing people together.

So his perception of the project changed, and so did my perception of the community and what the community does.

All the trash that everyone hates is not theirs.

they just work it out.

In fact, they don't live in garbage. they live on garbage.

So I started questioning myself and wondering what the real purpose of this whole project was.

It wasn't about bringing in art and beautifying the place.

It was about switching perceptions and starting a conversation about connecting with a community we didn't know about.

In this way, the calligraphy circle took shape day by day, and we were always looking forward to going back to the mountains to see the work.

And every day, standing at this exact spot, I recognized the symbolism behind this anamorphic work.

If you want to see someone's real image, it might be a good idea to change the angle.

There were questions and difficulties like fear and stress.

It wasn't easy to work in such an environment, there were pigs below me when I was painting, and sometimes I had to climb piles of garbage to get to the elevator.

But we all survived the fear of heights, shaking elevators, strong smells, and the stress of not finishing on time.

But the kindness of people made us forget everything.

The third building was the home of Uncle Baquito and Aunt Farida.

In Egyptian there is an expression "Arsene Nath" which means "best people".

they were the best people.

We used to rest in front of their house and all the neighborhood kids would come with us.

I was impressed and amazed by the children of Mansiyat Nasser.

For the first few days they were constantly refusing anything we offered, even snacks and drinks.

So I asked Aunt Farida, "Why is that?"

And she said she teaches her children to refuse anything from strangers. Because maybe that person needs it more than they do.

Therefore, it was at this very moment that I realized that the Zarayb community was the ideal environment to raise the topic of awareness.

We as a society need to ask to what extent we can misunderstand and judge communities based on their differences.

I remember arriving late at Uncle Ibrahim's house. Pigs raised on the roof were eating the sandbags that supported the elevators.

(Laughter) The house of Uncle Baquito and Aunt Farida was just such a meeting place.

People used to gather there.

I think this is what Uncle Ibrahim meant when he said that this is a project of peace and unity. Because I really felt that people were united.

Everyone greeted us with a smile, offered drinks and invited us to their homes for lunch.

One day, you are on the first floor of a building and someone opens the window and offers you a cup of tea.

And the same thing happens on the second floor.

And you keep going all the way to the top.

(Laughter) (Applause) I don't think I've ever had more tea than in Egypt.

(Laughs) To be honest, I could have finished it sooner, but I think it took me three weeks because there were so many tea breaks.

(Laughter.) There's another expression in Egypt. It's "Nawartuna", which means "You brought us light".

At Mansiyat Nasser they used to tell us:

I actually used white phosphorescent paint for the calligraphy, so at the end of the project I rented a black light projector to illuminate the entire neighborhood and amaze everyone around me.

I wanted to let them know that it was they who brought the light to us.

(Applause.) The Live community is strong, honest, hardworking, and they know their worth.

The Cairo people call them 'Zabaline', which means 'trash people', while the people of Mansiyat Nasser ironically call the people of Cairo 'Zabaline'.

It's not us who put out the garbage, but ourselves.

(Laughter) (Applause) It was about leaving something for this community, and I feel like they left something for our lives.

As you know, the art project was just a pretext for this wonderful human experience.

A work of art will disappear someday. In fact, someone has built two floors in front of Uncle Ibrahim's house, so part of the painting is covered, so you may have to go back and paint over it.

(Laughter.) It was about the experience, about the story, about the moment.

Viewed from the neighborhood street, the paintings appear fragmented and stand alone, separated from each other.

However, in connection with today's calligraphy signs, a powerful message is revealed that we should all consider before criticizing someone.

Anyone who wants to see sunlight clearly must first wipe their eyes.

thank you.

(applause)

hello everyone.

I brought baby diapers today.

We'll see why in a moment.

Baby diapers have an interesting property.

It can swell when water is added, and millions of children do this experiment every day.

(Laughter) But that's because they're designed in a very clever way.

These are made of something called a swellable material.

It is a special material that expands 1000 times in volume when water is added.

This is a very useful industrial polymer.

But what my group at MIT is trying to do is figure out whether the brain can do something similar.

Wouldn't it be great if we could make it even bigger, so big that we could look inside and see all the little building blocks, biomolecules, how they are organized in three dimensions, the structure of the brain, the structure of the truth?

If we can do that, we may be able to better understand how the brain is organized to produce thoughts, emotions, actions and sensations.

Maybe we can pinpoint the exact changes in the brain that cause diseases like Alzheimer's, epilepsy, and Parkinson's. There are few, if not cures, for these diseases, and all too often we don't know their causes, origins, or what actually happens.

Now, our group at MIT is trying to take a different perspective than the way neuroscience has been for the last 100 years.

we are designers. we are inventors.

We're trying to find ways to build technology that can examine and repair the brain.

The reason is that the brain is incredibly complex.

What we have learned over a century of neuroscience is that the brain is a very complex network, made up of very special cells called neurons with very complex shapes, and electrical currents flow through these complex shaped neurons.

Furthermore, neurons are connected in a network.

They are connected by tiny junctions called synapses that exchange chemicals and allow neurons to communicate with each other.

Amazing brain density.

There are about 100,000 of these neurons in one cubic millimeter of the brain, and perhaps a billion connections between them.

But it's even worse.

So once you can zoom in on a neuron, and of course, this is just our artist's representation of it.

What you will see are thousands of different biomolecules, tiny nanoscale machines organized in complex 3D patterns that together mediate electrical pulses and chemical exchanges that enable neurons to work together to generate thoughts, emotions, and more.

Now, we also do not know how neurons in the brain are organized to form networks, nor how biomolecules are organized within neurons to form these complex, organized machines.

If you really want to understand this, you'll need new technology.

But if we could have such a map, and see the organization of molecules and neurons, neurons and networks, we might really be able to understand how the brain transfers information from sensory areas and mixes it with emotions and sensations to generate our decisions and actions.

Perhaps we can pinpoint the sequence of molecular changes that occur in brain diseases.

And if we know how those molecules have changed, increased in number, or altered patterns, we may be able to use them as targets for new drugs or as new ways to power the brain to restore its computation in patients suffering from brain disorders.

We've all seen different technologies over the past century trying to combat this.

I'm sure everyone has seen a brain scan taken using an MRI machine.

Of course, they are non-invasive and have great potential for use on living human subjects.

However, it is also spatially crude.

Each of these blobs, or voxels, that you see can contain millions of neurons.

It is therefore not the level of resolution that allows us to pinpoint the molecular changes and wiring changes in networks that occur that contribute to our ability to become conscious and powerful beings.

At the other end of the spectrum is the microscope.

Of course, microscopes use light to see small things.

For centuries it has been used to observe bacteria and more.

To neuroscience, microscopy is actually how neurons were discovered in the first place about 130 years ago.

However, light has fundamental limits.

Ordinary old microscopes cannot see individual molecules.

You can't see small connections like this.

So if we want to make our ability to observe the brain even more powerful and unravel its true structure, we will need better technology.

A few years ago my group started thinking, "What if we did the opposite?"

If expanding the brain is so complicated, why can't we make it bigger?

It started with two graduate students in my group, Fei Cheng and Paul Tilberg.

Many others in my group are now helping me with this process.

We decided to see if we could physically incorporate polymers like those found in baby diapers into the brain.

If you can do it well, and add water, you might be able to explode your brain until you can distinguish those small biomolecules from each other.

You'll see their connections, and you'll get a map of your brain.

This can potentially be very dramatic.

I've got a little demo here.

Obtained refined baby diaper material.

It's much easier to buy online than to actually extract a few particles in a diaper.

Put just one teaspoon of this purified polymer in here.

And here is water.

What we're going to do is see if this teaspoonful of baby diaper material increases in size.

You can see the volume increase about 1,000 times before your eyes.

We could have put more stuff into it, but I think you've got the idea that this is a very interesting molecule, and if you can use it in the right way, it might actually expand the brain in ways that past technology couldn't.

OK. Now let's talk a little bit of chemistry.

What's Happening in Baby Diaper Polymers?

If you can zoom in, it might look similar to what you see on your screen.

Polymers are chains of atoms arranged in long, thin lines.

The chains are very small, about the width of biomolecules, and these polymers are very dense.

They are separated by a distance of the order of biomolecules.

This is very good. Because it is possible that everything in the brain can be moved separately.

What happens when you add water is that this swellable material absorbs water, causing the polymer chains to move away from each other, making the whole material bigger.

And because these chains are so small, biomolecular distances apart, it's possible they could blow up your brain and make them big enough to see.

Here lies the mystery. How do we actually create these polymer chains in the brain so that all the biomolecules can be put apart?

If we can do that, we may be able to get a true map of the brain.

I could see the wiring.

We can look inside and see the molecules inside.

To illustrate this, I made some animations to really see what the biomolecules look like in an artist's render and how they can be separated.

Step 1: The first thing is to attach all the biomolecules shown in brown to small anchors and small handles.

We need to pull the molecules of our brain apart, and to do that we need a small handle to attach those polymers to the molecule to exert force.

Now, if you take the baby's diaper polymer and dump it over the brain, obviously, it's going to sit on top of it.

So we need to find a way to make the polymer inside.

And here is where we are really lucky.

After all, you can take building blocks, called monomers, and put them in the brain to cause chemical reactions to form long chains inside brain tissue.

They wrap around and between biomolecules, forming complex webs that eventually allow the molecules to pull apart from each other.

And every time one of these little handles is around, the polymer binds to the handle. This is exactly what is needed to pull the molecules away from each other.

All right, it's a critical moment.

This specimen must be treated with chemicals to loosen all the molecules from each other. Then, when water is added, the swellable material begins to absorb water, pulling the polymer chains apart, but in turn bringing in biomolecules.

Just like drawing on a balloon and blowing it up, the image is the same, but the ink particles move away from each other.

That's what we're able to do now, and it's in three dimensions.

There is one last trick.

As you can see here, I've colored all biomolecules brown.

Because they all look the same.

Biomolecules are made of the same atoms, only in a different order.

So we need one at the end to display them.

A small tag with a glowing dye should be introduced to distinguish the tags.

Therefore, certain types of biomolecules may appear blue.

Another kind of biomolecule can be red.

etc.

And that's the final step.

Now we can look at things like the brain and observe individual molecules. Because we have separated them far enough from each other to be able to distinguish them.

So the hope here is that we can make the invisible visible.

We can turn what seems small and vague into a constellation of information about our lives.

Here's a video showing what it looks like in action:

Here we have a small brain in a dish, which is actually a small piece of brain.

Inject the polymer, then add the water.

What you see, in this video sped up about 60 times, is a small piece of brain tissue growing in front of you.

Volume can increase 100 times or more.

And the great thing is that these polymers are so small that they separate the biomolecules evenly from each other.

Smooth deployment.

Information configuration is not lost.

I'm just making it easier to see.

Now we can get the actual brain circuits. This is the part of the brain involved in memory, for example. You can now zoom in.

Let's see how the circuit is actually constructed.

Maybe one day I'll be able to read your memory.

Perhaps we can actually see how circuits are configured to process emotions, how the actual brain wiring is configured to shape us.

And, of course, we hope to be able to pinpoint real problems in the brain at the molecular level.

What if we actually looked at brain cells and found 17 molecules altered in brain tissue that are altered in epilepsy, Parkinson's disease, etc.?

If you can get a systematic list of what's going wrong, that's the target for therapy.

We can make drugs that combine them.

We could direct energy to different parts of the brain to help people with Parkinson's disease, epilepsy, and other conditions that affect over a billion people worldwide.

Something interesting is happening now.

Throughout biomedicine, it turns out that there are other problems that expansion could help solve.

This is an actual biopsy from a human breast cancer patient.

Looking at cancer, the immune system, aging, and development, we find that all these processes involve large biological systems.

But of course the problem starts with those tiny nanoscale molecules, the machines that power our body's cells and organs.

So what we are now trying to do is determine if this technology can be used in practice to map the components of life in different diseases.

Can we actually pinpoint molecular changes in tumors so that we can actually track them in a smart way and administer drugs that might wipe out exactly the cells they need?

As you know, many drugs are very high risk.

In some cases, it's even speculation.

My hope is that we can actually turn the high-risk lunar shots into something more reliable.

If you think about the original lunar shot that actually landed on the moon, it was based on solid science.

We understand gravity. We understand aerodynamics.

We knew how to make rockets.

Science risk was under control.

It was still a great feat of engineering.

But in medicine, there are not always all laws.

Do we all have laws analogous to gravity, laws analogous to aerodynamics?

I would argue that it might actually be possible to derive them using techniques like the one I'm talking about today.

We can map the patterns that occur in living systems and find ways to overcome the diseases that plague us.

As you know, my wife and I have two young children. As a bioengineer, one of my hopes is to make children's lives better.

And my hope is that if we can transform biology and medicine from a risky endeavor that depends on chance and luck to one that is won by skill and hard work, that would be a big step forward.

thank you very much.

(applause)

Sitting around a campfire, you can feel its heat, smell the smoke of the wood, and hear its crackling.

Getting too close can burn your eyes or prick your nose.

You can forever stare at the bright flame that twists and flickers in infinite incarnations.

But what exactly are we looking at?

Flame is clearly neither solid nor liquid.

When mixed with air, it becomes something like a gas, but more visible and more ephemeral.

And on a scientific level, fire is different from gas. Gas can exist indefinitely in the same state, but fire always burns out eventually.

One misconception is that fire is plasma, the fourth state of matter with electrons stripped from atoms.

Like fire, and unlike other types of matter, plasma does not exist in a stable state on Earth.

They form only when the gas is subjected to an electric field or heated to temperatures of thousands or tens of thousands of degrees.

In contrast, fuels such as wood and paper burn at hundreds of degrees well below the temperature threshold normally considered plasma.

So if fire isn't a solid, liquid, gas, or plasma, what's left?

Turns out the fire isn't really a problem at all.

Instead, it's a sensory experience of a chemical reaction called combustion.

In some ways, fire is like the leaves changing color in autumn, the scent of ripe fruit, or the flashes of fireflies.

These are all sensory cues that a chemical reaction is taking place.

What makes fire different is that it stimulates many of our senses simultaneously, creating the kind of vivid experience you would expect from something physical.

Combustion uses fuel, heat and oxygen to create that sensory experience.

When a campfire heats the log to igniting temperatures, the cell walls break down, releasing sugars and other molecules into the air.

These molecules react with oxygen in the air to produce carbon dioxide and water.

At the same time, the water trapped inside the log evaporates and expands, breaking through the surrounding wood and being expelled with a pleasant crackling sound.

As the fire heats up, it expands the carbon dioxide and water vapor produced by the combustion.

Since the density has decreased, it rises in a thin columnar shape.

Gravity causes this expansion and rise, giving the flame its characteristic taper.

Without gravity, the molecules would not be separated by density, and the shape of the flame would be completely different.

You can see all this because the combustion also produces light.

Molecules emit light when heated, and the color of the light is determined by the temperature of the molecule.

The hottest flames are white or blue.

The type of molecules in the fire can also affect the color of the flame.

For example, unreacted carbon atoms in a log form small clumps of soot, which rise into flames and give off a yellow-orange glow reminiscent of a campfire.

Substances such as copper, calcium chloride and potassium chloride can add their own characteristic shades to the mixture.

In addition to the multicolored flames, fire continues to generate heat as it continues to burn.

This heat maintains the flame by keeping the fuel above ignition temperature.

But eventually even the hottest fires will run out of fuel and oxygen.

And those winding flames, with their final whoosh, vanish in a puff of smoke as if they never existed in the first place.

Imagine you are walking in the woods.

You might be thinking of a group of trees that we foresters call a stand, with their craggy stems and beautiful crowns.

Yes, trees are the foundation of forests, but forests are more than what you see. Today, I want to change your thinking about forests.

As you know, there is another world underground, a world of endless biological pathways that connect trees and allow them to communicate, allowing the forest to behave as if it were a single organism.

It may remind you of some kind of intelligence.

How do we know this?

This is my story.

I grew up in the woods of British Columbia.

I was lying on the forest floor looking up at the tree canopy.

they were giants.

My grandfather was also a giant.

He was a horse lumberjack, cutting handpicked cedar sticks from the interior rainforest.

Grandpa showed me how quiet and united the forest is and how my family is integrated into it.

So I followed in Grandpa's footsteps.

Both he and I were curious about the forest. And my first big 'aha' was the outdoor cabin by the lake.

The poor dog's jig slipped and fell into a hole.

So Grandpa ran over with a shovel to help the poor dog.

He was there, swimming in the mud.

But as Grandpa dug into that forest floor, I became fascinated by the roots and later learned that there was a white mycelium underneath and a layer of red and yellow minerals underneath.

In the end, Grandpa and I rescued the poor dog, but in that moment I realized that those roots and soil pallets were really the foundation of the forest.

And I wanted to know more.

So I studied forestry.

But I soon found myself working with powerful people in charge of commercial harvesting.

The extent of the clearcutting was alarming, and I soon found myself at odds with my role in it.

Not only that, but the work of spraying and clearing poplar and birch trees in place of commercially valuable plantations of pine and fir was amazing.

Nothing seemed to stop this relentless industrial machine.

So I went back to school and studied my other world.

Scientists had just discovered in the lab that the roots of one pine seedling could transfer carbon to the roots of another pine seedling.

But this was in a lab and I wondered if it could happen in a real forest.

I thought so.

Trees in real forests may also be sharing information underground.

However, this was very controversial, some people thought I was crazy, and I had a really hard time getting research funding.

But I persevered and eventually did some experiments deep in the woods 25 years ago.

I have grown 80 replicates of 3 species: birch, Douglas fir, and western red cedar.

I thought birch and fir would be connected in an underground web, but cedar was not.

It was in its own separate world.

So I got all the equipment, but I didn't have the money, so I had no choice but to do it cheaply.

So I went to Canadian Tire -- (laughter) bought plastic bags and duct tape and shade cloths, timers, paper suits, and respirators.

I borrowed high-tech equipment from the university, including Geiger counters, scintillation counters, mass spectrometers, and microscopes.

And then we got something really dangerous. A syringe containing radiocarbon-14 carbon dioxide gas and a high-pressure bottle containing stable isotope carbon-13 carbon dioxide gas.

But I was legally allowed.

(laughter) Oh, I forgot a few important things. Bug spray, bear spray, and respirator filters.

oh well.

On the first day of the experiment, when we arrived at the property, a grizzly bear and its cubs chased us away.

And I didn't have bear spray.

But as you know, this is the way forest studies are done in Canada.

(Laughter) So when I came back the next day, Mama Grizzly and her cub were gone.

So this time we started in earnest, wearing a white paper suit, putting on a respirator, and then putting a plastic bag over a tree.

I got a giant syringe and injected the carbon dioxide gas of the tracer isotope into the bag. At first it was infused in birch.

Carbon-14, a radioactive gas, was injected into birch bags.

The fir trees were then injected with the stable carbon-13 carbon dioxide gas.

I used two isotopes because I wondered if there was a two-way communication between these species.

When we reached the last bag, the 80th duplicate, suddenly Mama Grizzly reappeared.

And she started chasing me, and I jumped into the truck with a syringe over my head and swatting mosquitoes, and I thought, 'This is why people do lab studies.

(laughs) I waited for an hour.

I figured it would take this long for the trees to take the CO2 through photosynthesis, turn it into sugar, pump it into their roots, and perhaps deliver the carbon to their neighbors underground.

After the time had passed, I rolled down the window and checked on Mama Grizzly.

Oh, she's eating huckleberries over there.

So I got out of the truck and got to work.

I went to my first bag of birch. I pulled out my bag.

I ran a Geiger counter on that leaf.

Hmmm!

completely.

The birch had absorbed radioactive gas.

And moments of truth.

I went to the fir tree.

I pulled out the bag.

When I moved the hands of the Geiger counter, I heard a very beautiful sound.

Hmmm!

It was the sound of a birch talking to a fir, and the birch was saying, "Hey, can I help you?"

And the fir said, "Yes, can you send me your carbon?"

Because someone threw a shade cloth over me. ”

I climbed a cedar tree and held a Geiger counter over its leaves. Then, as expected, it fell silent.

Cedar was in a world of its own.

It was not connected to the net connecting the birch and the fir.

I was so excited that I ran from plot to plot, checking all 80 duplicates.

The evidence was clear.

C-13 and C-14 showed me birch and Douglas fir having a lively two-way conversation.

It was found that during that time of summer, especially when the fir trees were in shade, the birch trees were sending more carbon to the fir trees than they were sending back to them.

Subsequent experiments showed the opposite. The fir tree sent more carbon to the birch tree than the birch tree sent to the fir tree. This was because the fir was still growing while the birch was shedding its leaves.

It turns out that the two species were interdependent, like yin and yang.

And in that moment everything became a focus for me.

I was convinced that I had found something big that would change our view of how trees interact in the forest, from mere competitors to collaborators.

And I found solid evidence of this huge underground communication network, another world.

I now sincerely hoped and believed that my discoveries would change the way we practice forestry, from clearcutting and weeding to a more holistic, sustainable, cheaper and more practical method.

What was I thinking?

Back to the story.

So how do we do science in complex systems like forests?

Well, as forest scientists, we have to work in forests, and as we've shown you, it's really hard.

And you have to be good at running away from bears.

But most of the time we have to persevere despite everything overlapping.

And we need to follow our intuition and experience and ask really good questions.

And we need to collect and validate the data.

In my case, I have conducted and published hundreds of experiments in the woods.

Some of my oldest experimental farms are already over 30 years old.

Please check it.

That is how forest science works.

So this time I would like to talk about science.

How did birch and Douglas fir communicate?

Well, it turns out they were talking not only about carbon, but also information about nitrogen, phosphorus, water, defense signals, allelic chemicals, hormones, and more.

And, you know, scientists thought before me that this subterranean mutualism called mycorrhizae was involved.

Mycorrhizal literally means "fungal root".

You can see their genitals while walking in the woods.

It's a mushroom.

But mushrooms are just the tip of the iceberg. This is because the stems of mushrooms produce mycelium-forming mycelium, which infects and colonizes the roots of all trees and plants.

And where fungal cells interact with root cells, an exchange of carbon and nutrients takes place and the fungus grows through the soil and acquires those nutrients by coating every soil particle.

Nests are so dense that hundreds of kilometers of mycelium can be present under a single footprint.

Not only that, but the mycelium connects different individuals in the forest, not only of the same species, but also of interspecies like birch and fir, working like the internet.

Like all networks, mycorrhizal networks have nodes and links.

We constructed this map by examining short sequences of DNA from all trees and all fungal individuals in a corner of a Douglas fir grove.

In this diagram, the circles represent Douglas firs, or nodes, and the lines represent interconnecting fungal highways, or links.

The largest and darkest node is the busiest node.

We refer to these hub trees more affectionately as "mother trees." Because we know that these hub trees grow young trees that grow in the understory.

And when you see those yellow dots, they are young saplings established within a network of old mother trees.

In a single forest, a parent tree may be connected to hundreds of other trees.

Using isotopic tracers, they also found that the mother tree sent excess carbon to the underlying seedlings through the mycorrhizal network, which was associated with a four-fold increase in seedling survival.

Well, we all know we like our kids, but I wondered if Douglas Fir could recognize his own relatives the way Mama Grizzly and her baby did.

So we started an experiment, growing mother trees with seedlings of relatives and strangers.

And it turns out that they recognize their relatives.

Mother trees colonize similar trees with larger mycorrhizal networks.

They pump more carbon underground.

They even reduce their own root competition to make elbow room for their children.

When the mother tree is damaged or withered, it sends a message of wisdom to the next generation of seedlings.

We therefore used isotope tracking to track carbon as it migrated from the injured parent tree down the trunk to the mycorrhizal network and to adjacent seedlings, tracking not only the carbon but also the defense signal.

And these two compounds made those seedlings more resistant to future stress.

Then the tree speaks.

(Applause.) Thank you.

Repeated interactions increase the resilience of the entire community.

It probably reminds us of our own social communities and our families, at least some of them.

(laughs) So let's go back to the first point.

Forests are not just collections of trees, they are complex systems with hubs and networks that connect trees in layers to enable communication, providing avenues for feedback and adaptation, thus making forests more resilient.

This is because there are many hub trees and many overlapping networks.

However, they are also vulnerable, not only to natural disturbances such as bark beetles that preferentially attack large, old trees, but also to high-grade logging and clear-cutting.

You can remove a hub tree or two, but the tipping point comes because hub trees are like rivets on an airplane.

If you remove one or two, the plane will still fly, but if you remove one too many, or if one of them grabs the wing, the whole system collapses.

So what are your thoughts on forests? is it wrong?

(audience) Yes.

nice.

I'm glad.

So remember I said earlier that I hope my research and discoveries will change the way we practice forestry.

Now, 30 years later, I would like to confirm that here in Western Canada.

It's about 100 kilometers west of us, right on the border of Banff National Park.

It's very clear.

Not so primitive.

In 2014, the World Resources Institute reported that Canada had the highest deforestation rate of any country in the world over the past decade, but you must have thought it was Brazil.

3.6% per annum in Canada.

My estimate is that this is about four times the sustainable speed.

Large-scale disturbances of this magnitude are now known to affect hydrological cycles, degrade wildlife habitats, release greenhouse gases into the atmosphere, and cause further disturbances and further tree mortality.

Not only that, but we continue to plant one or two plants and continue weeding the poplar and birch.

These simplified forests lack complexity and are highly vulnerable to infections and bugs.

And as the climate changes, it creates the perfect storms for extreme events, like the pine bug outbreak that just swept across North America, and the massive fires that have raged in Alberta in recent months.

So, back to my last question, how can we strengthen forests, rather than undermine them, to help address climate change?

As you know, the beauty of forests as complex systems is that they have enormous self-repairing capacity.

Our recent experiments found that patch-cutting and retention of hub trees and regeneration into diverse species, genes and genotypes resulted in very rapid recovery of these mycorrhizal networks.

With this in mind, I would like to leave you with four easy solutions.

And you can't joke that these are too complicated to act.

First, let's all go out into the woods.

We need to re-establish local commitment to our forests.

As you know, most of our forests are currently managed using a one-size-fits-all approach, but proper forest management requires knowledge of local conditions.

Second, we need to protect our virgin forests.

These are a treasure trove of genes, mother trees and mycorrhizal networks.

That means less disconnects.

It doesn't mean no cuts, it means cuts less.

And third, when we do harvest, we need to preserve the heritage, the mother tree and network, and the genes that are the wood, and pass that wisdom on to the next generation of trees so they can withstand future stresses.

We need to be conservationists.

And finally, fourth, we need to regenerate forests with diverse species, genotypes and structures by enabling planting and natural regeneration.

We must give Mother Nature the tools she needs to use her intelligence to heal herself.

And we have to remember that forests are much more collaborative than just bunches of trees competing with each other.

Now back to the jig.

Ziggs falling into an outdoor cabin showed me another world and changed my perspective on the forest.

I hope that listening to today has changed the way you think about forests.

thank you.

(applause)

Whenever I travel for work, I try to find out where my drinking water comes from and where my poop and pee go.

(Laughter) This earned me the nickname "Poop Princess" in my family. This is not normal and has ruined many family trips.

But thinking about where it goes is the first step to activating the superpowers that are actually in our poop and pee.

(Laughter) Right.

And if we make good use of them, we can live healthier and more beautiful lives.

Check out this landscape from Santa Fe, New Mexico.

Notice what words and emotions come to mind.

Sewage treatment water is used for this landscape.

Will it change anything for you?

I imagine it could be.

that's ok.

How we feel about this determines how innovative we can be.

I want to describe how it works, what words should I use?

This means that if I use profanity words like "shit" or "pee", Grandma won't watch the video.

Alternatively, you can use childish words such as "poop" or "pee". Er.

Alternatively, you can use scientific words such as "excretion" or "feces". Hmmm.

Mix and use.

(laughter) That's all I got. (Laughter) So, in this suburb, poop, pee and wash water are sent to this treatment plant in the middle of the community.

It's closer to a park than a treatment plant.

The poop at the bottom of the gravel layer provides solid food for the bog plants without touching anyone.

And the clean, clear water that emerges from the other side travels underground to water each person's garden.

So even in the desert, they can have their own oasis.

This approach is called integrated water management, or holistic or closed loop.

Whatever you want to call it, it contradicts the current way we think about hygiene: contain it, treat it, drive it away.

But with this approach, we're taking it a step further.

Everything is reusable, so we've designed it to be reusable from the start, but we're only planning on doing that now.

And in many cases, it creates a truly beautiful space.

But the most important thing about this system is not technical how it works.

It's how you feel about it.

Want this in your garden?

why not?

I am very interested in this question.

Why aren't we seeing more innovation in hygiene?

Why isn't such a thing the new normal?

This question bothers me so much that I work for a non-profit organization called Recode.

We want to accelerate the adoption of sustainable building and development practices.

We want more innovation.

But often entire categories of innovations that help make our lives more beautiful turn out to be illegal.

Today's regulations and norms are built on the premise that best practices will always be best practices, with incremental updates forever.

But innovation is not always incremental.

Ultimately, how we feel about a particular new technique is reflected in everything we do. How to talk about it, how to encourage people to study, jokes, norms, etc...

And ultimately, it determines how innovative we can be.

This is the primary reason why we do not innovate in hygiene.

We're kind of awkward talking about hygiene, which is why I'm called "Poop Princess".

The second reason is that we believe this issue is resolved here in the United States.

But it's not.

Here in America, people still get sick from drinking the poop in the sewage.

Seven million people get sick and 900 die each year.

And we are not taking a holistic approach to improve it.

So we haven't solved it.

In Portland, Oregon, where I live, raw sewage is sometimes dumped into the river, so I can't take Echo swimming during the rainy season.

Stormwater and sewage are sent to the same treatment plant.

If it rains too much, the river will overflow.

And Portland isn't the only one here.

40 percent of municipalities self-report that they dump raw or partially treated sewage into their waterways.

Another unfortunate thing that's happening with our current situation is that half of your poop and pee ends up fertilizing the farmland.

The other half is incinerated or landfilled.

It's a shame for me because my daily diet contains amazing nutrients.

It is comparable to pig manure. We are omnivores, they are omnivores too.

Think of your poop and pee as a tree health smoothie.

(Laughter) The other unfortunate thing that's going on here is that all the drugs that we ingest are immediately moving into the waterways.

An average wastewater treatment plant can remove perhaps half of the drugs that enter it.

The other half immediately goes out to the other side.

Consider how a mixture of hormones, steroids, Vicodin and other pharmaceuticals affects fish, dogs and children.

But this is not the only problem we have to contain.

Flip this over and you can create a resource that can solve many other problems.

And I want you to understand this idea, so imagine what I'm about to show you, these technologies, and the "I'm going to reuse this" attitude.

Let's design it to be beautiful" -- as advanced potty training.

(Laughter) I think I'm ready.

I think we are culturally ready for advanced potty training.

And there are three great reasons to register now.

The first is that food can be fertilized.

Each of us poops or pees something that can fatten half, or perhaps all of our food, depending on our diet.

Why is the dark brown poop in the toilet dark brown?

Dead things, bacteria.

that's carbon.

And when carbon is incorporated into the soil, it binds with other minerals and nutrients contained therein.

boom! a healthier diet.

So! healthier people.

Chemical fertilizers by definition do not contain carbon.

If we could transfer animal and human manure to soil, we might not need to rely on fossil fuel-based fertilizers or mine minerals from far away.

Imagine how much energy you can save.

Some of us are now concerned that industrial pollutants will pollute this recycling cycle.

it can be dealt with.

But you need to be able to separate your discomfort with talking about poop and pee so that you can calmly discuss how you want to reuse it and what you don't want to reuse.

And understand this. If we change our approach to hygiene, we can slow climate change.

Remember the carbon in poop?

If you can put it in a soil bank, it will begin to absorb the carbon dioxide you expelled into the air.

And it may help slow global warming.

I would like to share with you some of the brave souls who have bravely embraced this advanced potty training approach.

So why did the people of New Mexico do that?

because they are in the desert? Is it because they are saving money? yes.

But more importantly, they found comfort in seeing what was going down the toilet as a resource.

This is your average house in Portland, Oregon.

This home is special because it has a composting toilet that turns all poop and pee into soil conditioner over time.

Their wash and shower water flows underground into a series of mulch basins that feed the orchards below the hills.

When I went to ask for permission to do this, it was not allowed in Oregon.

However, five other neighboring states allowed it.

This was the first code change campaign for Recode (my organization).

This is a great example of the cheapest integrated water management approach.

This is three high-rise residential buildings in downtown Portland, but they are not flushed to the sewers.

how?

Well, flush water is reused to flush toilets, cool mechanical systems and water the landscape.

And after the building has used everything thoroughly, that is, the sheds inside the building are treated to the highest standards on site by plants and bacteria that seep into the groundwater just below.

And it was cheaper than updating the surrounding sewage infrastructure.

This is the final reason why we should be serious about doing things differently. Because it can save you a lot of money.

This was the first permit of its kind in Oregon.

Brave and open-minded people sat down and said with relief, "Oh, that story has a point."

(laughs) "Let's do it."

(Applause.) Do you know?

I keep showing examples where everyone reuses everything in the field.

why?

Now, if you look at our aging infrastructure, and it's old, but the cost of updating it, three-quarters of that cost is just the pipes that meander through our city.

Therefore, when building new or renovating, it may make more sense to process and reuse everything on-site.

San Francisco realized that the amount of water they could save as a community would be enormous, so it made sense for each household to invest in a rebate to reuse washing water and rainwater to water their backyards.

But why were all these projects so revolutionary?

The money part, yes.

But more importantly, they are happy with this advanced potty training idea.

Imagine what it would be like to innovate in sanitation, for example, in the same way we did with solar power.

please think about it. Solar power used to be uncommon and unaffordable.

Now more than ever they are part of our web of power.

And that creates resilience.

We now have a sun-like source of power no different from the drama on earth.

What drives such innovation?

it's us.

we are talking about energy.

It's great to talk about energy.

Some are even talking about the limited resources our current energy feeds into.

We encourage the brightest minds to tackle this issue: better solar panels, better batteries.

Now let's talk about where our drinking water comes from and where our poop and pee actually go.

If we can overcome this discomfort with this topic as a whole, we will be able to create something that will create a future treasure trove.

Every time you flush the toilet, I want you to think, "Where does my poop and pee go?"

Will they be profitably employed? ”

(Laughter) "Or will it wreak havoc in some waterway?"

If you don't know, look it up.

If you don't like that answer, think about how you can tell the people who can drive this change that you are highly potty trained and ready to reuse.

How you feel determines how innovative we can be.

Thank you very much.

(applause)

who do you want to be

It's a simple question, and whether you know it or not, you're answering that question through your daily actions.

This one question determines your professional success more than any other. Because how you appear and how you treat people means everything.

It either lifts people up by making them feel respected, valued, appreciated, and heard, or it suppresses them by making them feel small, insulted, neglected, and excluded.

And who you choose to be means everything.

I study the effects of rudeness on people.

What is rudeness?

It's disrespectful or disrespectful.

This includes a variety of behaviors such as making fun of or disrespecting someone, teasing people in a stinging way, telling offensive jokes, texting during a meeting, and more.

And what is rude to one person may be perfectly fine to another.

Receive text messages when someone is talking to you.

Some of us may find it rude, others may find it perfectly polite.

It really depends.

It all depends on the eye of the beholder, whether or not he/she feels disrespected.

We may not intend to make anyone feel that way, but there are consequences when we do.

I vividly remember walking into this stifling hospital room over 22 years ago.

It was heartbreaking to see my strong, athletic, energetic father lying in bed with electrodes strapped to his bare chest.

It was work-related stress that drove him there.

He has suffered from rude bosses for over ten years.

And to me, at the time, I thought he was just a freak.

But just a few years later, I saw and experienced a lot of disrespect in my first job out of college.

For a year, I went to work every day and my co-workers kept telling me things like, 'Aren't you stupid?

So I did of course.

I quit and went back to graduate school to study this effect.

I met Christine Pearson there.

And she had theories that small acts of disrespect could lead to bigger problems such as aggression and violence.

We believed that disrespectful behavior affected our performance and bottom line.

So we started our research. And what was discovered was an eye opener.

We sent out surveys to business school graduates working in various organizations.

We asked them to write a few sentences about an experience of being treated disrespectfully, disrespectfully, or insensitively, and to answer questions about how they reacted.

One person told me about a boss who made insulting remarks like "that's a kindergartener's job," and another about breaking someone's job in front of the whole team.

And what we found was that poor manners demotivated people. 66% reduced their work effort, 80% lost time worrying about what happened, and 12% quit their job.

After publishing these results, two things happened.

One was a phone call from the organization.

Cisco read these numbers, distills some of them, and conservatively estimates that disrespectful behavior causes $12 million in losses per year.

The second thing that happened was that I heard from others in our academic field:

Are people really underperforming?”

I wondered about that too.

With Amir Erez, I compared people who experienced rudeness with those who did not.

And what we found was that people who experienced rudeness were actually much less functional.

"Okay," you might say. "Meaningful.

After all, it's only natural for them to perform poorly. ”

But what if it wasn't you who went through it?

What if we just saw and heard?

you are a witness

We wondered if it affected witnesses as well.

So we conducted a study in which five participants witnessed an experimenter being rude to someone who arrived late to the study.

The experimenter asked, "What happened?

look at you! How do you expect to get a job in the real world? ”

Another small-group study also tested the effects of peer insults on group members.

Well, what we discovered was really interesting. Because the performance of witnesses also dropped significantly, not slightly.

Sneakyness is a bug.

It is contagious and we become carriers of it just by being near it.

And it's not just about the workplace.

This virus can spread anywhere, at home, online, in schools, and in communities.

It affects our emotions, motivation, performance, and how we treat others.

It can even affect our attention and rob us of some of our intelligence.

And this doesn't just happen when we experience or witness disrespectful behavior.

It can happen even if you just see or read a rude word.

Let me give you an example of what I mean.

To test this, we gave people word combinations to use to make sentences.

But we were so mean.

Half of the participants received a list of 15 words (rude, interrupting, offensive, annoying) used to induce rudeness.

Half of the participants received a list of words that did not contain these rude triggers.

And what we found was truly amazing. That's because people who were rude were five times more likely to miss the information in front of them on their computer screens.

And as the study continued, we found that people who read rude words took longer to make decisions, documented those decisions, and made more mistakes.

This can be a big problem, especially in life-or-death situations.

Steve, a physician, told me about a doctor he worked with. The doctor never showed respect, especially to junior staff and nurses.

But Steve told me about this particular interaction in which this doctor yelled at the medical team.

Shortly after the exchange, the team gave the patient the wrong dose.

Steve said the information was on the chart but somehow everyone on the team missed it.

He said they lacked the care and awareness to consider it.

Simple mistake, right?

Well, the patient died.

Researchers in Israel have demonstrated that medical teams exposed to disrespect perform poorly not only in diagnosis, but in all procedures performed.

This is largely because teams exposed to disrespect did not share information immediately and did not ask teammates for help.

And we see this in every industry, not just healthcare.

So if disrespectful behavior has such a high cost, why is it still so common today?

I was curious, so I did a survey about this as well.

The number one cause is stress.

People get overwhelmed.

Another reason people aren't polite is because they are skeptical or even concerned about whether they act or appear polite.

They believe that they are no longer leaders.

they wonder. "Do kind people end last?"

In other words, "Do idiots get ahead?"

(Laughter) It's easy to think so, especially when you look at some of the prominent examples that have been central to the conversation.

Well, it turns out not to be the case in the long run.

There is a great deal of research on this by Morgan McCall and Michael Lombardo who were at the Creative Leadership Center.

They found that insensitive, aggressive, or bullying style was the number one reason associated with management failure.

There are always outliers who succeed despite their rudeness.

But sooner or later most rude people sabotage their success.

For example, in the case of disrespectful cadres, when a weakness is held or something is needed, it will come back and hurt them.

People will have no backing.

But what about nice men?

Is politeness rewarded?

Yes, it is.

And being polite doesn't just mean you're not stupid.

Not holding someone down is not the same as lifting them.

Being really polite means doing little things like smiling and saying hello in the hallway or listening intently when someone is speaking.

Now you can have strong opinions, disagree, confront, and give negative feedback in a polite and respectful way.

Some people call "radical frankness" to directly disagree, even if you care about personal matters.

Yes, politeness pays off.

At biotech companies, my colleagues and I found that people who were seen as well-mannered were twice as likely to be seen as leaders and performed significantly better.

Why should politeness be rewarded?

Because people see you as an important, powerful, and unique individual who combines two important traits: warm and capable, friendly and smart.

In other words, being polite is not just about motivating others.

it's about you

If you are polite, you are more likely to be recognized as a leader.

You'll perform better and be seen as warm-hearted and capable.

But there's an even bigger story about how politeness pays off, and it ties in with one of the most important leadership questions. It's about what people want most from a leader.

We collected data from over 20,000 employees worldwide. As it turns out, the answer is simple: respect.

Being treated with respect was more important than recognition, appreciation, helpful feedback, and even learning opportunities.

People who felt respected were healthier, more focused, more likely to stay in an organization, and far more engaged.

So where do you start?

How can you lift people up and make them feel respected?

Well, the good thing is that it doesn't require any major changes.

Small things can make a big difference.

I have found that being grateful to people, sharing achievements, listening attentively, asking questions humbly, acknowledging others, and smiling makes a difference.

Patrick Quinlan, former CEO of Ochsner Health [System], told me about the effectiveness of the 10:5 approach: make eye contact if you're within 10 feet of someone and smile if you're within 5 feet.

He explained that politeness spread, patient satisfaction scores rose, and patient referrals increased.

Politeness and respect can be used to enhance organizational performance.

When my friend Doug Conant became CEO of Campbell's Soup Company in 2001, the company had just halved its market share.

Sales were down and many people had just been laid off.

Gallup managers said it was the least engaged organization they surveyed.

And on his first day at the company, Doug was driving to work when he noticed that the headquarters was surrounded by a barbed wire fence.

There was a guard tower in the parking lot.

He said it was like a minimum security prison.

It felt toxic.

Within five years, Doug turned things around.

And within nine years, they've set all-time performance records and won awards like Best Workplace.

how did he do that?

On the first day, Doug told employees that he would set high standards for performance, but that employees would be treated with respect.

He led the talks and expected his leaders to do the same.

For Doug, it was all about being hard-hearted with standards and kind-hearted with people.

For him, he said, it was all about touchpoints and day-to-day interactions with employees: corridors, cafeterias, meetings.

And if you handle each touchpoint well, your employees will feel valued.

Another way Doug made his employees feel valued and showed he was paying attention was by handwriting over 30,000 thank you letters to them.

And this set an example for other leaders.

Leaders experience these touch points approximately 400 times a day.

Most of the time it doesn't take long, less than 2 minutes each.

The key is to be alert and attentive to each of these moments.

Politeness lifts people up.

When we are polite, we encourage people to contribute more and perform at their best.

Irreverence undermines people and their performance.

It robs people of their potential, even if they're trying to avoid it.

What I know from research is that the more civic environment we have, the more productive, creative, helpful, happier and healthier we are.

We can do better.

Each of us can care more and take action to uplift those around us – at work, at home, online, in school, and in our communities.

In every interaction, consider: who do you want to be

Let's put an end to rudeness and start spreading politeness.

After all, it costs money.

thank you.

(applause)

The story of rising Africa is being challenged.

About 10 years ago, I spoke of an Africa, an Africa of hope and opportunity, an Africa of entrepreneurs, an Africa that is very different from what we usually hear about death, poverty and disease.

And what I said became part of what is now known as the story of the rise of Africa.

I would like to tell you two stories about this emerging Africa.

The first concerns Rwanda, which has experienced many trials and tribulations.

And Rwanda has decided to become the technology hub of the continent, that is, the technology hub.

It's a country with mountains and hills like here, so it's very difficult to serve people.

So what did Rwanda say?

To save lives, it's teaming up with Zipline, UPS and Gavi, the global vaccine alliance, to use drones to deliver life-saving medicines, vaccines and blood to people in hard-to-reach places.

Doing so will save lives.

This is some of the innovation we would like to see in emerging Africa.

The second story has to do with something I'm sure most of you have seen or remembered.

Droughts and floods are frequent occurrences in African countries and are becoming more frequent due to the effects of climate change.

When this happens, they usually wait for international appeals to raise funds.

We see pictures of children with flies on their faces and dead animals.

Now these countries, 32, have come together under the auspices of the African Union and have decided to establish an organization called Africa Risk Capacity.

what is it for?

It's a weather-based insurance agency, and what these countries are doing is paying about $3 million a year in insurance out of their own coffers each year, so that in the event of a difficult drought or flood, this money will be paid to each country, and that money can be used to care for their citizens instead of waiting for help to come.

Africa Risk Capacity paid $26 million to Mauritania, Senegal and Niger last year.

This enabled us to care for 1.3 million people affected by drought.

They were able to rebuild their livelihoods, buy fodder for their cattle, feed their children at school, and in effect keep their residents at home instead of moving them out of the area.

So these are stories of a kind of Africa taking responsibility for itself and being ready to find solutions to its own problems.

But that narrative is now being challenged as the continent hasn't been doing well for the past two years.

After 15 years of 5% annual growth, the forecast for this year was 3%. why?

Commodity prices fell in an uncertain global environment.

Much of the economy remains commodity-driven, which underperforms.

And now the Brexit issue doesn't make it any easier.

I had no idea that a Brexit could happen and that it could be one of the causes of global uncertainty like ours.

So now we are in a situation like this. And I think it's time to look back and say what the African nations have done.

what did they do wrong?

Building on all this, how can lessons be learned for the continued development of Africa?

So let's talk about six things we think we got right.

The first is better management of the economy.

The 80's and 90's were two lost decades and Africa was having a bad time. Some of you may remember the cover of The Economist called The Lost Continent.

But in the 2000s, policymakers learned that they needed to better manage the macroeconomic environment, and that they needed to ensure stability, keeping inflation low in the single digits, keeping budget deficits below 3% of GDP, and giving domestic and foreign investors some stability so they could invest in these economies with confidence.

So it was number one.

2. Debt.

In 1994, African countries had a debt-to-GDP ratio of 130 percent and no fiscal space.

Because they are paying their debts, they have not been able to invest their resources into development.

Some of you in this room may have worked to help debt relief in African countries.

So private creditors, multilateral and bilateral, have decided to come together to implement the High Indebted Poor Countries Initiative and provide debt relief.

So the 2005 debt relief brought the debt-to-GDP ratio down to about 30%, leaving enough money to try to reinvest.

The third is loss-making companies.

The government was involved in projects it was not originally involved in.

And they were running a business and making losses.

As such, some of these companies have been restructured, commercialized, privatized or closed down to reduce the burden on the government.

The fourth was very interesting.

A telecommunications revolution took place and African countries jumped on it.

In 2000 there were 11 million telephone lines.

There are currently about 687 million mobile lines on the continent.

This has allowed Africa to move forward in mobile technology, where it actually leads.

In Kenya, with the development of mobile money, M-Pesa, which you may have heard about, it took a while for the world to realize that Africa was ahead in this particular technology.

And this mobile money also provides a platform for access to alternative energy.

As you know, people can now pay for solar power the same way they pay for their phone cards.

This is a very good development and it worked.

We also invested more in education and health, but it wasn't enough, but there have been some improvements.

250 million children have been vaccinated in the last 15 years.

Another is that conflict has decreased.

There were many conflicts on the continent.

Many of you are aware of this.

But they fell and our leaders even managed to quell some coups.

New types of conflicts are emerging, and we'll talk about them later.

Based on the above, there is also a continental differentiation that I would like everyone to know. Some countries are doing relatively well at the moment, including Ivory Coast, Kenya, Ethiopia, Tanzania and Senegal, despite the coming doom and gloom.

But what did we do wrong?

I will tell you about eight things.

There are more things wrong than right.

(Laughter) So, eight things we did wrong.

First, despite our growth, we were unable to create enough jobs.

We didn't create jobs for young people.

Youth unemployment on the African continent is around 15%, and underemployment is a serious problem.

The second thing I did was that the quality of growth was not good enough.

Even the jobs we created were low-productive jobs, so we moved people from low-productivity agriculture to low-productivity commerce to work in the urban informal sector.

Third, inequality has widened.

So we created even more millionaires.

The 50 billionaires worth $96 billion own more wealth than the continent's bottom 75 million.

Poverty, the proportion of the poor, which is the fourth, decreased, but the absolute numbers were not due to population growth.

And population growth has not been discussed enough on this continent.

And I think we need to solve this problem, especially how to educate girls.

That's the way to get serious about this particular issue.

Fifth, there was insufficient investment in infrastructure.

There was also investment from the Chinese.

It helped some countries, but it's not enough.

Electricity consumption in Sub-Saharan Africa is comparable to Spain.

Total consumption is comparable to that of Spain.

Too many people live in darkness and, as the President of the African Development Bank recently said, Africa cannot develop in darkness.

Another thing we don't do is that our economy is still structured the same way it has been for decades.

So even though we are growing, the structure of the economy has not changed much.

We are still exporting goods, but what is exporting goods? It is exporting jobs.

Our manufacturing value added is only 11%.

We don't create enough decent manufacturing jobs for our young people, and we have low international trade.

Only about 12 percent of our transactions are between ourselves.

So this is also a serious problem.

Then there is governance.

Governance is a serious issue.

I think our organization is fragile, sometimes non-existent, and this is what causes corruption.

Corruption is a problem we have not yet fully addressed, and we must fight it relentlessly with greater transparency in how we manage our economies and finances.

We also need to be alert to new conflicts, new types of conflicts, like Boko Haram in my country Nigeria and Al-Shabaab in Kenya.

We need to work together with our international partners, developed countries, to fight this problem together.

Otherwise, we will create a new reality that is not what we want for a rising Africa.

And finally, there is the issue of education.

Education systems in many countries are collapsing.

We are not creating the skills we need for the future.

So we have to find ways to do better education.

So these are the things we're not doing right.

So where do we go from there?

I believe the way forward is to learn how to manage success.

All too often people and countries become successful and forget what made them successful.

Learning, managing and maintaining our successes is vital to us.

So everything we said was right and we have to learn to do it right again, we have to keep doing it right.

It is vital to manage the economy, get prices right and maintain policy coherence while creating stability.

It is often inconsistent.

As one regime dies and another rises, even policies that worked before are abandoned.

what does this do?

It brings uncertainty to people, households and businesses.

They don't know if and how to invest.

Debt: We have to manage the success of debt reduction, but now that countries are back in debt again, debt to GDP ratios are starting to slowly rise, and debt is a problem in certain countries, we need to avoid it.

It's about managing success.

A laser beam is then focused on the failed area.

First and foremost is infrastructure.

Yes, most countries are now aware that they need to invest in this and are trying to do everything they can to do so.

we must.

The most important thing is power.

You can't develop in the dark.

And governance and corruption, we have to fight.

We must make our country more transparent.

And above all, we must engage with young people.

Our youth have geniuses.

I see it every day.

That way, you wake up in the morning feeling ready to go.

We must unleash the talent of young people, go out of their way, and support them to create, innovate and lead the way.

And I know they will steer us in the right direction.

And our women, and girls: we must recognize that girls and women are gifts.

They have strength and we must unleash it so that they can serve the continent.

I strongly believe that doing all these things will prove that the story of Africa's rise is no fluke.

It is a trend, and if it continues, if it continues, if it unleashes youth, if it unleashes women, it may at times be set back, even sidetracked, but the trend is clear.

Africa will continue to rise.

To the business people in my audience, investing in Africa is not for today, it is not for tomorrow, it is not for the short term, it is for the long term.

But if we don't invest in Africa, we're missing out on one of the world's most important new opportunities.

thank you.

(Applause.) Kelly Stötzel: You mentioned corruption in your talk, and you're known and well known as a strong anti-corruption fighter.

But it had consequences.

People fought back and your mother was kidnapped.

How have you dealt with this?

Ngozi Okonjoiweala: It was very difficult.

Thank you for mentioning my mother's kidnapping issue.

It's a very difficult subject.

But that means that when we fight corruption, when we touch the pockets of the money-stealers, they don't just sit quietly.

They fight back, but the question for you is, when they try to blackmail you, do you give up or keep fighting?

Will you find a way to survive and fight back?

And the answer I got from the team I worked with is that we have to keep fighting.

We have to create those institutions.

We must find a way to stop these people from stealing our future legacy.

that's what we did.

And outside of government, we continued to make that point.

In our country, there is no one else willing to fight corruption for us.

So it comes with consequences, but we need to do all we can.

But I thank TED for giving those people a voice to say, "You can't win, we can't be intimidated."

thank you.

(Applause.) Kelly Stotzel: Thank you so much for your wonderful talk and important work.

(applause)

It was early 2013, and it was my third day at a hot Silicon Valley startup.

I was twice as old as the dozen engineers in the room.

I was brought into the company as a seasoned expert in my field, but in this special room I felt like a newcomer among tech geniuses.

I listened to them and decided that the best thing I could do was keep a low profile.

And suddenly the 25-year-old wizard who was leading the meeting looked at me and asked, "If you released a feature and no one used it, was it really released?"

(Laughter) "Ship a feature"?

At that moment, Chip found himself in a deep ship.

(laughs) I had no idea what he was saying.

I sat there awkwardly but thankfully he moved on to someone else.

I slipped into my chair, impatiently waiting for the meeting to end.

That was my introduction to Airbnb.

I was invited by three millennial co-founders to join their company and be an in-house mentor to CEO Brian Chesky to help transform their fast-growing technology start-up into a global hospitality brand.

Well, I spent my time as a boutique hotel entrepreneur from the ages of 26 to 52, so I think I've learned a few things along the way and amassed a wealth of hospitality knowledge.

But after my first week, I realized that this wonderful new world of home-sharing didn't need much of my knowledge of the old-school brick-and-mortar hotel.

The harsh reality upset me. What can I offer?

I had never worked for a tech company before.

Five and a half years ago, I had never heard of the “sharing economy” and had no Uber or Lyft apps on my phone.

This was not my natural habitat.

So I decided at that moment to run for the hills, to criticize these young geniuses, or, instead, to turn my judgment into curiosity and actually see if my wiser eyes matched their fresh eyes.

I envisioned myself as the modern-day Margaret Mead of the millennial generation, but I quickly realized that I had as much to offer them as they did to me.

The more I looked and learned about our respective generations, the more I realized that we often don't trust each other enough to actually share our respective wisdom.

We may share a border, but we don't necessarily trust each other enough to share our respective wisdom.

Looking at the modern workplace, we believe modern trade agreements are opening up pipelines of wisdom between generations, allowing us all to learn from each other.

Nearly 40% of bosses in the US are younger than you, and that number is growing rapidly.

Due to our growing reliance on DQ, or digital intelligence, power spills over to young people like never before.

As we watch young founders in their early 20s grow into global behemoths by the time they're 30, we expect these young digital leaders to somehow miraculously embody the relationship wisdom we older employees have learned over the decades.

It's hard to shake your inner intelligence in the microwave.

There is ample evidence that gender- and ethnically-diverse companies are more efficient.

But what about age?

This is a very important question. Because it's the first time you'll unintentionally have five generations working in the same office at the same time.

Perhaps it's time to think a little more deliberately about how we work collectively.

There are numerous European studies that show teams of different ages to be more effective and successful.

So why are only 8 percent of companies with diversity and inclusion programs actually extending their strategy to include age in a demographic as important as gender and race?

Perhaps they didn't get the memo: The world is aging!

One of the contradictions of our time is that baby boomers are more vibrant and healthier throughout their lives, and we actually work well into our later years, yet we feel less and less relevant.

Some of us feel like an old milk carton with an expiration date stamped on its wrinkled forehead.

For many of us in middle age, when we suddenly lose our jobs and our phones stop ringing, it's not just an emotion, it's a harsh reality.

No wonder for many of us, we worry that people see our experiences as liabilities rather than assets.

You've probably heard the old or relatively new phrase, "60 is physically the new 40."

right?

30 is the new 50 when it comes to power in the workplace today.

Okay, well this is all very exciting, isn't it?

(Laughter) To tell you the truth, power is moving 10 years younger.

We will all live another ten years.

calculate.

Society has created a new 20-year irrelevance gap.

Middle age used to be from 45 to 65 years old, but now it would be good to extend it to 40 years middle age marathon from 35 years old to 75 years old.

But wait. There are bright spots.

Why, in fact, do we get smarter and smarter about human nature as we age?

Our physical peak may be in our 20s and our financial and salary peaks in our 50s, but our emotional peaks are in middle age and beyond because we develop pattern recognition about ourselves and others.

So how can companies harness the wisdom of middle-aged people in the same way they nurture young digital geniuses?

The most successful companies of today and tomorrow will actually learn how to create these two powerful alchemies.

Here's how alchemy worked for me on Airbnb. I was assigned a young and smart partner to help develop the hospitality sector.

Laura Hughes noticed early on that I was a little lost in this environment, so she often sat next to me in meetings to be my technical translator. It also allowed me to write her a note and tell me, "What does that mean?"

Laura is 27 and when I met her, she had worked at Google for four years and then at Airbnb for a year and a half.

Like many of her millennial contemporaries, she actually grew into a management role before undergoing formal leadership training.

Whether you're in the B2B world, the B2C world, the C2C world, or the A2Z world, business is fundamentally H2H, human to human.

Yet Laura's approach to leadership was really shaped in the technocratic world and was purely metrical.

One of the things she said to me in the first few months was, "I love the fact that your approach to leadership is about creating compelling visions that are the North Star for us."

Now, my factual knowledge of how many rooms a maid cleans in an eight-hour shift may not matter so much in the world of home-sharing.

Process knowledge: "How do we get things done?"

An effort based on understanding the underlying motivations of everyone in the room was invaluable in a company where most people had little organizational experience.

As we spend more time on Airbnb, we realize that a new breed of seniors may be emerging in the workplace.

Not the elders of the past who were actually held in high esteem.

No, what is amazing about modern elders is their relevance, their ability to use timeless wisdom and apply it to contemporary problems.

Perhaps it is time for us to really value wisdom as much as destruction.

And maybe now, maybe not, it's time for us to definitely take back the word "elderly," and give it a modern twist.

The modern elder is both a leader and an intern. Because they recognize that in a rapidly changing world, a novice's mind and stimulating curiosity are life-affirming elixir, not only for themselves, but for those around them.

Intergenerational improvisation is known in the fields of music and art. Think Tony Bennett and Lady Gaga, or Wynton Marsalis and the Young Stars of Jazz.

This kind of bickering in the business world is often referred to as “mutual leadership,” the DQ of Gen X millennials and the EQ of Boomers.

As I was using Laura's analytical powers and my human-centered intuition to actually reinvent and evolve Airbnb's peer-to-peer review system, I was able to experience such cross-generational interactions with Laura and her brilliant data science team.

A perfect alchemy of algorithms and people's wisdom, we've been able to create an instant feedback loop that helps hosts better understand their guests' needs.

High tech meets high touch.

At Airbnb, I also learned that as a modern elder, my role is to intern publicly and mentor privately.

Search engines are great at giving answers, but a smart guide will help you ask the right questions.

Google doesn't understand nuances like the fine tuning of the human mind and spirit, at least not yet.

Over time, to my surprise, dozens of young Airbnb employees asked me for private mentoring sessions.

But in reality, we were often just tutoring each other.

In summary, CEO Brian Chesky brought me in for my industry knowledge, but what I really provided was my hard-earned wisdom.

Perhaps it's time to ditch the term "knowledge worker" and replace it with "wisdom worker."

We now have five generations in our workplace, but we could operate like separate isolationist nations, or we could really start to find ways to bridge the boundaries between these generations.

And it's time to really look at how to actually change the physics of wisdom so that wisdom actually flows both ways, from old to young and from young to old.

How can I apply this to my life?

Who can I personally reach out to for mutual mentorship?

And how can we, systematically, create the conditions that foster the flow of wisdom between generations?

This is the new sharing economy.

thank you.

(applause)

June 29, 2016.

Dear citizens, I am writing today to you who are lost in this age.

At this moment in our daily lives, when the world is full of destruction and malice and terror, I am simply writing this letter to you. Even though we both know there are many you behind this "you" and many I behind this "I".

I am writing to you because right now this shaking world we share scares me.

I'm sure you're scared too.

I suspect some of the things we fear are common fears.

But a lot of what we fear seems to be with each other.

You fear the world I want to live in, and I fear your vision too.

You know that feeling you get when you know the storm is coming before the storm is coming?

Dear compatriots, do you feel the same way now?

Does that feeling of discomfort and anxiety that people you know remind you of the 1930s?

Perhaps you are not, because our fears of each other are not aligned.

In this round, I felt a generational gathering of your fears for me, and for the world I've claimed to be right for both of us.

It took a while for your fear to trigger mine, especially since I didn't feel the need to be scared of you at first.

For many years I have heard you, but you have not listened, that this marvelous new world will not be astonishing to you and to many throughout the developed world. The open, fluid world that I enjoyed, where people, goods, and technology flow freely to go wherever you want in the world, was not liberation for you.

I walked through your town, looking for you, but I didn't see you.

In Stephenville, Texas, I noticed that town square after town square was occupied by law offices as people moved in and out of prison.

I found barren stores in Wagner, South Dakota, and VFW assembly halls that mocked the community's persevering dreams.

At Walmart in Lancaster, Pennsylvania, I noticed too many people in their 20s and 30s who looked like they had been dead for 10 or 20 years, with mottled, reddish skin, thinning, streaky hair, brown scrapes, worn teeth, and missing eyes.

The young people I met in Paris, Florence, and Barcelona, ​​who had degrees but had nowhere to go, were living on internships well into their 30s, and realized that they were being held back from the start by an economy that created wealth, not jobs.

I've certainly noticed the news that that part of London has become a haunted district. There, the global super-rich turn their dubious money into empty apartments and put a price on lifelong city dwellers and young couples moving out of their homes.

And I heard that the fabric of your life is being torn.

I used to be able to rely on work, but now I can't.

I used to be able to feed my children and ensure they were a little above me in life, but now I can't.

My work used to make me feel dignified, but now it doesn't.

It used to be normal for people like you to own homes, but not now.

I can't say that I didn't know these things, but while you were struggling on Earth, I was preoccupied with creating a future we could live on Mars.

Even though many of you are beginning to live shorter lives than your parents, I was preoccupied with immortal innovations.

I heard all these things, but I didn't hear them.

i saw it but i didn't see it

I read it, but I didn't understand it.

The only time I paid attention was when you started voting and shouting, and when the content of your voting and shouting began to intimidate me.

The only time I listened was when you moved towards crushing the Continental Confederation and electing a lowly agitator.

Only then did your pain interest me.

I know that feeling hurt is often the prelude to coping with hurt.

I now suspect that if I had stood by your side when you were simply feeling it, you might not have been so eager to deal with it.

I ask myself why I didn't support you then.

One of the reasons is that I became fascinated by the masters of change, a new religion for the new, and an admirer of globalization and open borders and kaleidoscopic diversity.

Once change becomes my full belief, I may go blind.

You may not see the results of your changes.

I tend to overlook the importance of roots, traditions, rituals, stability and belonging.

And the more I became a fundamentalist who worshiped change and openness, the more I drove you guys to another polarity, to cling, to clump, to close, to belong.

Now, unlike before, I see that not having proper skin and proper organs is not the only disadvantage.

With those privileged qualities, there are more subtle and quieter downsides to feeling history drift away from you. The past was hospitable to people like you, but the future will be more hospitable to others. The world is becoming less familiar and less our own by the day.

I do not for a moment concede that old privileges should not be reduced.

It cannot decrease fast enough.

It's for you to learn how to live in the new millennium where there are no bonuses for showing up with the right skin and the right organs.

When your anger turns to hate, know that there is no room for that in our flat.

But, my compatriots, I admit that I have underestimated the burden of dealing with the loss of status.

I forgot that what is necessary socially is also difficult for me personally.

Something similar happened in the economy you and I share.

Just as I can't and don't want to turn back the clock on equality and diversity, but need to understand the loss they cause, I refuse to turn back the clock on ever more interconnected and interdependent worlds, and inventions that never stop, and I refuse to turn back the clock, and I don't want to.

Still, I need to understand your experience with these things.

You have been telling me for years that your experience with these things is not as good as my theory would have predicted.

And yet, before you finish your sentence complaining about irregular work hours, erratic wages, the difficulty of living with dwindling opportunities, the pain of leaving your children in 24-hour childcare to meet your 3 a.m. shift, I fire back at you – before you finish – my dogma that what you are actually experiencing is flexibility and freedom.

Language is one of the only things we can truly share, and I have sometimes used this joint inheritance to obfuscate, redirect, and justify myself. To rebrand what was good for me as good for both of us when we abused terms like “sharing economy”, “disruptive destruction” and “global resource”.

Now that I think about it, what I was really doing was sometimes trying to buy your pain cheap, dress it up, and sell it back to you as freedom.

I wanted to believe, and I wanted you to believe, that the system that was great for me and made my life easier than ever was the best system for you.

I have disparaged you for the idea that you are voting against your financial interests—voting against your interests as if I knew your interests.

That's the story of my dogmatic economism.

I have a hard time treating people's financial interests as my sole interest and ignoring things like belonging, pride, and the desire to send a message to those who ignore me.

So we are now in a terrifying yet inexplicable moment of agitation, division, xenophobia, resentment and fear.

And if we continue down this road, I won't listen and you feel unheard, you scream for me to listen and worry about both of us.

I fear that each of us is tempted by visions of a future where each other has no place.

At this rate, at this rate, blood may come out.

Already this blood sign is published in the daily newspapers.

Roundups, raids, deportations, detention camps and secession are possible.

No, I don't think I'm exaggerating.

There may even be talk of war in places where you were certain the war was over.

There is always hope of salvation.

But that's not the cheap, shallow salvation that comes from speaking out loud about us all being together.

This will take longer.

It requires that we both accept what we have chosen to be here.

We create the 'other'.

As parents, as neighbors, as nations, we see each other exist and sometimes we ignore it.

You weren't born vengeful.

I also play a part in the thirst for revenge you are feeling right now. That craving now tempts me to plan ever more elaborate escapes from our common lives, the schools and neighborhoods we once shared, airports and amusement parks.

So the problems we face are not due to these great inhuman forces.

We are facing problems in your relationship with me.

We chose how to relate to each other to get here.

We can choose to relate in a way that liberates us.

But, citizens, there may be things that we have to let go of, starting with the versions of reality that we hold dear.

Imagine if you let go of these people and the illusion of people being banished from society.

Imagine if I saved the world in your shadow and let go of my habit of pondering the future of your job, food, and school where you can't get past security.

This is only possible if you first acknowledge that you have been ignoring each other.

If there is any hope to summon in these ominous times, it is this.

For too long, we have sacrificed our attention to each other's underlying dreams, the dreams of caring for each other, unleashing each other's wonders, and walking through history together, chasing various twinkling dreams.

More important than any neon, we were able to boldly commit to each other's dreams.

Let's take the plunge.

Good luck to all my compatriots.

(applause)

How do we build a society without fossil fuels?

This is a very complex task, but I believe developing countries can lead this transition.

I know this is a controversial statement, but the reality is that if we continue to keep fossil fuels at the center of our development, so much is at stake in our country.

You can do it another way.

And it's time to debunk the myth that countries must choose between development on the one hand and environmental protection, renewable energy and quality of life on the other.

I am from Costa Rica, a developing country.

Our population is about 5 million and we live in the middle of the Americas. So it's very easy to remember where we live.

Nearly 100% of our electricity comes from renewable sources, 5 of which are renewable.

(Applause) Hydro, geothermal, wind, solar, biomass.

Did you know that last year we went 299 days without using fossil fuels to generate all our electricity?

This is a great achievement, but it also hides the contradiction that nearly 70% of our total energy consumption is oil.

why?

That's because, like most countries, our transportation system is completely dependent on fossil fuels.

So if we think of the energy transition as a marathon, the question is how do we get to the finish line, how do we decarbonise the rest of the economy.

And it's fair to say that if we don't succeed, it's hard to know who will.

That's why I want to talk about Costa Rica. Because I believe Costa Rica is an excellent candidate for pioneering a vision of fossil fuel free development.

If you know one thing about our country, it's that we don't have an army.

So let's go back to 1948.

That year, the country was emerging from a civil war.

Thousands of Costa Ricans died and families were violently divided.

Nevertheless, a surprising idea won people's hearts. We will reboot the country and the Second Republic will have no army.

abolished there.

And then-president José Figueres found a powerful way to tear down the walls of army bases.

The following year, 1949, we permanently applied that decision to the new constitution. That's why, nearly 70 years later, we can still tell the story.

And thank you.

I am grateful that they made that decision before I was born. Because it has allowed me and millions of other people to live in a very stable country.

And you might think it was lucky, but it wasn't.

There was a pattern of deliberate choices.

In the 1940s, Costa Ricans had free education and free health care.

We called it Social Security.

The abolition of the armed forces allowed military spending to be turned into social spending, which was the engine of stability.

The '50s -- (Applause) In the '50s, we started investing in hydropower. It kept us out of the trap of using fossil fuels to generate electricity that the world struggles with today.

In the 1970s, we invested in national parks. It has kept us away from the deeply flawed logic of growing, growing, growing at all costs that others have accepted, especially in the developing world.

In the 90s, we pioneered payments for ecosystem services, thereby reversing deforestation and promoting ecotourism, a key driver of growth today.

Therefore, investments in environmental protection did not have a negative impact on the economy.

Quite the opposite.

That doesn't mean we're perfect, or that we're free of contradictions.

it doesn't matter.

Importantly, by choosing to do so, we have developed resilience to deal with development challenges.

And for a country like ours, the GDP per capita is about $11,000, depending on how you measure it.

But we are completely outliers when it comes to turning GDP into social progress, according to the Social Progress Index.

Abolishing the military and investing in nature and people has also had a very powerful effect.

It has been very empowering to shape the story, the story of a small country with big ideas, and grow with that story.

So the question is, what is the next big idea for this generation?

And what comes next, I believe, is for this generation to give up fossil fuels for good, like we did with the military.

Fossil fuels cause climate change.

We know that, we know how vulnerable we are to the impacts of climate change.

Therefore, as a developing country, it is in our best interest to build development without using fossil fuels that harm people in the first place.

Because if we can use electricity instead, why should we continue to import oil for transportation?

Remember, this country is powered by heat from river water, volcanoes, wind turbines, solar panels and biowaste.

Doing away with fossil fuels means disrupting transportation systems so that electricity can power cars, buses and trains instead of dirty energy.

And transportation has become an existential problem for us Costa Ricans. Because the model we have is not working for us.

It's hurting people, it's hurting businesses, and it's hurting our health.

Because this is what happens every day when policies and infrastructure fail.

2 hours in the morning and 2 hours in the evening.

I don't understand why this has to be accepted as normal.

It's annoying to have to waste time like this every day.

And this highway is actually pretty good compared to other countries where traffic is booming.

Costa Ricans call this "Presa".

Presa means "imprisoned".

And people are becoming violent in this country that is originally pure happiness.

It's happening.

So many things are at stake.

The good news is that when we talk about clean transportation and mobility options, we're not talking about some distant utopia out there.

We are talking about electric mobility that is happening today.

By 2022, electric and conventional cars are expected to be priced the same, and cities are already experimenting with electric buses.

And these truly amazing creatures save money and reduce pollution.

So if you want to do away with oil-based transportation, you can now because you have options that you didn't have before.

I'm really looking forward to it.

But, of course, some people are very uncomfortable with this idea. They will come and say that the world is stuck in oil, and so is Costa Rica. So be serious.

that's what they tell you.

And do you know what the answer to that argument is?

In 1948 we didn't say the world was stuck with the military, so let's keep the military.

No, we made a very brave choice, and that choice made a whole change.

So it's time for this generation to gather up the courage again and do away with fossil fuels forever.

And here are three reasons why you should.

First, our model of transportation and urbanization is collapsing, so now is the best time to redefine the future of cities and mobility.

We don't want cities built for cars.

We want cities where people can walk and bike.

And we want public transportation, plenty, clean and dignified public transportation.

Because if we keep adding conventional cars, our cities will become unbearable.

Second, we must change, but incremental change is not enough.

We need transformational change.

There are several progressive projects in my country and I am the first to celebrate them.

But let's not joke.

While we continue to invest in the same kind of infrastructure, more cars, more roads, more oil, it's not like we're going to have a really beautiful electric car or a few electric buses here.

We are talking about moving away from oil, but gradualism will not get us there.

Third, as you know, the world is hungry for inspiration.

We are particularly keen to hear success stories in dealing with complex problems in developing countries.

So I believe Costa Rica can inspire others, as we did last year when we made it clear for days that we are completely free of fossil fuels to generate all our electricity.

The news spread all over the world.

I am also very proud that Costa Rican woman Cristiana Figueres played a decisive role in negotiating the Paris Climate Agreement.

Therefore, we must uphold that legacy and lead by example.

So what happens next?

people.

How do I get people to own this?

How can we convince people that it is possible to build a society without fossil fuels?

A lot of work is required from the ground up.

That's why we founded Costa Rica Limpia in 2014.

'Limpia' means 'clean' and we want to empower and inspire our citizens.

Without citizen participation, clean transport decisions will be bogged down by never-ending technical debates and an avalanche of lobbying by various established interest groups.

Aiming to become a green country with renewable energy is already part of our story.

We must not let anyone take it away.

Last year, we invited people from seven states to discuss climate change matters to them. Also, this year we again invited a group of Costa Ricans to discuss renewable energy.

And what do you know?

These people disagree on almost everything except renewable energy and clean transportation and clean air.

It connects people.

And the key to true participation is making sure people don't feel small.

People feel powerless and tired of not being heard.

So what we do is be concrete, translating technical problems into the language of citizens to show them that they have a role to play and together we can do it.

For the first time, we are tracking the promise of clean transport, and while politicians know they must deliver, the tipping point will come when they form a coalition of citizens, businesses, and public transport advocates to make electric mobility the new normal, especially in developing countries.

By the next election, I believe all candidates will have to make their positions clear on phasing out fossil fuels.

Because this issue must be brought into our mainstream politics.

Let me tell you, this is not about climate policy or environmental issues.

It's about the country we want, the city we have, and the city we want, and who makes that choice.

After all, what we have to show is that renewable energy development is good for people, for Costa Ricans alive today, and especially for those who are not yet born.

This is the National Museum today.

Bright and peaceful, standing in front of it, it's hard to believe this was an army barracks in the late 1940s.

We started a new life without the military in this place. This is where the end of fossil fuels will one day be announced.

And we will make history again.

thank you.

(applause)

Guys, I have a problem.

(Laughter) Growth is being lost, and that's a big deal.

Our global economy will stop growing.

And it's nothing new.

In fact, growth rates have declined over the last 50 years.

At this rate, we will have to learn how to survive in a world without growth for the next decade.

This is terrifying. Because if the economy doesn't grow, our children won't get a better life.

What's even scarier is that if the pie doesn't grow, each of us gets a smaller portion.

And ready to fight for something bigger.

This creates tension and serious conflict.

Growth is so important.

If we look at the history of growth, times of great growth have always been fueled by great manufacturing revolutions.

It happened three times every 50-60 years.

Mid-19th Century Steam Engine, Early 20th Century Production Model -- Thank you, Mr. Ford.

The 1970s saw the first wave of automation.

Why have these manufacturing revolutions brought so much growth to our economy?

That's because productivity has improved significantly.

It's pretty simple. To grow, you have to produce more and put more into the economy.

This means more labor, more capital, or more productivity.

Productivity has always been the engine of growth.

I am here today to tell you that we are about to undergo another major change, and amazingly, this change will come again from manufacturing.

It will lift us out of growth stagnation and fundamentally change the way globalization has shaped over the last decade.

I'm here to tell you about an amazing fourth manufacturing revolution that is currently underway.

It's not that we haven't done anything about manufacturing since the last revolution.

In fact, we've made some pretty boring attempts to activate it.

But none of them fall short of the massive overhaul we really need to grow again.

For example, they tried to move factories abroad to cut costs and take advantage of cheap labor.

Not only did this not stimulate productivity, but cheap labor wasn't cheap for long, so money was only saved for a short period of time.

Then, we tried to enlarge the scale of the factory and make it specialized for each product.

The idea is that one product can be made in large quantities, stockpiled, and sold according to demand.

This made me more productive for a while.

But that created a lot of rigidity in the supply chain.

Consider fashion retail.

Traditional clothing companies have built rigid supply chains that are offshore and global.

When fast-fashion competitors like Zara began replenishing their inventory faster, from twice-yearly collections to monthly collections, no one could keep up.

Most of them face great difficulties today.

However, these factories have various drawbacks, but they are the ones we know today.

Open the door and it still looks the same as it did 50 years ago.

We have changed the location, size and the way we operate.

Can you name anything else that looks the same as it did 50 years ago?

it's crazy.

I've made every possible adjustment to the model, but now I'm at my limit.

After all my attempts to fix the manufacturing model failed, I figured growth would come from elsewhere.

We turned to the technology field. There is so much innovation going on there.

One of them is the Internet.

I expected it to bring growth.

And indeed it changed our lives.

It made waves in media, services and entertainment.

However, it doesn't help much in improving productivity.

In fact, what is surprising is that despite these innovation efforts, productivity is declining.

Please try to imagine. Imagine sitting at work and scrolling through Facebook or watching videos on YouTube making us less productive.

strange.

(Laughter) This is why we don't grow.

We have failed to reinvent the manufacturing floor, and large-scale innovation has moved away from the manufacturing floor.

But what if these forces could be combined?

What happens when the next big reinvention of manufacturing comes from the merging of existing manufacturing and large-scale innovation?

bingo!

This is the fourth manufacturing revolution, and it's happening right now.

Major technologies are entering the manufacturing arena.

These will boost industrial productivity by more than a third.

This is huge and will go a long way in generating growth.

Let's talk about some of them.

Have you already seen advanced manufacturing robots?

They are about the size of humans and can actually be programmed to cooperate with humans and perform complex, non-repetitive tasks.

Currently, only 8% of tasks are automated in our factory.

Less complexity means more repetition.

In 10 years it will be 25%.

This means that by 2025, advanced robots will complement workers and work together to increase productivity by 20%, increase output by 20%, and achieve a further 20% growth.

This is not a fancy, futuristic idea.

These robots are working for us now.

Last year in the United States, Amazon helped prepare and ship all the merchandise needed for Cyber ​​Monday, the annual peak of online retail.

Last year in the United States, it was the biggest online shopping day of the year and the biggest ever.

Consumers spent $3 billion on electronics that day.

That is real economic growth.

Then there is additive manufacturing and 3D printing.

3D printing has already improved plastic manufacturing and is now making its way into metal.

They are no small industry.

Plastics and metals account for 25% of global manufacturing output.

Let's see a real example.

Fuel nozzles are one of the most complex parts to manufacture in the aerospace industry. One reason is that the fuel nozzle consists of 20 different parts that must be manufactured separately and then painstakingly assembled.

Aerospace companies are now using 3D printing, which can turn 20 different parts into one.

result?

This particular industry will have 40% more productivity, 40% more output, and 40% more growth.

But really, the most interesting part of this new manufacturing revolution goes far beyond productivity.

It's about creating better, smarter products.

It's about customizing the scale.

Imagine a world where you can buy exactly the product you want, with the features you want, the design you want, and at the same cost and delivery time as mass-produced products like cars, clothes, and mobile phones.

A new manufacturing revolution makes it possible.

Advanced robots can be programmed to perform any product configuration without setup or start-up time.

3D printers instantly generate customized designs.

We are now able to produce one batch of products, your product, at the same cost and lead time as many batches.

These are just a few examples of the manufacturing revolution underway.

Not only will manufacturing be more productive, but it will also be more flexible. These were exactly the growth factors we were missing.

But the reality is that when manufacturing comes back into the spotlight, it has an even bigger impact on all of us.

It will bring about big changes in the macro economy.

First, our factory will be transferred to the domestic market.

In the world of scale customization, proximity to the consumer is the new norm.

Then our factories will be smaller and more agile.

Scale no longer matters, flexibility matters.

Multi-product, made-to-order production.

The change will be dramatic.

Globalization is entering a new era.

East-to-west trade flows are replaced by regional trade flows.

East to the east, west to the west.

Come to think of it, the old model was pretty crazy.

We stock up on inventory and travel the globe before our products reach the final consumer.

Produced right next to the consumer market, the new models are cleaner and better for the environment.

In mature economies, manufacturing will return home, creating more jobs, more productivity and more growth.

Good news.

But growth does not happen automatically.

A mature economy will have to seize it.

Employees need to be extensively retrained.

In most countries, including my country France, we have taught our children that manufacturing has no future.

that it happened far away.

It is necessary to reverse this trend and teach manufacturing again at universities.

Only countries that change boldly will be able to seize this growth.

It is also an opportunity for developing countries.

Of course, China and other emerging economies will no longer be the world's factories.

As a matter of fact, these countries are getting richer, so this was not a long-term sustainable model.

Last year, production in Brazil was already as expensive as production in France.

By 2018, China's manufacturing costs will be on par with the United States.

A new manufacturing revolution will accelerate the shift to a domestic consumption-driven model in these emerging economies.

This is good. Because this is where growth comes from.

Over the next five years, China's next billion consumers will bring more growth to our economy than the top five European markets combined.

This fourth manufacturing revolution is an opportunity for all of us.

If we do the right thing, we will see sustainable growth in all economies.

This means more wealth will be distributed to all of us, giving our children a better future.

thank you.

(applause)

I am a palliative care physician and today I would like to talk to you about health care.

I want to talk about the health and care of our country's most vulnerable people, those who are grappling with the most complex and serious health problems.

I would also like to talk about the economy.

And this intersection of the two should scare you - it scare me.

I would also like to talk about palliative care. Palliative care is a paradigm of care for these people, based on what they value.

Patient-centered care, based on patient values, helps these people live better and longer.

This is a model of care that tells the truth, engages one-on-one, and meets people where they are.

I would like to start with the story of my first patient.

Wearing a long white coat, it was my first day as a doctor.

As soon as I wandered into the hospital, a 68-year-old gentleman named Harold came into the emergency department.

He had been suffering from headaches for about 6 weeks and the headaches were getting worse and worse.

An examination revealed that he had cancer that had spread to his brain.

My doctor directed me to go talk to Harold and his family about the diagnosis, prognosis, and treatment options.

Five hours into my new career, I did the only thing I knew how to do.

I went in and sat down, took Harold's hand, took his wife's hand and just breathed.

He said, "Isn't that good news, Sony?"

I said no. "

And we talked, we listened, we shared.

And after a while he said, "Harold, what does it mean to you?"

What do you hold sacred? ”

And he said, "My family."

I said, "What do you want?"

He tapped me on the knee and said, "I want to go fishing."

I said, "I know how to do that."

Harold went fishing the next day.

He died a week later.

As I train throughout my career, I think of Harold.

And I think this is an all too rare conversation.

And it was a conversation that led us to a crisis, the greatest threat to the American way of life today: healthcare costs.

So what do we know?

We know that this sickest population accounts for 15 percent of the gross domestic product, or nearly $2.3 trillion.

That means the 15 percent of most sick people account for 15 percent of GDP.

Extrapolating this over the next 20 years, along with the growth of baby boomers, would result in 60 percent of GDP at this rate.

60 percent of the Gross Domestic Product of the United States, but at that point it had little to do with healthcare.

It's about a gallon of milk and college tuition.

It has to do with everything we care about and everything we know now.

It is endangering the free market economy and capitalism of the United States.

Forget about statistics for a minute, forget about numbers.

Let's talk about the value we get out of all this money we spent.

Well, about six years ago the Dartmouth Atlas looked at every dollar spent by Medicare (and this population in general).

We found that patients with the highest spending per capita had the most suffering, pain and depression.

And often they die sooner.

What should I do?

We live in the United States, which has the best healthcare system on the planet.

We spend 10 times more on these patients than the second most populous country in the world.

It makes no sense.

But what we do know is that our country ranks 37th among the top 50 countries on the planet with organized health care systems.

The former Eastern bloc and sub-Saharan African countries rank higher than ours in terms of quality and value.

What I experience in my daily practice, and I'm sure many of you who travel also experience, is that "the more the less, the less".

People who have had more tests, more bells, more whistles, more chemo, more surgeries, whatever—the more we do to someone, the lower their quality of life.

And in most cases it will be shortened.

So what do we do about this?

what are we doing about this?

And why?

Ladies and Gentlemen, the harsh reality is that we in the medical industry, doctors in long white coats, are stealing money from you.

Any illness robs you of the opportunity to choose how you want to live your life.

We focus on disease and pathology, surgery and pharmacology.

We miss humans.

How can you handle this without understanding this?

we are working on this. We need to do something for that.

Three goals in healthcare: One is to improve the patient experience.

The second is to improve public health.

The third is to continue to reduce per capita spending.

How did our group, palliative care, work with those most ill with cancer, heart disease, lung disease, kidney disease, dementia and more in 2012 to improve the patient experience?

"I want to stay home, Doctor."

"Okay, we'll take care of you."

Improved quality of life.

Think about humans.

2: People's health.

How were we able to see this group differently, engage with them on a different level, a deeper level, and connect with the human condition in a broader sense than myself?

How will this group be managed so that 94 percent of outpatients will never need to go to the hospital in 2012?

Not because it couldn't be done.

But it didn't need to.

We cared for them.

We have maintained its value and quality.

Third: spending per person.

For a population of $2.3 trillion today, which will be 60 percent of GDP in 20 years, we have cut healthcare spending by nearly 70 percent.

They get more of what they want based on their values, live better lives, and spend two-thirds less money and live longer.

Harold's time was limited, but palliative care time is limited.

Palliative care is a paradigm from diagnosis to end of life.

Consecutive hours, weeks, months, years with or without treatment.

Meet Christine.

Stage III cervical cancer, metastatic cancer that started from the cervix and has spread throughout the body.

She's in her fifties, but she's alive.

This is about life, not the end of life.

This is not just a problem for the elderly, it is also a problem for people.

Richard.

End-stage lung disease.

"Richard, what do you hold sacred?"

"My kids, my wife and my Harley."

(laughs) "Alright!

I can barely ride a bike so I can't drive you there, but let's see what we can do. ”

Richard came to see me, but he wasn't feeling well.

He whispered that it would probably take weeks or months of his time.

Then we just talked.

And I listened and tried to hear, but there was a big difference.

Use this in proportion.

I said, "Okay, let's do it one day at a time." Just like you do in other chapters of your life.

And we met Richard right where he is every day.

I call him once or twice a week, but I am very active with terminal lung disease.

Well, palliative care is not only for the elderly, it is not just for middle-aged people.

That's true for everyone.

Meet my friend Jonathan.

We are honored to have Jonathan and his father here today.

Jonathan is in his twenties and I met him a few years ago.

He had metastatic testicular cancer that had spread to his brain.

He suffered a stroke and underwent brain surgery, radiation and chemotherapy.

When I met him and his family, he was weeks away from a bone marrow transplant, so they listened and said, "Help me understand what cancer is."

How did we get here without understanding what we were dealing with?

How did we get to this point without someone understanding what they were working on, taking the next step, engaging with them as humans, and knowing if that was what we should be doing?

Lord knows we can do anything for you.

But should it?

Don't take my word for it.

All the recent evidence related to palliative care proves with absolute certainty that people can live better and longer.

In 2010 there was an influential article in the New England Journal of Medicine.

A study done at Harvard University by a friend and colleague of mine.

End-stage lung cancer: One group receives palliative care, the other group does not receive palliative care.

The group receiving palliative care reported less pain and depression.

Reduced need for hospitalization.

And guys, they lived 3-6 months longer.

If palliative care were an anti-cancer drug, every oncologist on the planet would write a prescription for it.

Why not?

Again, we're idiots, so doctors in long white coats are trained and have faith to deal with this, not this.

This is a space that everyone will visit someday.

But this conversation today is not about dying, it's about living.

I live by my values, what I consider sacred, how I want to write, whether it's the last chapter or the last five chapters of my life.

What we do know and prove is that this conversation needs to happen today, not next week or next year.

At stake are our lives today, our lives when we are old, and the lives of our children and grandchildren.

Not just in the hospital room or on the couch at home, but everywhere we go, everything we see.

Palliative medicine is the answer to engaging with humans and changing the journey we all face, changing it for the better.

I ask my colleagues, my patients, my government and all of humanity to stand up, cry out and demand the best possible care so that we can live better today and ensure a better life tomorrow.

We need to change today to live tomorrow.

thank you very much.

(applause)

In July 1911, a 35-year-old Yale graduate and professor left a rainforest camp with his team.

After climbing a steep hill and wiping the sweat from his forehead, he described what he saw below.

He saw this incredibly intertwined labyrinth of granite and beautifully interlocked emerge from the dense foliage of the rainforest.

The amazing thing about this project is that it was first funded by National Geographic and made the cover of the magazine in 1912.

This professor used state-of-the-art photographic equipment to document the scene and changed the face of exploration forever.

That place was Machu Picchu, discovered and explored by Hiram Bingham.

He looked at the scene and said, 'This is an impossible dream.

what could it be? "

So today, 100 years from now, I invite you to join me, a 37-year-old Yale graduate and professor, on an amazing journey.

(Cheers) We are nothing less than using state-of-the-art technology to map the entire country.

This is a dream started by Hiram Bingham, but we are expanding it around the world, making archaeological exploration more open, inclusive and at a scale never before possible.

This is why we are so excited to share with you today that we are launching the 2016 TED Prize Platform in Latin America, especially Peru.

(Applause.) Thank you.

We are transforming Hiram Bingham's impossible dream into a glorious future that we can all share.

So Peru doesn't just have Machu Picchu.

There are some really great pieces of jewelry like the ones you can see here.

There are wonderful Moche pottery depicting human figures.

There are Nazca Lines and fine textiles.

So as part of the TED Prizes platform, we'll be partnering with some great organizations. First and foremost, we partner with DigitalGlobe, the world's largest provider of high-resolution commercial satellite imagery.

They will help us build this amazing crowdsourcing platform.

Some people may have used it for the MH370 crash or for searching for planes.

Of course, they will also provide satellite images.

National Geographic will help you not only with education, but also with exploration, of course.

Likewise, they will provide us with rich content for the platform, including some of the archival images and documentary footage you saw at the beginning of this talk.

We have already started building and planning our platform and we are very excited.

Now comes the big part.

My team, led by Chase Childs, has already started looking at some of the satellite imagery.

Of course, what we see here is data for 0.3 meters.

This is a place called Chan Chan in northern Peru.

It dates back to 850 AD.

It's a really great city, but let's expand.

This is the type and quality of data you will see.

You can see individual structures, individual buildings.

And previously unknown places are already being discovered.

I can already say that as part of the platform, you will be helping discover thousands of previously unknown sites, including this site and potentially larger sites here.

Unfortunately, we're also starting to discover massive looting of sites like the one you see here.

So many sites in Peru are under threat, but the cool thing is that all this data is being shared with archaeologists who are on the front lines of protecting these sites.

So I was just in Peru, meeting with the Peruvian Minister of Culture and UNESCO.

We will continue to work closely with them.

As you all know, the site will be in both English and Spanish. This is essential so that people from Peru and all of Latin America can participate.

Our main project collaborator is the gentleman you see here, Dr. Luis Jaime Castillo, professor at the Catholic University.

Dr. Castillo, a respected Peruvian archaeologist and former undersecretary, will assist in coordinating and sharing data with archaeologists so that they can explore these sites on the ground.

He also runs this amazing drone mapping program. Some of that images can be seen behind me and here.

And this data goes into the platform, and he also helps image some of the new sites to help you find them.

Our partner on the ground to assist us with education, advocacy and heritage preservation is the Sustainable Conservation Initiative, led by Dr. Larry Coben.

Some may not know that some of the world's poorest communities coexist with some of the world's most famous monuments.

What SPI does is empower these communities, especially women, through new economic approaches and business training.

Therefore, it helps to teach them how to make beautiful handicrafts and sell them to tourists.

This empowers women to value and own their cultural heritage.

I had the opportunity to spend time with 24 of these women at a famous archaeological site called Pachacamac, just outside Lima.

These women have been incredibly inspirational. And the cool thing is that SPI helps transform communities near some of the places you helped discover.

Peru is just getting started.

As we intend to expand this platform globally, we have already received thousands of emails from professors, educators, students, and other archaeologists around the world who are very excited to help get involved.

In fact, they have already suggested wonderful places for us to discover, such as Atlantis.

I don't know if I'll be looking for Atlantis, I don't know.

So we are very excited to launch this platform.

It is expected to officially launch by the end of the year.

And if what my team has already discovered in the past few weeks is any indication, I have to say that what the world will discover is beyond imagination.

Hold on tight to your alpaca.

thank you very much.

(Applause.) Thank you.

(applause)

There is a big question at the heart of life in today's democracies. How do we fight terrorism without destroying democracy and trampling on human rights?

Having spent much of my career working with journalists, bloggers, activists, and human rights researchers around the world, I have come to the conclusion that radical extremist ideologies are much more likely to survive if democratic societies do not step up to protect and defend human rights, press freedom, and a free and open internet.

(Applause) OK, all done. thank you very much.

No, just kidding.

(Laughter) Actually, I'd like to dig a little deeper into this.

Tunisia is one of the countries at the forefront of this issue. Tunisia is the only country to have a successful democratic revolution since the Arab Spring.

Five years later, they are suffering from serious terrorist attacks and widespread recruitment by ISIS.

And many Tunisians have called on the government to do whatever it takes to keep them safe.

Tunisian cartoonist Nadia Chiari sums up the character's situation: "I don't care about human rights.

I don't care about revolutions.

I don't care about democracy or freedom.

I just want to be safe. ”

"Satisfied?" asked the guard.

"It's safe now."

If Tunisians could find ways to deal with terrorism without staying in places like this, they would be a role model not only for their region, but for all of us.

The reality is that while civil society, journalists and activists are being attacked by extremist groups, in many countries they are also being attacked by their own governments.

We see bloggers and journalists imprisoned, prosecuted and threatened by their own governments, many of whom are allied with the West in the war on terror.

Just three examples.

My friend and former colleague Hisham Almirat, along with six other activists in Morocco, have been charged with endangering national security.

Saudi blogger Raif Badawi has been jailed and flogged for insulting Islam and criticizing the Saudi regime on his blog.

Most recently, Errol Onderoglu, Turkey's representative of Reporters Without Borders, was detained and charged, along with other activists, with spreading terrorist propaganda for supporting Kurdish media.

Counter-terrorism measures quickly turn into state repression without strong protections for minority communities and peaceful debate. This should be supported by a robust independent local media.

But while that's not really happening, Washington, in partnership with Silicon Valley and Hollywood, is pouring millions and hundreds of millions of dollars into what it calls "counter-messaging," a fancy term for propaganda.

To combat the terrorist propaganda spread on the Internet, Internet inquiry units have been established in Europe to allow people to report extremist content they find and have it censored.

The problem is that all this propaganda, surveillance and censorship has not fully compensated for the fact that the most credible voices who can offer credible ideas and alternative solutions to the real economic, social and political problems in their communities that drive people to extremism in the first place are being silenced by their own governments.

All this adds up to less freedom around the world.

The human rights group Freedom House reported that 2015 marked the 10th year in a row of declines in freedom around the world.

And this is not only due to the actions of authoritarian governments.

Partly because democratic governments are cracking down on dissenters, whistleblowers and investigative journalists.

UN Secretary-General Ban Ki-moon warned that "preventing extremism and promoting human rights go hand in hand."

It's not that governments shouldn't keep us safe, but they should. But we need public oversight, transparency and accountability for the rule of law.

Meanwhile, extremists are literally killing civil society in some countries.

Since 2013, more than a dozen secular bloggers and community activists in Bangladesh have been literally massacred by extremists while the government has done little.

In the Syrian city of Raqqa, people like Rukia Hassan and Naji Jaaf were assassinated for reporting from ISIS-controlled areas.

A citizen media group called "Raqqa is Being Sloleded Silently" uses strong encryption to transmit its reports and protect itself from eavesdropping and surveillance.

But authorities in the US, UK, and many other democracies are trying to use the law to weaken or outright ban strong encryption because bad guys use it too.

We must fight for the right of our citizens to use strong cryptography.

Otherwise, dissent and investigative reporting will become even more difficult in many more places.

And the bad guys — criminals and terrorists — are still trying to find ways to communicate.

Hats off to companies standing up to protect their users' right to use encryption.

But when it comes to censorship, things get even more complicated.

Yes, there is a real problem with the proliferation of extremist content on the Internet.

And Facebook, YouTube, and Twitter are among the many companies that have reported removing hundreds of thousands of content and disabling accounts linked to extremist speeches.

The problem is that its enforcement mechanism is a complete black box with collateral damage.

Take, for example, activist Iyad El-Baghdadi who makes fun of ISIS on Twitter.

His account was disabled because he shares the last name with a prominent ISIS leader.

Last December, the accounts of a number of women named Isis, who is also the name of an Egyptian goddess, were deactivated.

And this woman, a computer programmer living in the United States, managed to get enough media attention to report her Facebook deactivation on Twitter and get her account reinstated.

But that's the problem - she needed media attention.

And journalists are not immune.

David Thomson, a terrorism expert and reporter for Radio France International, was removed from his Facebook account and suspended for several days after his report included a picture of the ISIS flag, even though he was only reporting on ISIS and not promoting it.

And there are stories of people like this Egyptian man, Ahmed Abdelahi. He recently reported at an event in Washington, D.C., that some of his discussions with extremists were part of his discussions with extremists — he now argues with ISIS supporters on social media to try and alienate them — some of his discussions with extremists have been deleted, which he believes has the effect of protecting them from a different perspective.

It's unclear if Facebook knows the extent of the collateral damage, or if other companies do.

But we know that journalism, activism and public discourse are being silenced to root out extremist speech.

Therefore, these companies have great influence over the discourse of society and should be held accountable.

They need to conduct impact assessments to identify and resolve issues that we are clearly aware of.

Enforcement mechanisms should be more transparent, with clear appeal and grievance mechanisms so that users can restore their content.

Now, I've spent the last 10 minutes talking about how governments and corporations are making life difficult for these people.

Here is a photo of members of Global Voices, the citizen media network I helped co-found with my friend Ethan Zuckerman over ten years ago.

Interestingly, about five years ago, shortly after the Arab Spring, data scientist Gilad Rotan created a network map of the people at Global Voices who were heavy Twitter users during the Arab Spring.

And he found that many of these people served as key information nodes between activists and journalists throughout the Tunisian and Egyptian revolutions.

We need to ensure that these people not only survive, but continue to thrive.

Many of them are still active, with the exception of those who have gone into prison, hiding or defecting.

All over the world, people fed up with fear and oppression are uniting in communities and across borders.

We must do all we can to encourage governments and businesses to better protect our rights.

We also need to be more careful about how our own personal, political, consumer and business choices affect people like this around the world.

And if you follow the news, it's clear that it's not enough.

We must take personal responsibility by joining, or at least actively supporting, a growing ecosystem of individuals and groups fighting for social justice, environmental sustainability, government accountability, human rights, press freedom, and a free and open internet around the world.

I believe we can finally overcome the digitized networks of extremism, demagoguery and hate.

but ...

We must achieve this by truly strengthening the global network of citizens around the world, empowered by those who work hard every day and take personal risks for a more peaceful, just, open and free future world.

Thank you for your attention.

(applause)

Hello. I want to show you 30 seconds of the best day of my life.

(Applause.) It was El Capitan in California's Yosemite National Park. For those who don't know, I was climbing alone without a rope. This was a style of climbing known as free soloing.

It's the culmination of almost a decade of dreams, and in the video I'm over 2,500 feet off the ground.

Does it look scary? Yep, that's why I spent years dreaming of playing El Cap solo, but never did.

But the day the video was shot didn't feel scary at all.

It felt as comfortable and natural as a walk in the park, something most people were doing in Yosemite that day.

Today I want to talk about how I felt so comfortable and how I overcame my fear.

I'll start by briefly explaining how I became a climber, then I'll talk about my two most important free solos.

Both were successful, which is why I am here.

(laughter) But while the first day was mostly unsatisfying, the second El Cap was the most fulfilling day of my life.

Through these two climbs, you can see my process of controlling my fear.

So, I started climbing at the gym when I was about 10 years old, and have been living a climbing-centered life for over 20 years.

After nearly a decade of mostly indoor climbing, I moved outdoors and gradually started free soloing.

I built up my comfort over time and slowly took on bigger and more challenging walls.

Also, I had a lot of freelance soloists before me, so I got a lot of inspiration from them.

But by 2008, I was beginning to envision breaking into new territory, repeating most of their previous solos at Yosemite.

The obvious first choice was Half Dome, the iconic 600-meter-tall wall that towers over the eastern edge of the valley.

The problem, as well as the charm, was that it was too big.

I really didn't know how to prepare for a potential free solo.

So we decided to skip the preparation and just go there and have an adventure.

I figured I would get through this situation, but of course it wasn't the best strategy.

At the very least, I climbed the roped route with a friend two days ago to make sure I knew the approximate destination and was physically fit.

But when I came back two days later by myself, I decided I didn't want to go there.

I knew there would be a 300 foot change going around one of the hardest parts of this climb.

Despite having never climbed before, I suddenly decided to skip the difficult part and try the variations, but I soon started doubting myself.

Imagine being alone in the center of your face at an altitude of 600 feet and worrying that you've lost your way.

(Laughter) Thankfully, I was on the right track, so I circled back to my original route.

It was a little rickety, pretty rickety, but I knew all the hardest climbs were at the top, so I tried not to worry too much.

I had to keep my cool.

It was a beautiful September morning. As we gained altitude, we heard the voices of tourists chatting and laughing at the summit.

They were all hiking the regular trails in the back that I was planning to use for my descent.

But there was an empty granite slab between me and the top.

There were no cracks or edges to grab onto, just tiny ripples of texture on the walls that were slightly below vertical.

I had to surrender my life to the friction between my climbing boots and smooth granite.

I carefully balanced and shifted my weight back and forth between the small dirts.

But then I reached a completely unreliable footing.

Two days ago, I could have climbed onto it immediately, but it would have been roped off.

Now it felt too small and slippery.

I was wondering if my feet would stop even if I put my weight on it.

I thought about a foot more to the side, but that seemed even worse.

I changed my foot and tried to step further.

It seemed even worse.

I started panicking.

I could hear people laughing on the summit right above me.

I wanted to be somewhere other than the slate.

My mind was racing in all directions.

I knew what I had to do, but I was too scared to do it.

I had to stand up on my right leg.

And after what felt like an eternity, I accepted what I had to do, stood up on my right foot, and it didn't slip, so I didn't die, and that move marked the end of the hardest climb.

And from there I rushed towards the top.

So usually when you climb to the top of Half Dome, you're armed with ropes and lots of climbing gear, and tourists crowd around you to catch your breath and take pictures.

This time I was shirtless, gasping, jacking and jumping over the edge.

I was excited, but nobody paid attention.

(Laughter.) I looked like a hiker who got lost approaching a cliff.

Around me, there were people talking on their cell phones and having picnics.

I felt like I was in a shopping mall.

(Laughter) When I took off my tight climbing shoes and started to descend, people stopped me.

"Hike barefoot? That's very hardcore."

(Laughs) I didn't mean to bother explaining, but in my climbing diary that night, I wrote down the free solo at Half Dome, but with a scowl, I added a comment, "Do you want to work harder?"

I made a solo ascent and it was celebrated as a big first in mountaineering.

Some friends later made a movie about it.

However, I was not satisfied.

I was disappointed with my performance. Because I knew I had done something.

I didn't want to be a lucky climber. I wanted to be a great climber.

In fact, I didn't think I should make a habit of relying on luck, so I quit free soloing for the next year or so.

But even though I didn't do a lot of solos, I was already thinking about El Cap.

It has always been in the back of my mind as Solo's obvious crown jewel.

It is the most impressive wall in the world.

For the next seven years, every year, I thought, 'This is the year I'm going to play El Cap solo.

Then I drove to Yosemite and looked up at the wall and thought, 'That's crazy.

(laughs) Too big and too scary.

But eventually I came to accept that I wanted to test myself against El Cap.

It represents true mastery, but I needed it to feel different.

I didn't want to run away from anything and barely pass by.

I wanted to do it right this time.

What makes El Cap so intimidating is the sheer size of its walls.

It takes most climbers three to five days to climb 3,000 feet of vertical granite.

The idea of ​​building a wall this size with just shoes and a chalk bag seemed impossible.

A 3,000-foot climb represents thousands of different hand and foot movements, so there's a lot to keep in mind.

Many of the movements were memorized over and over again.

I've climbed El Cap probably 50 times in the last 10 years with a rope.

But this photo shows my favorite way to rehearse the moves.

I'm at the top and trying to practice my day by rappelling over 1,000 feet of rope.

Once I found a sequence that felt safe and reproducible, I had to memorize it.

I had to make sure they penetrated deep within me so there was no chance of mistakes.

I didn't want to wonder if I was on the right track or using the best holds.

Climbing with a rope is primarily a physical effort.

You just need to be strong enough to hold on and move upwards.

But free soloing plays a more important role in my heart.

Physical strain is about the same.

Your body is still climbing the same wall.

But it takes a certain mindset to stay calm and perform at your best when you know every mistake can be deadly.

(Laughter) It shouldn't be funny, but if it's funny, it's funny.

(Laughter) I tried to cultivate that mindset through visualization. This basically means imagining the entire experience of climbing a wall solo.

It was partly to help me remember all the holds, but most of the visualization was to feel the texture of each hold in my hands and imagine what it would feel like to stretch out and put my foot down.

I would imagine it all like a choreographed dance thousands of feet up in the air.

The most difficult part of the whole route was called the boulder problem.

Rising about 600 feet off the ground, it consisted of the hardest physical movements of the entire route. It was a long pull between poor railings with very small, slippery feet.

This is what I mean by "poor". It's smaller than the width of a pencil, but the end points down and I had to push it up with my thumb.

But it wasn't the hardest thing.

The crux culminated in a left-foot karate kick to the inside of the adjacent corner. It's a maneuver that requires a high degree of precision and flexibility, and for the past year I've been doing nightly stretches to keep my feet comfortable reaching.

As I practiced the movements, my visualizations turned into potential solo emotional elements.

Basically, what if you get up there and get too scared?

What if you are too tired?

What if the kick doesn't go well?

All possibilities had to be considered while safely on the ground, so there was no room for doubt creeping in when the time came and we actually started moving without ropes.

Doubt is a precursor to fear, and I knew that fear would not allow me to experience the perfect moment.

It took a lot of imagination and rehearsal to dispel any doubts.

But beyond that, I also imagined how it would feel if it never felt possible.

What do you do when you're too scared to try after doing so much?

What if I wasted my time and didn't feel comfortable in such a exposed position?

There was no easy answer, but El Cap meant enough to me that I decided to try and find it.

Some of my preparations were more routine.

Here is a picture of my friend Conrad Anker climbing the bottom of El Cap with an empty backpack.

We spent the entire day climbing a particular crack in the middle of the wall. It was blocked by loose rock, and that part was difficult and potentially dangerous. A single misstep could cause a rock to slam into the ground, killing a passing climber or hiker.

So we carefully removed the stones, loaded the pack and rappelled down.

Imagine how ridiculous it would be to climb a 400 foot wall just to stuff your backpack full of rocks.

(Laughter) Carrying a pack full of stones is never easy.

It's even harder on cliffs.

It may have felt silly, but I had to do it nonetheless.

Everything had to feel perfect if you were going to climb the route without ropes.

After two seasons of working towards a potential free solo for El Cap, it's finally all set.

I knew all the clues and footholds throughout the route and knew exactly what to do.

We were basically ready.

It's time to solo El Cap.

On June 3, 2017, I woke up early to eat my usual breakfast of muesli and fruit and arrived at the base of the wall before sunrise.

Looking up at the wall gave me confidence.

I felt even better when I started climbing.

At about 500 feet up, I reached a slab that looked a lot like the one I had a hard time with at Half Dome, but this time it was different.

I scouted every option, including hundreds of feet of walls on either side.

I knew exactly what to do and how to do it.

I had no doubts. I kept climbing.

The difficult and tough sections were easily passed.

I was following my routine perfectly.

I took a short break under the boulder problem and climbed with a rope as I had practiced many times.

Without hesitation my feet flew towards the wall on the left and I felt I had done it.

Climbing Half Dome was a big goal and I achieved it, but I didn't get what I really wanted.

I didn't reach mastery.

Hesitant and scared, it wasn't the experience I was hoping for.

But El Cap was different.

With 600 feet to go, I felt like the mountain was giving me a victory lap.

I climbed smoothly and precisely and enjoyed the sounds of birds flying around the cliffs.

Everything felt like a celebration.

After 3 hours and 56 minutes of spectacular climbing, we reached the summit.

It was the climb I wanted and felt like it was accomplished.

thank you.

I once had a nightmare like this. You are standing in the middle of a desolate field full of mines.

In real life, I love hiking, but I always get nervous when I want to go hiking.

In the back of my mind, I have this thought that I might lose a limb.

This underlying fear began ten years ago when I met Mohammed, a cluster bomb survivor of the Israeli-Hizbollah war in Lebanon in the summer of 2006.

Mohammed, like many other survivors around the world, had to live through the horrifying effects of cluster bombs every day.

I was still working at Agence France-Presse in Paris when the month-long conflict began in Lebanon.

I remember being glued to the screen with anxiety about the news.

I wanted to reassure myself that a falling bomb had hit my parents' house.

When I arrived in Beirut on a mission to cover that war, I was relieved to be united with my family as they had finally escaped from South Lebanon.

I remember seeing this footage the day the war ended. On one of the blocked roads, a displaced person eagerly rushes south to return home, regardless of what they find.

An estimated 4 million cluster submunitions were spread in Lebanon during the 34-day conflict.

Muhammad lost both legs in the final weeks of the conflict.

The fact that he lives a five-minute drive from my parents' house made it easier to follow him through the years.

It's been almost 10 years since we met for the first time.

I saw a boy who had to undergo physical and mental trauma.

I saw a teenager trying to give a friend a tattoo in exchange for a set fee of $5.

And I know young unemployed men who spend hours surfing the net looking for potential girlfriends.

His fate and the consequences of losing his leg are now his everyday reality.

Bomb trauma survivors like Ms. Mohammed have to deal with more details than we can ever imagine.

Who would have thought that many of the daily tasks we do or take for granted, like going to the beach or picking something off the floor, could cause stress and anxiety.

Well, that's what happened to Muhammad in the end because of his inflexible prosthetic leg.

Ten years ago, I had no idea what cluster bombs were or what they meant.

I learned that this indiscriminate weapon is used in so many parts of the world and continues to kill on a regular basis without distinguishing between military targets and children.

I naively asked myself, "But seriously, who made those weapons?

And for what? ”

Explain what a cluster bomb is.

It is a large container filled with kittens.

When dropped from the air, it opens in the air and releases hundreds of particles.

They scatter over a wide area, and many do not explode when they collide.

Those unexploded ordnance, like mines, will eventually sit on the ground waiting for their next target.

It can explode if someone accidentally steps on it or picks it up.

These weapons are so unpredictable that the threat is even greater.

One day farmers will be able to cultivate their land without any problems.

The next day, he is able to start a fire and burn the branch, causing any submunitions that were nearby to explode due to the heat.

The problem is that children mistake them for toys because they look like bouncing balls or soda cans.

A documentary photographer, I decided to return to Lebanon months after the end of the conflict to meet cluster bomb survivors.

And I met some - Hussein and Rasha, both of whom lost a leg to subbombs.

Their stories are similar to those of many other children around the world, and testify to the horrific effects of continued use of such weapons.

That's when I met Mohammed in January 2007.

He is 11 and I met him exactly 4 months after the accident.

When I first met him, he was undergoing painful physical therapy to recover from his fresh wounds.

Mohammed was still young and in shock and had trouble adjusting to his new body.

Sometimes I would wake up in the middle of the night wanting to scratch my lost leg.

What brought me closer to his story was the instant understanding that the difficulties Mohammed would face in the future, the pain he suffered while adjusting to his injury at the age of 11, would be multiplied.

Even before he became disabled, Muhammad's life was not easy.

He was born in the Rashidiye camp for Palestinian refugees and still lives there.

There are about 400,000 Palestinian refugees in Lebanon, who suffer discriminatory laws.

They are not allowed to work in the public sector or engage in certain occupations and are denied the right to own property.

This is one of the reasons why Mohammed does not genuinely regret dropping out of school soon after his injury.

He said, "What's the point of having a college degree if you can't find a job in the first place?"

The use of cluster munitions not only harms the lives of victims, but also harms communities.

Many people injured by this weapon drop out of school, are unable to find work, or even lose their jobs and consequently the ability to provide for their families.

This, of course, is an experience of continuous physical pain and loneliness.

These weapons affect the poorest of the poor.

High medical expenses are a burden on the family.

They end up relying on humanitarian agencies, which are inadequate and unsustainable, especially when the injured need lifelong assistance.

Ten years after Muhammad's injury, he still cannot afford to buy a proper prosthesis.

Having embarrassed his friends with several falls over the last few years, he is very careful with his feet.

He joked that because he has no legs, he sometimes tries to walk on his hands.

One of the worst invisible effects of this weapon is the psychological scars it leaves.

One of Mohammed's early medical reports diagnosed him with symptoms of PTSD.

He suffered from anxiety, anorexia, sleep disturbances and showed signs of anger.

In reality, Muhammad did not receive adequate help for a full recovery.

His current obsession is to leave Lebanon at all costs, even if it means embarking on a perilous journey with the refugees drifting through the Mediterranean towards Europe today.

Knowing how dangerous such a journey would be, he said, "Even if I die on the way, it doesn't matter."

For Muhammad, he is dead here anyway.

Cluster bombs are a global problem as they continue to destroy and harm entire communities for generations to come.

In an online interview with Jamie Franklin, director of the Mines Advisory Group, he said, "US forces have dropped more than 2 million tons of ammunition over Laos.

Landing a loaded plane is dangerous if it fails to find its target in Vietnam, so Laos had a free-fall area where the cargo could descend before the plane returned to base. ”

According to the International Committee of the Red Cross, between 9 and 27 million unexploded submunitions remain in Laos alone, one of the poorest countries in the world.

Since 1973, about 11,000 people have been killed or injured.

The weapon has been used by more than 20 countries during armed conflicts in more than 35 countries, including Ukraine, Iraq and Sudan.

So far, 119 countries have signed an international treaty banning cluster bombs. The treaty is officially called the Convention on Cluster Munitions.

However, some of the largest producers of cluster munitions, namely the United States, Russia and China, continue to produce cluster munitions outside the scope of this life-saving treaty, reserve the right to produce cluster munitions in the future, and stockpile their harmful weapons and may even use them in the future.

Cluster munitions have reportedly been used recently in the ongoing conflicts in Yemen and Syria.

Financial institutions have invested billions of dollars in companies that make cluster bombs, according to a survey of global investments in cluster bomb manufacturers by Dutch-based NGO Pax.

Most of these agencies are based in countries that have not yet signed the Convention on Cluster Munitions.

Coming back to Mohammed, one of the few jobs he could find was picking lemons.

When I asked if it was safe to work in the field, he said, "I don't know."

Studies show that cluster munitions often contaminate areas where agriculture is the main source of income.

A study by Handicap International found that 98 percent of cluster munition casualties are civilians.

84% of casualties are male.

In a country where these people have no choice but to work in the field, they are just doing it at their peril.

Muhammad is the only male of three sisters.

Culturally, he is expected to provide for his family, but is unable to do so.

He tried so many different jobs but was unable to continue due to his disability and the environment which was not very friendly to people with disabilities to say the least.

When he went looking for a job, he was so hurt that he paid a small amount of money out of pity and was turned down.

"I'm not here to ask for money, I just want to make money," he said.

Mohammed is 21 years old today.

He is illiterate and communicates by voice messages.

Here is one of his messages.

(Audio) Mohammed: (speaking in Arabic) Laura Bouchnak: He said, "My dream is to run. I'm sure once you start running, you'll never stop."

thank you.

(applause)

Imagine you are a pig farmer.

You live on a small farm in the Philippines.

Your animal is your family's only source of income, as long as it's healthy.

You know that your pig can catch the flu, or swine flu, at any time.

Living in confined spaces, when one pig coughs and sneezes, it soon causes the next to cough and sneeze, and eventually swine flu sweeps the farm.

If it's a vicious enough virus, your herd's health can be lost in the blink of an eye.

A veterinarian is called to visit the farm and take samples from the pig's nose and mouth.

But then you have to drive back to the city to test the samples at the central laboratory.

You will receive the results after 2 weeks.

Two weeks may be just enough time for the infection to spread and take over your lifestyle.

But it doesn't have to be.

Farmers can now collect those samples themselves.

They immediately jump into the pen, wipe the pig's nose and mouth with a small piece of filter paper, place the small filter paper in a small tube, and mix it with a chemical that extracts the genetic material from the pig's nose and mouth.

And without leaving the farm, they take a drop of that genetic material, put it in an analyzer smaller than a shoebox, program it to detect DNA or RNA from the swine flu virus, return results within an hour, and visualize the results.

This reality is possible because today we live in an era of personal DNA technology.

All of us can actually test our own DNA.

DNA is the basic molecule that carries the genetic instructions that help build the living world.

Humans have DNA.

Pigs have DNA.

Bacteria and some viruses also have DNA.

Genetic instructions encoded in DNA inform how our bodies develop, grow and function.

And often the same information can cause illness.

Your genetic information is strung together in the DNA double helix, a long, twisted molecule with over 3 billion letters from beginning to end.

However, lines that convey meaningful information are usually very short, ranging from tens to thousands of characters long.

So when you're trying to answer a question based on your DNA, you usually don't actually need to read all 3 billion characters.

It's like being hungry at night and having to flip through a phone book from start to finish, pausing line by line to find the nearest pizza place.

(Laughter) Fortunately, thirty years ago, humans began to invent tools that could find specific genetic information.

These DNA machines are great.

They can find any lineage of DNA.

But once you find it, that DNA is still small and surrounded by a lot of other DNA, so what the machine does is copy the target gene, stacking one copy on top of another, millions and millions, until that gene stands out against the rest. Until you can visualize it, interpret it, read it, understand it, and answer "Does my pig have the flu?"

Or is there another question embedded in our own DNA: am I at risk for cancer?

am i Irish?

Is that boy my son?

(Laughter) This ability to make copies of DNA sounds simple, but it has transformed our world.

Scientists use it every day to detect and treat disease, develop innovative medicines, modify food, and assess whether food is safe to eat or whether it is contaminated with deadly bacteria.

Judges also use the output of these machines in court to determine guilt or innocence based on DNA evidence.

The inventor of this DNA copying technology was awarded the Nobel Prize in Chemistry in 1993.

But for 30 years, the power of genetic analysis has been confined to the ivory tower, the work of scientists with big-name PhDs.

Well, several companies around the world are working to make this same technology available to the public, like pig farmers like you.

I co-founded one of these companies.

Three years ago, together with fellow biologist and friend of mine, Zeke Alvarez-Saavedra, we decided to build a personal DNA machine for everyone to use.

Our goal was to bring DNA science to more people in new places.

We started working in the basement.

We had a simple question. What would the world look like if everyone could analyze their DNA?

If I had shown you this photo in 1980, you would have been equally intrigued.

(Laughter.) You must have thought, "Wow!"

Now I can call Aunt Glenda from the car and wish her a happy birthday.

You can call anyone at any time.

This is the future! ”

Little did you know that you would be tapping that phone to make a reservation for a dinner you and Aunt Glenda will celebrate together.

Tap it again and you'll be ordering a gift for her.

One more tap and you're liking Auntie Glenda on Facebook.

All while sitting on the toilet.

(Laughter) It's notoriously difficult to predict where new technology will lead us.

And the same is true for personal DNA technology today.

For example, I could never have imagined that a truffle farmer would use a personal DNA machine.

Dr. Paul Thomas makes a living growing truffles.

Pictured here, he holds Britain's first grown truffles at one of his farms.

Truffles are this delicacy that arises from fungi that grow at the base of living trees.

and rare fungus.

Some species can fetch $3,000, $7,000, or more per kilogram.

I learned from Paul that the risks for truffle farmers can be very high.

When sourcing new truffles to grow on his farm, he is threatened by imitations, truffles that look and feel like the real thing but are of lower quality.

But even with a trained eye like Paul's, even under a microscope, these truffles are real.

So in order to grow the highest quality truffles that chefs around the world vie for, Paul must use DNA analysis.

Isn't that shocking?

I'm sure you'll never see that black truffle risotto again without thinking about its genes.

(Laughter) But personal DNA machines can also save human lives.

Professor Ian Goodfellow is a virologist at the University of Cambridge.

Last year he traveled to Sierra Leone.

When the Ebola epidemic broke out in West Africa, he quickly realized that doctors there lacked the basic tools to detect and fight the disease.

Results can take up to a week, too long for suffering patients and families.

Ian decides to move his lab to Makeni, Sierra Leone.

Here, Ian Goodfellow is bringing over 10 tons of equipment into a pop-up tent and will be rigged to detect, diagnose, and sequence viruses within 24 hours.

But there is something surprising here. The same equipment that Ian was able to use in his UK lab to sequence and diagnose Ebola does not work under these conditions.

We're talking 35 degrees Celsius heat and over 90% humidity here.

But instead, Ian could continue to sequence viruses and save lives with a personal DNA machine small enough to sit in front of an air conditioner.

This may seem like an extreme place for DNA analysis, but let's move on to an even more extreme environment: space.

Let's talk about DNA analysis in space.

When astronauts live on the International Space Station, they orbit the planet at an altitude of 400 miles.

They are traveling at 17,000 miles per hour.

Imagine watching 15 sunsets and sunrises every day.

You too are floating in microgravity.

And under these circumstances, our bodies can do strange things.

One is that our immune systems are suppressed, making astronauts more susceptible to infections.

AnnaSofia Boglaev, a 16-year-old girl from New York, wondered if changes in the astronaut's DNA were responsible for this immunosuppression, and through a scientific competition called "Genes In Space," AnnaSofia designed an experiment to test this hypothesis using a personal DNA machine on the International Space Station.

Here, Anasophia can be seen watching the launch of an experiment to the International Space Station on April 8, 2016 at Cape Canaveral.

That cloud of smoke was the rocket that carried the Anasophia experiment to the International Space Station, and three days later, astronaut Tim Peake conducted the experiment in microgravity.

Personal DNA machines are now on board the International Space Station to help monitor living conditions and save the lives of astronauts.

For a 16-year-old boy to plan a DNA experiment to save the life of an astronaut might seem rare and a mark of a child prodigy.

To me, it means something bigger. It means that DNA technology is finally within reach of each and every one of you.

A few years ago, a college student with a personal computer could code an app, the social network that now has over a billion users.

Could we move to a world where each home has one personal DNA machine?

I already know a family living in this reality.

For example, the Daniels family set up a DNA lab in the basement of their Chicago suburb.

This is not a family of PhD scientists.

This is the same as any other family.

They just like spending time together doing fun and creative things.

By day, Brian is an executive at a private equity firm.

He spends nights and weekends conducting DNA experiments with children aged 7 and 9 as a way to explore the living world.

The last time I called them, they were looking at home grown produce in their backyard garden.

They took the flesh of the harvested tomato skins, placed them in test tubes, mixed them with chemicals to extract the DNA, and used a home DNA copier to test the tomatoes for genetically modified traits.

For the Daniels family, a personal DNA machine is like a 21st century chemistry set.

Most of us may not yet be diagnosing a genetic disorder at the kitchen sink or doing a paternity test at home.

(Laughter) But we've definitely reached a point in history where everyone can actually experience DNA in the kitchen.

Copy, paste, and analyze DNA to extract meaningful information from it.

And it's times like these that big changes are bound to happen. This is the moment when transformative and powerful technology, hitherto confined to a select few in an ivory tower, is finally within reach of all of us, from farmers to schoolchildren.

Think of the moment when phones were no longer corded to the wall, or when computers moved away from mainframes and permeated our homes and offices.

It may be difficult to predict the ripples of the personal DNA revolution, but one thing is certain: the revolution is irreversible and DNA technology is already spreading faster than we can imagine.

If you're interested, get up close and personal with DNA today.

Being curious is in our DNA.

(laughs) Thank you.

(applause)

As human anatomy enthusiasts, we are so excited to finally be able to focus on our bodies.

Through practices such as preventive medicine, patient empowerment, and self-monitoring, I am still obsessed with every step of the day.

All of these work to promote a healthy connection between us and our bodies.

Despite the focus on the healthy self, public knowledge of the anatomical self is lacking.

Many people don't even know where their vital organs are located or how they work.

That's because human anatomy is a difficult and time-consuming subject to learn.

How many people here have studied anatomy?

Great, most of you are in medicine.

Like you, I've spent countless hours memorizing hundreds of structures.

Something an anatomy student can't do without a visual aid.

Because at the end of the day, these medical illustrations are what make studying anatomy so interesting, whether you remember all the details or not.

When we look at them, we are actually looking at our own manuals.

But what happens when you finish studying?

These beautiful illustrations are locked into the pages of medical textbooks and apps, and referenced only when necessary.

And for the general public, medical illustrations may only be seen passively on the walls of clinics.

From the beginning of modern medicine, medical illustration, and therefore anatomy, has existed primarily within medical education.

But now something interesting is happening.

Artists are breaking anatomy out of the medical world and pushing it into the public arena.

For the past nine years, I have been cataloging and sharing with the public this flourishing of anatomical art through my perspective as a medical illustrator.

But before introducing how artists are reusing anatomy today, it's important to understand how art has influenced anatomy in the past.

Now, anatomy is essentially a visual science, and the first anatomists to understand this lived during the Renaissance.

They enlisted the help of artists to promote their discoveries to the public.

And this drive to entertain as well as teach has produced some of the strangest anatomical illustrations.

Anatomy was embroiled in a struggle between science, art, and culture that lasted over 500 years.

Artists brought dissected cadavers to life and posed in these humorous anatomical striptease shows.

Imagine it in today's textbooks.

They also showed them completely dead, involuntarily stripped of their skin.

Disembodied limbs were often posed in literal still lifes.

Some of the illustrations also included references to pop culture.

This is Clara the famous rhinoceros who was traveling in Europe in the mid 1700's. At the time, seeing a rhino was an exciting curiosity.

Her inclusion in this illustration is akin to celebrity sponsorship today.

Then the introduction of color brought a whole new depth and clarity to the anatomy that made it amazing.

By the early 20th century, with the advent of medical illustrators, the perfect balance between science and art was finally achieved.

They created a universal representation of anatomy: neither living nor dead, immune to artistic culture.

And this emphasis on lean accuracy was precisely for medical education.

And this is what we will learn from today.

But why has medical illustration captured our imagination, both past and present?

Now, we are naturally sensitive to the beauty of the human body.

And medical illustration is still art.

Nothing evokes more emotional reactions, from delight to outright disgust, than the human body.

And today, armed with that emotion, artists are taking anatomy from the medical world and reinvigorating it through art in the most imaginative ways.

A perfect example of this is Spanish contemporary artist Fernando Vicente.

He takes 19th-century anatomical illustrations of the male body and envelops them in female sensuality.

The women in his paintings challenge us to look beyond surface anatomy, thereby introducing a strong femininity that has been lacking in previous histories of anatomical representation.

Artistry can also be seen in the repair and restoration of the human body.

This is an x-ray of a woman who broke and dislocated her ankle in a roller skating accident.

As a tribute to her trauma, she commissioned Montreal-based architect Federico Carvajal to create a wire sculpture of her damaged leg.

Now, notice the bright red screws that are magnified in the engraving.

These are the actual surgical screws used in her ankle reconstruction.

Medical hardware repurposed as art.

I am often asked how I choose the art I present online or feature in gallery shows.

And for me, it's a balance of technique and concept that pushes the boundaries of anatomy as a way of knowing yourself. That's why Michael Reedy's research struck me.

His serious portraits are often overlaid with elements of humor.

For example, look at her face.

Notice the red mark.

While these crazy cartoon monsters grow annoying and out of control in the background, Michael expresses serious anxiety due to his skin condition.

In the mirrored figure, we render the full body anatomy and cover it with glitter to make it look like candy.

In doing so, Michael belittles the popular perception that anatomy is so closely tied to sickness and death.

Now, the next concept may not make much sense, but human anatomy is no longer limited to humans.

As a child, did you ever wish your toys could come to life?

Jason Freeney makes those dreams come true with Magic Toy Dissection.

(Laughter.) Some might think this brings a morbid edge to an innocent childhood character, but Jason says of his own anatomy, "What I've never seen in a child's reaction to my work is horror."

Always wanting to surprise, surprise and explore.

Fear of anatomy and guts is a learned response.

This dissection also extends to politically and socially influenced objects.

Noah Scullin's Anatomy of War depicts guns being dissected to expose human organs.

However, if you look closely, you can see that the brain is missing.

And if you keep watching, you might notice that Noah very carefully places the rectum on the tip of the gun barrel.

Now, the following artists have been my focus for many years and have seen me get the public excited about anatomy.

Danny Kwark is a young artist who paints his subjects in the process of autopsy.

He bends the rules of medical illustration by inserting highly dramatic light and shadows.

This creates a 3D illusion and is very suitable for painting directly on human skin.

Danny makes it look as if a person's skin has actually been peeled off.

And this effect is also cool and tattoo-like and can be easily transferred to medical illustrations.

Danny now travels the world teaching anatomy to the public through body painting. So when I found out he was rejected from the Medical Illustration Program, it was quite a shock.

But he's fine.

And there are artists who extract anatomy from both the medical and artistic worlds and display it directly in the street.

London-based SHOK-1 draws giant X-rays of pop culture icons.

His x-rays show how cultures can have their own anatomy and, conversely, how cultures can become part of the human anatomy.

I come to admire his work because X-rays are very difficult to reproduce by hand, let alone spray paint.

But again, this person is a street artist who also happens to have a degree in applied chemistry.

Austrian street artist Nikos takes the term 'exploded view' to a whole new level, decorating walls with anatomical drawings of humans and animals around the world.

Influenced by comics and heavy metal, Nikos injects a very youthful and charming energy into the anatomy I love.

Street artists believe that art belongs to the public.

And what makes this street anatomy so fascinating is that it is the furthest thing from the world of medicine.

It forces you to look at it and confront your own perceptions of anatomy, whether you, like me, find it beautiful, terrible, morbid, or awe-inspiring.

It is because of our intimate and often changing relationship with it that it elicits these responses.

All of the artists featured here today use medical illustrations as references for their art.

But for them, anatomy is not just something to memorize, it is the basis for understanding the human body on a meaningful level. To portray it in a way that we can relate to, whether it's cartoons, body painting, or street art.

Far beyond the pages of medical textbooks, anatomy art has the power to arouse public excitement and reinvigorate enthusiasm in the medical community, ultimately connecting our innermost selves with our bodies through art.

thank you.

(applause)

I had about five minutes before I had time to talk to a bunch of executives about visibility and being on camera.

After all, I'm a so-called expert there, a former 20-year TV newscaster and life & business coach.

I just happened to look down at my cell phone to check the time and realized I had a missed call from my ex-husband.

I can still hear his voice.

"Dalice, what's going on?

I just got a call from a stranger telling me to go to this website. And now I'm looking at all your naked pictures.

Your private parts are everywhere on this website.

who saw this? ”

It was inconceivable. I couldn't breathe.

I was so humiliated, so embarrassed, so embarrassed.

I felt like my world was coming to an end.

Nevertheless, this was the beginning of many months of pain and depression and anger and confusion and silence for me.

My manipulative, jealous and stalking ex-boyfriend did exactly what he said he would do. He set up a website with my name on it and posted this.

this.

And there were a few explicit photos he took while I was sleeping living with him in Jamaica.

Months before that he had been sending me these threatening text messages.

He was trying to make me look like a vulgar and vulgar woman.

He even threatened to kill me.

He said he would shoot me in the head and stab me in the heart simply because he wanted to end a controlling relationship.

I couldn't believe this happened to me.

I didn't even know what to call it.

It may be known as cyber harassment or cyberbullying.

The media calls this "revenge porn."

I now call it "digital domestic violence."

It's usually attributed to a deteriorating relationship, and when a controlling, nervous ex-lover can't stand rejection and can't physically reach out to you, they use another weapon: their cell phone or laptop.

What about ammunition?

All photos, videos, explicit information and content are posted online without your consent.

The truth is, we all live online.

And the Internet is really a small world.

We show off baby pictures, start and grow businesses, forge new relationships, and let people join the world with one Facebook like at a time.

And do you know what I found?

A smaller world.

1 in 25 women say they have been affected by revenge porn.

For women under the age of 30, the number appears to be 1 in 10.

This leaves a few potential victims in this audience.

Want to know more alarming things?

Lack of laws and laws to adequately protect victims and punish perpetrators.

Only one federal bill is pending. This is called the "ENOUGH Act" by Senator Kamala Harris.

Revenge porn would then be criminalized.

But it can take years to complete.

So what remains in the meantime?

petty civil crime.

Currently, only 40 states and Washington, DC have enacted any laws regarding revenge porn.

And those fines vary -- we're talking a $500 fine.

$500?

are you kidding me

Women are losing their jobs.

They suffer from damaged relationships and damaged reputations.

They are sick and depressed.

And suicide rates are rising.

You're looking at a woman who spent 11 months of court life, 13 court appearances, and thousands of dollars in legal fees just to get protection from cyberstalking and cyber abuse (also known as a PFA) and a judge's letter to force third-party Internet companies to take down their content.

Expensive, complicated, and confusing.

To make matters worse, legal loopholes and jurisdictional issues dragged this issue on for months while my private parts were on display for months.

How would you feel if your naked body was exposed to the world and you were helplessly waiting for its contents to be removed?

Eventually, I came across a private company that issued a DMCA notice to take down a website.

DMCA -- Digital Millennium Copyright Act.

Laws that regulate digital materials and content.

Broadly speaking, the purpose of the DMCA is to protect both copyright owners and consumers.

This means that people who take and share nude photos own the rights to those selfies and should be able to issue a DMCA to remove the content.

But not so fast. Because another battle we're dealing with is non-compliant, unresponsive third-party internet companies.

By the way, even in a consensual relationship, obtaining nude or naked photos does not give you the right to share them, even if you had no intention of harming them.

Let's go back to my case. He was stalking and harassing me from another country, making it nearly impossible to get help here.

But wait -- isn't the Internet international?

Shouldn't we have some policy that protects us at large, regardless of borders and restrictions?

I just couldn't give up. I had to keep fighting.

So, having all the evidence in my possession, I was happy to allow both my cell phone and laptop to be compromised three times for a thorough forensic investigation by the Department of Homeland Security and the Jamaican Embassy.

I painstakingly shared private parts of myself with the all-male research team.

And it was to jump additional hoops that were embarrassing and humiliating.

But then something happened.

Jamaican authorities actually arrested him.

He is currently facing charges under abusive communications laws that could carry thousands of dollars in fines and up to 10 years in prison if convicted.

And I know my lawsuit is making history. This is the first international lawsuit based on this new crime.

Wow, justice has finally arrived.

But this got me thinking.

No one deserves this.

No one deserves this level of humiliation and has to jump through all these hoops.

Our cyber civil rights are at stake.

Here in the United States, we need clear and tough enforcement. We need to hold online companies accountable and responsive. You should promote social responsibility in posting, sharing, and texting. And we need to restore the dignity of victims.

And what about the victims who are disenfranchised, unfairly labeled and left overwhelmed, without the time, money or resources to wage war?

There are two. To release shame and to end silence.

Shame is at the heart of all this.

And for a silent prisoner of shame, it is the fear of judgment that holds you hostage.

And the price to pay is to rob you of your self-esteem.

The day I ended my silence, I was freed from shame.

And I freed myself from the fear of judgment from the one person I thought would judge me the most: my son. My son actually said to me, "Mom, you are the strongest person I know.

You can get past this.

Besides, Mom, he chose the wrong woman to date. ”

(Laughter) (Applause) That was the day I decided to use my platform, my story, my voice.

To begin, I asked myself one simple question: "Who do I need to be now?"

That question changed my life and made me think about all sorts of possibilities when faced with everything I faced.

I now own my story, tell my truth, and tell a new chapter in my life.

Its name is "Fifty Shades of Silence".

This is a global social justice project and we are working on filming an upcoming documentary to give victims a voice and dignity.

If you are a victim or know a victim, please know this. To gain strength, you must take care of yourself and love yourself.

You must turn anger into action, pain into strength, and setbacks into preparation for what's next in life.

This is a process, a journey of self-discovery that includes forgiveness.

But it definitely takes courage, confidence and conviction.

I call it "finding courage every day."

thank you.

(applause)

A technology has emerged that could have the greatest impact in the coming decades.

And it's not social media.

Not big data.

It's not robotics.

Even though it's not AI.

You would be surprised to learn that it is the underlying technology for digital currencies like Bitcoin.

It's called blockchain. blockchain.

It's not the most resounding word in the world, but I believe this is the next generation of the Internet, with enormous potential for every business, every society, and every single one of you.

For the past few decades, we have been using the Internet of information.

When I send emails, PowerPoint files, etc., I'm not really sending the original, I'm sending a copy.

That is wonderful.

This is democratized information.

But when it comes to assets like money, financial assets like stocks and bonds, loyalty points, intellectual property, music, art, votes, carbon credits, and other assets, sending a copy is a very bad idea.

If I'm going to send you $100, I don't have that money yet (laughter) and it's very important that I can't send you.

This has long been called the "double spending" problem by cryptographers.

So today we rely entirely on big intermediaries such as banks, governments, big social media companies and credit card companies to build trust in the economy.

And these intermediaries perform all the business and transactional logic of any kind of commerce, from authentication and personal identification to clearing, settlement and record keeping.

And overall they do a pretty good job.

But the problem is growing.

First of all, they are centralized.

That means they can be hacked, and more and more. JP Morgan, the US Federal Government, LinkedIn, Home Depot and others have found it the hard way.

They are excluding billions of people from the global economy, for example those who do not have enough money to have bank accounts.

They slow things down.

It can take a second for an email to travel around the world, but it can take days or even weeks for money to move across a city through the banking system.

And they take 10 to 20 percent of the bulk of that action just to transfer money to other countries.

They collect our data so they can't monetize it or use it to better manage their lives.

Our privacy has been violated.

And the biggest problem is, on the whole, they are asymmetrically using the benefits of the digital age. We are creating wealth, but social inequality is growing.

So what if there was not just an internet of information, but an internet of value, some sort of giant, global distributed ledger running on millions of computers and available to everyone?

And where can assets of all kinds, from money to music, be stored, moved, traded, exchanged and managed without powerful intermediaries?

What if there was a native medium that created value?

Well, in 2008 the financial industry collapsed. And perhaps fortunately, an anonymous person named Satoshi Nakamoto wrote a paper that developed a protocol for digital cash using an underlying cryptocurrency called Bitcoin.

And this cryptocurrency allowed people to establish trust and conduct transactions without a third party.

And this seemingly simple act set off a spark in the world that excited, terrified, or intrigued everyone in many places.

Well, don't get confused about Bitcoin. Bitcoin is an asset. It goes up and down, so speculators should be interested.

More broadly, it is cryptocurrency.

It is not a legal tender controlled by a nation-state.

And that's even more interesting.

But the real pony here is the underlying technology.

It's called blockchain.

Thus, for the first time in human history, people everywhere can trust each other and transact peer-to-peer.

And trust is established through collaboration, encryption, and some clever code, not by big institutions.

And I call it the "Trust Protocol" because trust is inherent in technology.

Now, you're probably wondering, "How does this work?"

fair enough.

Assets (digital assets such as money, music, or anything else) are not stored in a central location, but distributed across a global ledger using the highest level of cryptography.

And when transactions are executed, they are sent to millions of computers around the world.

And there is a group of people called "minors" all over the world.

They are bitcoin miners, not young people.

They have at their fingertips a huge amount of computing power, 10 to 100 times more than all Googles in the world.

These miners do a lot of work.

And every 10 minutes, like a network heartbeat, a block is created containing all transactions for the last 10 minutes.

After that, the miners start working and try to solve some difficult problems.

and they compete. The first miner to discover the truth and validate the block will be rewarded in digital currency, bitcoin in the case of the bitcoin blockchain.

And here's the important part, that block is linked to the previous block and the previous block to create a chain of blocks.

And everything is time-stamped, sort of like a digital seal.

So if I want to hack a block and pay you, say, the same money as you, I have to hack that block and all the blocks before it, the entire history of commerce on that blockchain, not just on one computer, but on millions of computers simultaneously, all using the highest level of encryption, in terms of the world's most powerful computing resources watching over me.

It's hard to do.

This is far more secure than the computer systems we use today.

blockchain. That's how it works.

Therefore, there is only one Bitcoin blockchain.

The Ethereum blockchain was developed by a Canadian named Vitalik Buterin.

He is [22] years old and this blockchain has some extraordinary features.

One of them is the ability to build smart contracts.

It's kind of like that.

It is a self-enforced contract, and contracts deal with the enforcement, control, performance and payment of agreements between people. In a way, contracts also have bank accounts.

And now, there are projects underway on the Ethereum blockchain that will do everything from building a new marketplace to replace the stock market to building a new model of democracy where politicians are accountable to the public.

(Applause.) So, to understand what a fundamental shift this will bring, let's look at the financial services industry.

Are you aware of this?

Rube Goldberg Machine.

It's a ridiculously complex machine that does very simple things like crack an egg or close a door.

It honestly reminds me of the financial services industry.

So if you tap a card at the corner store, Bitstream goes through a dozen companies, each with their own computer system, including a 1970s mainframe older than many of the people in this room, and three days later there's a settlement.

Well, there is no settlement in the blockchain financial industry. Payments and settlements are the same activity, just a ledger change.

The financial industry, not only on Wall Street, but around the world, is in chaos over this, wondering if they can replace us or how they can embrace this technology for success.

Well, why should you care?

Now let's discuss some applications.

prosperity.

The first era of the Internet, the Internet of Information, brought us wealth, but prosperity was not shared because of growing social inequalities.

And this is at the heart of all the anger, extremism, protectionism, xenophobia and worse that we see growing in the world today, the latest example being Brexit.

So can we develop a new approach to this inequality problem?

Because the only approach today is to redistribute wealth, tax people and spread it further.

Is it possible to distribute wealth in advance?

Can we change the way wealth is created in the first place by democratizing wealth creation, getting more people involved in the economy, and ensuring that they are fairly rewarded?

We'll show you five ways to do this.

Part 1: Did you know that 70 percent of the world's land owners have tenuous rights to their land?

So when there's a small farm in Honduras and a dictator comes to power, he says, "I know you have a piece of paper that says you own your farm, but the government computer says my friend owns your farm."

This is happening massively in Honduras and this problem exists everywhere.

The great Latin American economist Hernando de Soto said that this is the number one problem in the world in terms of economic liquidity, which is even more important than having a bank account. Because if you don't have a valid title to the land, you can't rent it and you can't plan for the future.

So now companies are working with governments to put land titles on the blockchain.

And once there, this becomes immutable.

It cannot be hacked.

This creates the conditions for potentially billions of people to thrive.

Second, many writers are talking about Uber, Airbnb, TaskRabbit, Lyft, etc. as part of the sharing economy.

This is a very powerful idea that peers can band together to create and share wealth.

my view is...

These companies don't really share.

In fact, they are successful because they don't share.

They bundle their services together.

What if instead of Airbnb being a $25 billion company, there was a decentralized application on the blockchain (we call it B-Airbnb) that was essentially owned by everyone who rented a room?

And when someone wants to rent a room, it will go through the blockchain database and all the criteria and sift through it to help find the right room. Blockchain then assists with contracts, identifies parties, and processes payments exclusively through digital payments. These are built into the system.

In addition, it also handles reputation. Because if she rates a room as a 5 star room, it's there, rated, and immutable.

That means the big disruptors of Silicon Valley's sharing economy could be destroyed, which would be good for prosperity.

Third, the largest flow of money from developed to developing countries is not business investment, nor even foreign aid.

It's a remittance.

This is the global diaspora. People leave their ancestral lands and send money back to their families.

That's $600 billion a year, and the amount is increasing, and these people are being duped.

Anale Domingo is a housekeeper.

She lives in Toronto and goes to the Western Union office with cash every month to send money to her mother in Manila.

Her cost is about 10%. It takes 4-7 days for the money to arrive. Her mother doesn't know when it will arrive.

She spends five hours a week doing this.

Six months ago, Analeid Domingo used a blockchain application called Abra.

Then I transferred $300 from my mobile device.

It was sent directly to her mother's mobile device, without an intermediary.

Then she turned to her mobile device. It was like an Uber interface, with Abra "points" moving around.

She clicked on the 5-star teller 7 minutes away.

The man showed up at the door and gave her a Philippine peso, which she put in her purse.

The whole process took minutes and cost 2%.

This is a big chance for prosperity.

Fourth: The most powerful asset in the digital age is data.

And data is really a new asset class, perhaps larger than previous asset classes such as land under agricultural economies, industrial plants and even money.

And folks, we all create this data.

We create this asset and leave a trail of this digital shard for the rest of our lives.

These pieces are then assembled into a mirror image of you, the virtual you.

And your virtual you may know you better than you. Because you can't remember what you bought a year ago, what you said a year ago, or exactly where a year ago.

And the virtual you is not your property - that's the big problem.

So today there are companies working to create an identity inside a black box, a virtual thing that you own.

And this black box moves around with you as you travel around the world, and it's very, very stingy.

It provides only the snippet of information needed to do something.

In many transactions, the seller doesn't even need to know who you are.

They just need to know they got paid.

And this avatar will wipe all this data and make it monetizable.

This is great. Because it also helps protect our privacy, and privacy is the foundation of a free society.

Let's put this asset we created back under our control so that we can own our own identity and manage it responsibly.

Finally -- (applause) Finally, number five. Many content creators are not getting their fair compensation because the intellectual property system is broken.

It was destroyed by the first age of the Internet.

Let's take music.

Musicians are the last remaining remnants of the entire food chain.

If you were a songwriter, 25 years ago you could have written a hit, sold a million singles, and earned about $45,000 in royalties.

Today, you're a songwriter, write a hit song, have it streamed a million times, and get $36, not $45,000, enough to buy you a good pizza.

So Grammy-winning singer-songwriter Imogen Heap is now trying to put music on the blockchain ecosystem.

She calls it "mycelium."

And music is surrounded by smart contracts.

And music protects her intellectual property rights.

want to hear a song?

It could be free, or a few microcents flowing into your digital account.

Unless you want the song in the movie, all intellectual property rights are specified.

Want to make ringtones? It is different.

She explains that the song will become a business.

The platform does the marketing itself and protects the rights of the authors. The song also has a payment system like a bank account, so all the money goes back to the artist, and the artist controls the industry rather than a powerful middleman.

Now this is -- (applause) this isn't just a songwriter, it's an art, an invention, a scientific discovery, a journalist, a creator of any kind of content.

There are many people who have not received their fair compensation, but with blockchain, we can make it rain.

That is wonderful.

So these are 5 out of 12 opportunities to solve one problem: prosperity, one of the myriad problems blockchain can apply.

Of course, technology does not create prosperity, humans create it.

But my contention to you is that once again the tech genie has escaped from the bottle, summoned by an unknown person during this uncertain period in human history, and that is giving us the opportunity to strike the can again, rewrite the economic grid and the old order, and solve some of the world's toughest problems.

thank you.

(applause)

When we see a stranger or neighbor walking by, we may say:

We say, "Hello, how are you?"

What a wonderful day.

how do you feel? "

These all seem a bit cryptic, don't they? And in a way, it is.

They have no semantic meaning.

It doesn't matter how you feel or what the day is like.

they have something else

They have social significance.

What we mean when we say these things is "I see you there."

I am addicted to talking to strangers.

I make eye contact, say hello, offer help, and listen.

I can hear all kinds of stories.

About seven years ago, I started documenting my experience to figure out why.

What I discovered was that something really beautiful was happening.

This is almost poetic.

These were really deep experiences.

Those were unexpected delights.

They were genuine emotional connections.

Those were liberating moments.

One day I was standing on a street corner waiting for a traffic light to change. I mean, being a New Yorker, I was actually standing on the street next to the storm drain, thinking as if I could cross it quickly.

And next to me stands an old man.

So he wore a long overcoat and kind of an old man's hat and looked like someone in the movie.

And he said to me, "Don't stand there, it might disappear."

Isn't this absurd?

But I did what he said. I went back to the pavement.

And he smiled and said,

If I turn around, it might be gone. ”

This was weird and also really nice.

He was very warm and very happy that he saved me.

We had this little bond.

For a moment, I felt that my existence as a human being was noticed and worthy of being saved.

What is really sad is that in many parts of the world we are raised to believe that strangers are dangerous by default, untrustworthy and that they may harm us.

But most strangers are not dangerous.

We have no background, so being around them makes us uneasy.

I don't know what their intentions are.

So instead of using our perceptions to make choices, we rely on this category of "strangers."

I have a 4 year old.

Say hello to passers-by and she asks why.

She says, "Do we know them?"

“No, they are our neighbors,” I say.

"Are they our friends?"

"No, it's good to be friends."

Every time I tell her that, I think about it a lot because I really mean it, but I know, especially as a woman, that not all strangers in town are well-intentioned.

It's good to be friendly, and it's good to learn when not to be friendly, but don't be afraid.

Using senses instead of fear has two big advantages.

The first is that it sets us free.

Come to think of it, using perceptions instead of categories is easier said than done.

Categories are what our brains use.

When it comes to people, it's a shortcut to learning about them.

We look at men, women, young, old, blacks, browns, whites, strangers, friends and use the information in that box.

It's quick and easy, but it's the road to prejudice.

And that means we don't think of people as individuals.

I know an American researcher who frequently travels alone in Central Asia and Africa.

She walks into towns and cities as a total stranger.

She has no bond, no connection.

she is a foreigner

This is her survival strategy. It's about having strangers see you as a real individual.

If you can do that, other people will see you that way too.

A second advantage of using the senses has to do with intimacy.

Intimacy and strangers may sound a bit counterintuitive, but quick interactions like this can lead to what sociologists call “fleeting intimacy.”

So it's a short experience with emotional resonance and meaning.

It's the good feeling you get when you're saved by an old man from a storm drain death trap, or the feeling of being part of a community when you talk to someone on the train on your way to work.

You may even go further.

Researchers have found that people often feel more comfortable speaking honestly and openly about their inner workings to strangers than they do to friends and family, and they often feel that strangers are more understood.

This is being reported in the media with great disappointment.

“I communicate better with strangers than with my spouse!”

Good headline.

I think that's totally off the mark.

The key to these studies is how important these interactions are. How does this special form of intimacy give us what we need, just like our friends and family?

So how are we able to communicate so well with strangers?

There are two reasons.

The first is that the interaction is quick.

Result is nothing.

It's easy to be honest with someone you'll never see again, right?

It makes sense.

The second reason is more interesting.

We have prejudices against people who are close to us.

We expect them to understand us.

We assume they do, and we expect them to read our minds.

For example, imagine you're at a party and can't believe your friends or spouse don't know that you want to leave early.

And you're thinking, "I got it."

With strangers we have to start from scratch.

We tell all our stories and explain who people are and how we feel about them. Spell out all the inside jokes.

And what do you think?

Sometimes they understand us a little better.

OK。

We know talking to strangers is important, but how does it work?

There are unspoken rules that we tend to follow.

Rules vary greatly depending on the country and culture you are in.

In most parts of the United States, a basic public expectation is to balance politeness with privacy.

This is known as civil negligence.

Now imagine two people walking across the street facing each other.

They look at each other from a distance.

It's courtesy and recognition.

And when approached, they look away to give each other space.

In other cultures, people go to great lengths to not interact at all.

Danish people said that many Danes are very averse to talking to strangers and would rather miss the bus stop than say 'excuse me' to someone who needs to be moved.

Instead, carefully shuffle their bags or tell them they need to use their bodies to get through it instead of using two words.

I've heard that in Egypt it's rude to ignore strangers and they have a culture of great hospitality.

Strangers may ask each other for a sip of water.

Alternatively, if you ask someone for directions, they're very likely to invite you over to their house for coffee.

These unspoken rules are most apparent when they're being broken, or when you're in a new place and trying to figure out what's right.

Sometimes breaking the rules a bit is where the action is.

If it's not clear, I'd like to see you actually do this. OK?

So it looks like this:

Find out who is making eye contact.

That's a good signal.

The first is a simple smile.

Smile when you pass each other on the road or in the corridor.

Let's see what happens.

Another is triangulation.

There's you, there's a stranger, there's public art, someone preaching in the street, someone wearing funny clothes, etc. There's a third thing that both of you might see and comment on.

try out.

Comment on the third thing and see if it starts a conversation.

The other is what I call 'awareness'.

This is usually a compliment.

I love looking at people's shoes.

In fact, I'm not wearing great shoes right now, but they are generally great.

And they are fairly neutral when it comes to compliments.

People always want to talk about their great shoes.

You may have already experienced the dog and baby principle.

Talking to someone on the street can be awkward. I don't know how they will react.

But you can always talk to dogs and babies.

Dogs and babies are social conduits for the person, and their reaction will tell you if they want to talk more.

The last thing I want to challenge is information disclosure.

This is a very vulnerable act, but a very rewarding one.

So the next time you're talking to a stranger and you feel safe, tell something real about yourself, something really personal.

You, too, may have had experiences that I spoke of that made you feel understood.

Sometimes it comes up in conversation and people ask me, "What is your dad doing?" Or "Where does he live?"

And sometimes I tell them all the truth. That is, he died when I was a child.

In every such moment they share their own experience of loss.

We tend to respond to disclosure with disclosure, even to strangers.

So here we are.

When you talk to strangers, you get a beautiful cut-in to the expected narrative of you and their daily lives.

Unexpected connections are made.

If you don't talk to strangers, you'll miss it all.

We spend a lot of time teaching our children about strangers.

What if you spent more time studying on your own?

We can reject all thoughts that make us suspicious of each other.

I was able to create space for change.

thank you.

(applause)

Concrete is the most widely used building material in the world.

It can be found in the wide swaths of city footpaths, bridges over vast rivers, and the tallest skyscrapers on earth.

However, this tough material has a weakness. It is prone to catastrophic cracks that cost tens of billions of dollars each year to repair.

But what if we could get around that problem by making concrete that heals itself?

The idea isn't as wild as it sounds.

It all boils down to understanding how concrete is formed and how we can harness that process to our advantage.

Concrete is a combination of coarse stone and sand particles called aggregate, which is mixed with cement, a powdered mixture of clay and limestone.

When water is added to this mixture, the cement forms a paste that covers the aggregates and hardens rapidly through a chemical reaction called hydration.

Eventually, the resulting material grows strong enough to support buildings hundreds of meters into the sky.

For over 4,000 years, people have used different recipes to make cement, but concrete itself has a surprisingly short lifespan.

After 20 to 30 years, cracks can occur due to natural phenomena such as concrete shrinkage, excessive freeze and thaw, and heavy loads.

It's not just big cracks that matter. Small cracks are equally dangerous.

Concrete is often used as a secondary support around rebar.

Even the smallest cracks in this concrete can allow water, oxygen and carbon dioxide to enter, corrode the steel and cause catastrophic collapse.

In structures such as bridges and highways that are in continuous use, detecting these problems before they lead to catastrophic events can be a costly and expensive challenge.

But to do otherwise would put thousands of lives at risk.

Luckily, we're already experimenting with how this material can begin to heal naturally.

And some of these solutions are inspired by concrete's natural self-healing mechanisms.

As water enters these tiny cracks, it hydrates the calcium oxide in the concrete.

The resulting calcium hydroxide reacts with carbon dioxide in the air, initiating a process called self-healing, in which microscopic calcium carbonate crystals form, gradually filling the gap.

Unfortunately, these crystals are limited in what they can do and can only repair cracks less than 0.3 mm wide.

Materials scientists have found a way to repair cracks up to twice the size by adding hidden glue to the concrete mix.

When the adhesive-filled fibers and tubes are placed in the mixture, they snap open when cracks occur, releasing their sticky contents and closing the gaps.

However, adhesive chemistries often behave quite differently than concrete and can cause even more severe cracking over time.

So perhaps the best way to repair large cracks is to give the concrete a tool to help itself.

Scientists have discovered that some bacteria and fungi can produce minerals such as calcium carbonate, which are included in self-healing.

Laboratory concrete mixes contain spores of these bacteria and fungi along with nutrients in the concrete mix, where they can lie dormant for hundreds of years.

When cracks eventually form and water drips into the concrete, the spores germinate, grow, consume the surrounding nutrient broth, and modify their surroundings to create optimal conditions for calcium carbonate to grow.

These crystals gradually fill in the gaps, and after about three weeks the industrious microbes are able to fully repair cracks up to nearly 1mm wide.

Once the crack is sealed, the bacteria or fungi produce spores and go dormant again, ready to start a new self-repair cycle when the crack forms again.

Although this technology has been extensively researched, there is still no way to introduce it into global concrete production.

However, these spores have great potential to increase the resilience and durability of concrete, potentially significantly reducing the economic and environmental costs of concrete production.

Ultimately, these microbes may force us to rethink the way we think about cities and breathe life into inanimate concrete jungles.

The conventional wisdom about our world today is that we are in a time of terrible decline.

It's not surprising given the bad news all around us, from ISIS to inequality to political dysfunction to climate change to Brexit.

But here comes the problem, which may sound a little strange.

As a matter of fact, I don't support this dark tale, and I don't think you should either.

Look, it's not that we don't see the problem.

I read the same headline as you.

What I challenge is the conclusion that so many people draw from it, which is that we are all screwed because the problem is insoluble and the government is useless.

Now why am I saying this?

I'm not particularly optimistic by nature.

But I've always been really annoyed by the media's fixation on the problem, not the answer, and constantly fanning the doom.

So a few years ago, as a journalist, I decided to go around the world and see if I could do better by actually asking people if and how they were tackling big economic and political challenges.

And what I found surprised me.

We have found remarkable signs of progress in the world, often in the most unexpected places, and they have convinced us that our great global challenges may not be so insoluble after all.

There are more than just theoretical fixes. Those fixes have been tried.

they worked.

And they give hope to the rest of us.

I'll explain what I mean by talking about how the three countries I visited—Canada, Indonesia, and Mexico—overcame three seemingly impossible problems.

Their stories are important because they contain tools that the rest of us can use not only for those specific problems, but for many others as well.

Today, when most people think of my homeland, Canada, to think of Canada in the slightest is considered cold, boring, or polite.

They think we say "sorry" too often with a funny accent.

And it's all true.

(laughs) I'm sorry.

(Laughter) But Canada is also important in terms of winning over immigration, the issue that is currently tearing many other countries apart.

Think about it, Canada today is one of the most welcoming countries in the world, even compared to other immigration-friendly countries.

The per capita immigration rate is four times that of France and the proportion of foreign-born residents is twice that of Sweden.

Canada, meanwhile, took in ten times as many Syrian refugees as the United States last year.

(Applause.) And now Canada is doing even more.

Nonetheless, when you ask Canadians what they are most proud of about their country, in many places the foul word “multiculturalism” ranks second to hockey.

hockey.

(Laughter.) In other words, Canadians want more foreigners into the country at a time when other countries are desperately building new barriers to keep them out.

Now comes the really interesting part.

Canada wasn't always like this.

Until the mid-1960s, Canada had an overtly racist immigration policy.

They called it "White Canada," but as you can see, they weren't just talking about snow.

So how did that Canada become what it is today?

Well, whatever my mother in Ontario said, the answer had nothing to do with virtue.

Canadians are not inherently superior to others.

The real explanation involves Pierre Trudeau, who became Canada's leader in 1968 and is also the father of the current Prime Minister.

(Applause.) What you should know about the first Prime Minister Trudeau is that he was very different from previous Canadian leaders.

He was a French speaker in a country long ruled by the British elite.

he was an intellectual.

He was even kind of groovy.

I mean, seriously, the guy was doing yoga.

He dated the Beatles.

(Laughter) And like all hipsters, he might get furious at times.

But nevertheless, he accomplished one of the most progressive transformations any country has ever seen.

From what I learned, his formula contained two parts.

First, Canada scrapped its old race-based immigration rules and replaced them with new color-blind rules that emphasized education, experience and language skills.

And what it did was greatly increase the likelihood that new entrants would contribute to the economy.

Then, in Part Two, Prime Minister Trudeau developed the world's first formal multiculturalism policy to promote integration, acknowledging that diversity is key to Canada's identity.

Well, in the years that followed, Ottawa continued to push this message, but at the same time Canadians in general soon began to see the economic and material benefits of multiculturalism all around them.

And these two influences soon combined to form the passionately open Canada that it is today.

Now let's turn to another country and an even more difficult problem: Islamic extremism.

In 1998, Indonesians took to the streets to overthrow longtime dictator Suharto.

It was a great moment, but it was also a terrifying moment.

With a population of 250 million, Indonesia is the largest Muslim-majority country on earth.

It's also a hot, huge, unruly climate, made up of 17,000 islands and people who speak nearly 1,000 languages.

Well, Suharto was a dictator, a terrible dictator.

But he was also a very capable tyrant, always careful to keep religion out of politics.

So experts feared the country would explode or be taken over by religious extremists and turn Indonesia into a tropical Iran if he didn't put a lid on it.

And it just seemed like the very first thing that happened.

In 1999, Islamist parties won 36% of the vote in the country's first free elections, and the islands were set ablaze as thousands died in riots and terrorist attacks.

But since then, Indonesia has taken a surprising turn.

While the public has become more reverent on a personal level, and while a recent visit saw far more scarves than a decade ago, the country's politics are moving in the opposite direction.

Indonesia is now a fairly decent democracy.

Nevertheless, support for Islamist parties has steadily declined, falling from a high of about 38% in 2004 to 25% in 2014.

As for terrorism, it is now very rare.

A few Indonesians have also recently joined ISIS, but their numbers are very small and, on a per capita basis, far fewer than the Belgians.

Consider another Muslim-majority country that could say the same thing.

In 2014, I visited Indonesia and asked the current president, a quiet technocrat named Joko Widodo, "Why is Indonesia prospering when so many other Muslim nations are dying?"

"Well, what we've found is that in order to deal with extremism, we have to deal with inequality first," he told me.

Religious parties in Indonesia, like their counterparts in other regions, tended to focus on issues such as poverty reduction and fighting corruption.

So that's what Djoko and his predecessors did, and thereby stole the Islamist thunder.

Terrorism has also been cracked down on, but Indonesia's Democratic Party says it has learned an important lesson from the dark ages of dictatorships, and that crackdowns will only breed more extremism.

There they waged war with extraordinary delicacy.

They used the police instead of the military.

Suspects were detained only when there was sufficient evidence.

They held a public trial.

They have even sent liberal imams to prison to convince jihadists that terrorism is un-Islamic.

And all of this has worked wonderfully to create a country that was unimaginable 20 years ago.

So at this point, my optimism should be starting to make a little more sense.

Neither immigrants nor Islamic extremists are insurmountable.

Join us for our final trip, this time to Mexico.

Now, of our three stories, this one probably surprised me the most. Because, as you all know, this country is still grappling with many problems.

But a few years ago, Mexico achieved what many other countries, from France to India to the United States, can still only dream of.

It shattered the political paralysis that had ruled Japan for many years.

To understand why, you have to rewind to 2000, when Mexico finally became a democracy.

Instead of using their new freedoms to fight for reform, Mexican politicians used them to fight each other.

With Congress in a deadlock, the country's problems - drugs, poverty, crime and corruption - spiraled out of control.

Things have gotten so bad that in 2008 the Pentagon warned that Mexico was in danger of collapsing.

And in 2012, a man named Enrique Peña Nieto was somehow elected president.

Well, this Peña inspired little confidence at first.

He was handsome, sure, but he was from Mexico's corrupt former ruling party, the PRI, and was a notorious womanizer.

In fact, he looked so light and handsome that the women called him "bonbon" (pretty boy) at election rallies.

But this same bonbon soon surprised everyone by striking out a truce between the country's three warring parties.

And over the next 18 months, they worked together to pass an incredibly comprehensive set of reforms.

They broke Mexico's suffocating monopoly.

They liberalized the rusty energy sector.

They reorganized the collapsed schools and so on.

To understand the scale of this achievement, imagine the US Congress passing immigration reform, campaign finance reform, and banking reform.

Now imagine Congress doing everything at the same time.

That's what Mexico did.

Some time ago, I met Peña and asked him how he managed everything.

The president showed me that famous bright smile (laughter) and said the short answer was "compromise", that is, compromise.

Of course, I asked him for more details, and the long answer came down to "compromises, compromises, and more compromises."

Peña knew he needed to build trust early, so he began a dialogue with the opposition a few days after the election.

To avoid pressure from special interests, he kept the meetings small and private, and many of the participants later told me that this intimacy, and the large amount of tequila they shared, helped build their confidence.

So was the fact that all decisions must be unanimous, and Peña even agreed to let some of his opponent's priorities pass over his own.

Opposition Senator Santiago Creel told me: "I'm not saying I'm special or anyone is special, but that group was special."

proof of?

When Peña took office, the deal was honored and Mexico moved forward for the first time in years.

good.

We have now seen how these three countries have overcome three major challenges.

That makes them very happy, right?

But what good is that for the rest of us?

Now, in studying these and many other success stories, I have noticed some commonalities, like how Rwanda bounced back after its civil war, how Brazil reduced inequality, or how South Korea continued to grow faster and longer than any other country on the planet.

Now, before I explain them, I should add a caveat.

Of course, we know that every country is unique.

So you can't just port something that worked in one environment to another and expect it to work there as well.

Nor will any particular solution work forever.

We need to adapt them as the situation changes.

That said, it's definitely possible to take the substance out of these stories and extract some common tools for problem solving that work in other countries, boardrooms, and all sorts of other situations.

First, accept extremes.

In all the stories we've seen so far, salvation comes at a moment of life or death.

It was no coincidence.

Let's take the example of Canada. When Prime Minister Trudeau took office, he faced two immediate dangers.

First, his vast and sparsely populated country desperately needed more bodies, yet Europe, the preferred source of white workers, had just stopped exporting bodies as it was finally recovering from World War II.

Another problem was that the long Cold War between the French and British communities in Canada was just intensifying.

Quebec threatened to secede, and in fact Canadians were killing other Canadians for political reasons.

Today, countries are constantly facing crises. right?

It's nothing special.

But Prime Minister Trudeau's genius was in realizing that Canada's crisis had swept away all the obstacles that normally hinder reform.

Canada had to open up. I had no other choice.

And we had to rethink that identity.

Again, I had no choice.

And it gave Prime Minister Trudeau a once-in-a-generation opportunity to break the old rules and make new ones.

And like all heroes, he was smart enough to grab it.

Second, there is power in indiscriminate thinking.

Another striking similarity to great problem solvers is that they are all realists.

They steal the best answers from anywhere and don't get in the way of details like partisanship, ideology, or sentimentality.

As I said before, the Indonesian Democrats were smart enough to steal many of the Islamist campaign promises for themselves.

They even invited some radicals into the coalition government.

Well, it terrified many secular Indonesians.

But forcing the radicals to actually help govern quickly exposed the fact that they were incompetent at the job, and involved them in all the dirty compromises and petty humiliations that are part of everyday politics.

And it damaged their image so badly that they could never recover.

Third, I would like to ask you from time to time.

I know you said earlier that crises give leaders extraordinary freedom.

That's true, but problem solving often requires more than just boldness.

You also need to show self-control when you definitely don't want to.

Take Prime Minister Justin Trudeau, when he took office, he could easily have put his core constituency first: Canada's French community.

He could have pleased some people at any given time.

And Peña could have used that power to keep attacking his opponents, as per Mexican tradition.

But while he forced his party to compromise, he chose to accept his enemies instead.

And Prime Minister Trudeau urged everyone to stop thinking in terms of tribes and see multiculturalism, not language or color, as what makes them quintessentially Canadian.

No one got everything they wanted, but everyone got enough at the bargain.

So at this point you might be thinking: "Okay, Tepperman, if the fix really exists as you keep insisting, why aren't more countries using it already?"

It doesn't require any special power to run.

So none of the leaders we've seen so far have been superheroes.

They could do nothing on their own and had many shortcomings.

Take Indonesia's first democratic president, Abdurrahman Wahid, for example.

The man was so uncharismatic that he once fell asleep in the middle of a speech.

(laughs) True story.

What this shows us is that real disability is neither ability nor circumstance.

It's simpler.

Big changes come with big risks, but taking big risks is scary.

It takes courage to overcome that fear, and as we all know, courageous politicians are very rare.

But that doesn't mean we voters shouldn't look to our political leaders for courage.

I mean, that's what put them in the office in the first place.

And given the state of the world today, we have no other choice.

The answers are there, but now it's up to us to elect more women and men who have the courage to find, steal, and put the answers to work.

thank you.

(applause)

The good news is that the experimental robot Ant was a success.

The bad news is that you accidentally gave them the ability to fire deadly lasers...and you can't turn it off.

The laser must be stopped for 5 minutes before going online.

Until then, all robot ants walk through their habitat at exactly 1 meter per minute.

If you hit a bump or hit a dead end, turn around immediately and go back the way you came.

After the 5 minutes have passed, they turn on their lasers and break free, launching themselves into the world and blazing a trail of destruction.

Your only chance to stop the ants is to insert two emergency suction nozzles into their habitat and suck them out before they fly out.

The nozzle can be pushed into any part of the habitat through the membrane covering its front, sucking in and inactivating any passing ants.

If you place the nozzle without leaving a hole for the robot ant to pour out of, it cannot be moved, so choosing the right location is important.

The habitat is made of tubes one meter long.

When the robot reaches an intersection, it randomly chooses to go left, right, or forward.

It will only retreat if it hits another robot ant or a dead end.

Unfortunately, there are hundreds of storks inhabiting the habitat, and if even one escapes, it will suffer a great deal of damage.

With less than 5 minutes left, where would you place the two vacuum nozzles to suck up all the robot ants?

Pause the video now if you want to figure it out for yourself.

Number of Answers: 3 Number of Answers: 2 Number of Answers: 1 Robot ants are bouncing around their habitat, and it may seem impossible to stop them before they break free.

However, the situation is simpler than it sounds.

Here's why.

Imagine two robot ants crawling towards each other.

Upon collision, the direction is immediately reversed.

And what if that chain of events passed each other?

They look exactly the same before and after the collision, but their positions have been swapped.

This is true whenever a pair of robot ants meet.

The identity of the individual ants is irrelevant, so all you have to do is figure out where to place the nozzle to catch a single ant that starts anywhere in its habitat and continues walking uninterrupted within 5 minutes.

Much easier to conceptualize and solve.

Placing the nozzle at the intersection of 3 or 4 tubes seems like the best bet. Otherwise, the robot ant may change direction and miss the nozzle.

There are only four intersections...which two should you choose?

The top right intersection should be one of them.

Otherwise, an ant that crawls down from this intersection to a dead end will crawl for 4 minutes until it returns to the intersection, then go in one of three directions and walk at least another minute.

Once you have the nozzle on the top right, the only other option that might work is the bottom left.

To see this working, imagine there are ants elsewhere in their habitat.

In the worst-case scenario, ants could start right next to the vacuum nozzle and march away from it.

But in these worst cases, the ants will march no more than 4 meters before being sucked into the vacuum.

Choosing an option other than the two intersections does not guarantee catching all robot ants within 5 minutes.

I cleaned everything with a vacuum cleaner, so a big crisis was averted.

Before you play around with robot ants again, you'll want to have your robot anteater ready.

And wouldn't it be nice if you could fly and breathe fire?

It can't be wrong!

(music) Rainn Wilson: Being alone comes at a great price.

I'm a little lost, but it's finally time to make a real connection.

Who am I?

(Drums) I'm a single white male, 45 years old.

i love animals

Advantageously employed.

I am a human.

I'm staying healthy

Who am I looking for?

I'm looking for an idea mate.

Do you agree with the real me?

(Video) Ron Finley: How would you feel if you didn't have access to healthy food?

Gardening is the most healing and rebellious act you can do.

RW: Wow, first dates sure are tough.

RF: Gardening is the most healing and rebellious act you can do.

People in these areas are exposed to bad food.

I want people to know that growing your own food is the same as printing your own money.

RW: You're like a food superhero!

RF: The problem is food, the solution is food.

(music) Erin McKean: I'm a lexicographer.

My job is to put every possible word into the dictionary.

RW: I also love words. I like it as much as a lexicographer.

What if you liked the word you just made up, say, I don't know, "Scuba Finkles"?

Bo Lott: Do you think you can see reality?

RW: Well, I'm a little nearsighted, but yes.

BL: Well, you can't -- your brain doesn't have access to this world.

In fact, even sensory information received by the eyes and ears is utterly meaningless, as it could mean anything.

The tree could be a large object in the distance, or it could be a small object nearby, and your brain has no way of knowing.

RW: I thought I saw a Bigfoot once, but it was just a German Shepherd.

Isabel Benque Izquierdo: Bonobos, along with chimpanzees, are humans' closest living relatives.

Bonobos have frequent and promiscuous sex to manage conflicts and solve social problems.

RW: Just out of curiosity, are there any social issues that need to be resolved or conflicts that need to be managed?

IBI: Remember -- you're dating my ideas, not me.

Jane McGonigal: This is the face of someone who, against all odds, is on the verge of an epic victory.

RW: Epic win?

JM: Winning epic is such a positive outcome that I didn't even know it was possible until I achieved it.

I'm not making facial expressions.

I have a face that says, "I'm not good at life."

RW: Arthur, let's be honest.

I'm also looking at other ideas. OK?

I get along with people around me.

That's the situation.

Arthur Benjamin: I'd like to say: Mathematics isn't just about solving x, it's about figuring out why.

RW: Would you like some pie?

AB: Pie?

3.14159265358979 -- Reggie Watts: If you're going to do something, just make a decision.

Because without decisions we are powerless.

Without power, there is nothing to feed the chain of people who are genuinely interested in solving all our current situations.

RW: And "even if you choose not to make a decision, you have made a choice" -- Rush.

JM: Yes!

This is the face that millions of problem solvers around the world should see as we tackle the challenges of the next century.

RW: So are you going to Dutch?

AB: 3846264338327950 28841...

971?

RW: Would you like to go see a movie or something one night?

RF: No way! Let's go plant something!

RW: Plant something!

Now what is this that I am planting?

Bonobo!

Ibi: Bonobo! (laughs) Bonobos.

R Watts: Well, are you very interested?

RW: I would love to incorporate your ideas.

R Watts: Well, you know what they say in Russia.

RW: Hmm?

R Watts: "Scuba Finkle"

(Bottle clatters)

Forgotten things are fun.

When I went to see my mother the other day, she told me this story. She told me that when we were driving together, she pulled over and by the time she got out of the car and circled the car to get me out, I had already gotten out of the car and pretended to be dead.

(Laughter) (Applause.) That's how you die.

(Laughter) I remember, it was a game I used to play to myself when I was bored or frustrated, to entertain myself.

(Laughter) Calm down.

(Laughter) They say we live in an age of information overload. right?

I don't know about that, but I do know that I get too many marketing emails.

I received a marketing email from a supermarket company. We will remain anonymous, mainly for legal reasons, but will call it "Safemart".

(Laughter) I got an email from them. The contents were as follows. "3 weeks left until King's Cross Safe Mart opens!!!"

And this pissed me off. Because I was offended by the fact that not only did I not remember signing up for it, but they seemed to think I should be excited about the shop opening.

So what I did was scroll to the bottom of the email and hit "unsubscribe".

And I thought that would be the end of it.

However, a week later I received another email stating "2 more weeks until King's Cross Safe Mart opens!!!"

And, obviously, I thought maybe I wasn't clicking with enough force.

So I tried it again. right?

It's been a week. "One more week until King's Cross Safe Mart opens!!!"

And here's the problem. The Internet has given us access to everything. But at the same time, we have access to everything.

Without having an email about a supermarket chain or the Candy Crush saga, it's hard enough to separate the things that really matter in this world from the minutiae of life.

And I was really annoyed with them and thought, okay, I'll write a strong word email, which I can do.

(Laughter) So I thought, well, let's find a game.

So I replied to it and said, "Literally I can't wait!!!!"

(laughter) "What do I need?"

they gave me a reply. A man named Dan said, "Hi James. I asked a colleague to help you with your question."

(Laughter) Sounds like you need help.

So I said, "What's the plan, Dan?"

I'm thinking fireworks, bouncy castles..."

(Laughter) "I don't know what you're talking about."

(laughs) I said, 'I'm so excited for the opening!

(Laughs) "Do you want to reserve a bouncy castle or do you want to reserve it?"

He said, "I think you misunderstood."

(Laughs) “We are planning to open a new store, but there are no plans to celebrate.”

I said, "But what was the 'three weeks to go' or 'two weeks to go' email?

I'm getting excited. ”

(Laughter) "I'm sorry to disappoint you."

(laughs) I said, 'Don't worry.

Let's do something anyway!

Besides, the Bouncy Castle deposit was non-refundable. ”

(laughter) "If you don't use it, you'll lose hundreds of pounds, Dan."

(laughter) He said, "Mr. Veech, I'm not responsible for what you ordered."

I said, "Let's not get into who did what.

Bottom line: you and I are working on this issue together. ”

(Laughter) (Applause) "Question: Will you be there to make sure people take their shoes off?"

(Laughter) To be honest, my relationship with Dan has deteriorated somewhat. The next email I received was: "Thank you for your email - your case number is..."

(Laughter) That's ridiculous.

I said, "So?"

(Laughter) And I thought, this is... And I, I...

And I said, "Danny?"

And I thought this was terrible. All I do is collect case numbers.

I said, "D, dog?"

(laughs) "The shop is already open."

(Laughter) I said, "But Dan, they must have wondered why there was no bouncy castle."

And here we are again.

That may have been the end of the story, but I was reminded that finding the right game can make anything, even something mundane like getting out of the car, fun.

So here's what I replied: [Thank you for your email - your case number is #0000001. ] (laughter) (applause) And we just, uh...

(laughs) It was like dancing.

It was just a beautiful relationship.

we just kept going.

it was adorable.

But let's be honest, folks, this was pretty labor intensive, and believe it or not, I had other things to do.

So what I did was have a little email autoresponder program.

I then configured it to return one ping for each email received from SafeMart.

So I set it up and it says "Thank you for your email - your case number is...".

Then it contains a little formula I wrote to increment the case number each time.

And put it on the server and run it.

(Laughter) To be honest, folks, I forgot after that.

(Laughs) When I checked again the other day, it seems that several emails were exchanged.

21,439.

(Applause.) It's very satisfying to know that these computer programs will ping each other forever.

And as Legacy goes, I don't think that's a bad thing.

So everyone, please remember. If you feel overwhelmed by the bureaucracy and often mundane life of modern life, don't fight your frustration.

Let it be the catalyst of wonder.

(laughs) Thank you.

(applause)

Twelve years ago, I picked up my camera for the first time to photograph the olive harvest in a Palestinian village in the West Bank.

I came here to make one documentary and then thought I would move to other parts of the world.

But something kept pulling me back.

Now, usually when overseas viewers hear about that part of the world, more often than not they simply wish that conflict would go away.

The Israeli-Palestinian conflict is terrible and we want it to go away.

We feel much the same about other conflicts around the world.

But every time we turn our attention to the news, it seems like another country is on fire.

So I've been wondering if we should start looking at conflict in a different light, focusing on how we manage conflict rather than just wanting it to end.

This is a big question for me, which I have pursued with the team at the nonprofit Just Vision.

After witnessing several different kinds of struggles in the Middle East, I began to notice some patterns in the more successful struggles.

I wondered whether these variables apply to different cases and, if so, what lessons can be gleaned for conducting constructive conflicts in Palestine, Israel, and elsewhere.

There is some science about this.

Maria Stefan and Erica Chenoweth studied 323 major political conflicts between 1900 and 2006 and found that nonviolent activism was almost 100% more likely to lead to success than violent activism.

Non-violent campaigns are less likely to cause physical harm to campaigners as well as their opponents.

And importantly, they usually lead to more peaceful and democratic societies.

In other words, nonviolent resistance is a more effective and constructive way of waging conflict.

But if it's such an easy choice, why aren't more groups using it?

Political scientist Victor Asal and others have examined several factors that shape the tactical choices of political groups.

It turns out that the biggest determinant of a movement's decision to employ nonviolence or violence is not whether the group is left or right, whether it is more or less influenced by religious beliefs, whether it opposes democracy or dictatorship, or even the level of repression it faces.

The greatest predictor of the movement's decision to embrace nonviolence is its ideology regarding the role of women in public life.

(Applause.) When a movement incorporates gender equality into its discourse language, it dramatically increases the likelihood that the movement will adopt non-violence, and therefore the movement's chances of success.

This research matched my own documentation on political organizing in Israel and Palestine.

I realized that a movement to welcome women into leadership positions, such as the one I documented in a village called Budrus, was far more likely to achieve its goals.

When Israel began building the separation wall, the village was under real threat of being wiped off the map.

The proposed route would require the destruction of the community's olive groves and cemetery, eventually encircling the village on all sides.

Through inspired local leaders, they launched a non-violent resistance campaign to stop it.

The odds were very high for them.

But they had a secret weapon. A 15-year-old girl who bravely jumped in front of a bulldozer that was trying to uproot an olive tree and stopped it.

At that moment, the Budrus community realized what was possible if women were welcomed and encouraged to participate in public life.

Thus, the women of Budrus went to the front line day after day, using their creativity and insight to overcome the obstacles they faced in ten months of unarmed struggle.

And, as you can see at this point, they win in the end.

The separation wall was completely transformed into the internationally recognized green border and the women of Budrus became known throughout the West Bank for their indomitable energy.

(Applause.) Thank you.

I'd like to pause for a moment with your help, as I'd like to address two very serious misconceptions that can occur at this point.

The first is that I do not believe that women are inherently or inherently more peaceful than men.

But in today's world, I believe women experience power differently.

Because women have had to navigate underpowered positions in many aspects of their lives, women are often adept at how to covertly exert pressure for change on large and powerful actors.

The term “manipulative” is often stigmatized in a derogatory sense towards women, reflecting the reality that women often have to find ways other than direct confrontation to achieve their ends.

And finding alternatives to direct confrontation is at the heart of nonviolent resistance.

Now let's address the second potential misunderstanding.

I have spoken a lot about my experiences in the Middle East, and some may now think that the solution is to educate Muslim and Arab societies to be more accepting of women.

They will be more successful if we do.

They don't need this kind of help.

Women have been part of some of the most influential movements out of the Middle East, but tend to stay low in the international community.

Our cameras are primarily focused on men who end up being involved in more confrontational scenes that we find very appealing in the news cycle.

And we end up with narratives that not only erase women from the struggles of the region, but often misrepresent the struggles themselves.

In the late 1980s, rebellion began in Gaza and quickly spread to the West Bank and East Jerusalem.

It became known as the First Intifada, and those who remember it visually commonly think of something like this: Palestinian men throw stones at Israeli tanks.

Reports at the time made it seem as though the only activity going on in the Intifada was stones, Molotov cocktails and burning tires.

However, the period was also marked by widespread non-violent organizing in the form of strikes, sit-ins and the establishment of parallel agencies.

During the First Intifada, all sectors of the Palestinian civilian population were mobilized across generations, factions and classes.

They did this through a network of popular commissions, and their use of direct action and community self-help projects challenged Israel's very ability to maintain control over the West Bank and Gaza.

According to the Israeli military itself, 97 percent of its operations during the first intifada were unarmed.

And here is another thing that is not part of our story at the time.

It was the women who took the lead behind the scenes during the 18 months of the Intifada. Palestinian women from all walks of life were responsible for mobilizing hundreds of thousands of people to withdraw their consent from the occupation.

Naela Aish encouraged Gaza women to grow vegetables in their backyards and helped build a self-sufficient Palestinian economy, an activity considered illegal by Israeli authorities at the time. Rabeha Diab took over decision-making authority over the entire rebellion when the men who were leading the rebellion were deported. Fatima al-Jaafari swallowed leaflets containing instructions for the uprising in order to spread them throughout the territory without being arrested. And Zahira Kamal ensured the permanence of the uprising by leading an organization that increased the number of women from 25 to 3,000 in one year.

Despite their extraordinary accomplishments, none of the women appear in the story of the First Intifada.

Other parts of the planet are doing the same.

For example, in our history books and in our collective consciousness, men are the face and voice of the struggle for racial justice in America in the 1960s.

But women were also an important force in mobilizing, organizing and taking people to the streets.

How many people think of Septima Clark when they think of the civil rights era in America?

significantly less.

But she played a key role at every stage of the struggle, especially with an emphasis on literacy and education.

Like many other women who played key roles in the US Civil Rights Movement, she has been omitted and neglected.

This is not about getting credit.

It's deeper than that.

The stories we tell profoundly affect how we see ourselves and how we believe movements are run and won.

The stories we tell about movements like the First Intifada and the American Civil Rights Era are so important and crucial to the choices Palestinians, Americans, and people around the world make—and the courage to face them—the next time they encounter injustice.

We cannot set an example for future generations if we do not lift the women who have played a key role in these struggles.

The lack of role models makes it difficult for women to hold their rightful place in public.

And, as we saw earlier, one of the most important variables in determining a movement's success is its ideology regarding the role of women in public life.

This is a question of whether we are moving towards a more democratic and peaceful society.

In a world where so much change is happening and will continue at an ever-faster pace, it is not a question of whether we face conflict, but of which narratives we choose and how we pursue conflict.

thank you.

(applause)

I'm here today to talk about two ideas that, at least based on my observations at Khan Academy, are kind of core, or important leverage points for learning.

And that's the idea of ​​mastery and the idea of ​​thinking.

I saw this in my early days working with my cousin.

Many of them initially struggled with mathematics because of these accumulated gaps in their learning.

Because of that, at some point they went to an algebra class, but maybe they were a little shaky in the pre-algebra part. So they thought they didn't have the math gene.

Or you might go to a calculus class and still be a little shaky at algebra.

I saw it in my early days when I was uploading some videos to YouTube and realized that other people besides my cousins ​​were also watching it.

(Laughter) And at first, those comments were just words of appreciation.

I thought that was pretty big.

I don't know how much time you guys spend on YouTube.

Most of the comments are not "thank you".

(Laughter) They're a little more pointed than that.

But then the comments got a little more intense, and one student after another said they had grown up hating math.

It got harder as I progressed to more advanced math topics.

By the time they got to algebra, there were too many gaps in their knowledge to tackle it.

They thought they didn't have the math gene.

But when they got a little older, they made a little decision and decided to get engaged.

They were able to find resources like Khan Academy to fill those gaps and master the concepts. That reinforced their belief that the problem was not solved. that they could actually learn mathematics.

And in many ways, this is how you master many things in life.

That's how you learn martial arts.

In martial arts, you practice your white belt skills as long as you need them and only progress to your yellow belt when you master them.

It's the same way you learn to play an instrument. Practice basic songs over and over until you master them before moving on to more advanced songs.

But what we are pointing out is that this is not how traditional academic models are built, not the type of academic model most of us grew up with.

Traditional learning models group students by middle school age and perceived ability, usually by age, and teach them all at the same pace.

And, as is often the case, suppose you are in a middle school pre-algebra class, the current unit is exponents, and the teacher gives a lecture on exponents, and then you go home and do your homework.

The next morning, I review my homework, and then lecture, homework, lecture, homework.

It will last for about 2-3 weeks, and then you will be tested.

On that test, maybe I get 75 percent, maybe you get 90 percent, maybe you get 95 percent.

And I didn't know 25% of the content, even though the test revealed knowledge gaps.

What did the 5% of A students not know?

Having identified gaps, the entire class moves on to the next subject, perhaps a more advanced subject that further develops those gaps.

It can be logarithmic or negative exponential.

And as the process continues, you quickly begin to realize how strange this is.

I didn't know 25 percent of the more basic stuff, and now I'm stuck with the more advanced stuff.

And this goes on for months, years, and at some point you might hit a wall in an algebra class or a trigonometry class.

It's not because algebra is fundamentally difficult, or because students aren't smart.

That's because I'm looking at the equation and dealing with exponents, and there's a 30 percent that shows up that I didn't know about.

And I start leaving.

To understand how absurd it is, imagine if we did other things in life that way.

For example, building a house.

(Laughter) So we brought in a contractor and said, 'They said it would take two weeks to build the foundation.

Do what you can. ”

(Laughter.) So they do the best they can.

It may rain.

Some items may not be displayed.

And two weeks later, an inspector came and looked around and said, "Okay, the concrete over there is still wet, that part isn't good enough to code...".

I will do 80 percent. ”

(Laughter) You say, "Wow, that's C. Let's build the first floor."

(Laughter) Same thing.

You have two weeks, do what you can, the inspector will come, 75 percent.

While building the second, third, and third floors, suddenly the whole building collapses.

And if your reaction is a typical one in an educational setting, or a reaction many people have, you might say that perhaps the contractor was at fault, or that better or more frequent inspections were needed.

But it was the process that was really broken.

We artificially limited the amount of time we had to do something, almost guaranteed that results would fluctuate, struggled to inspect and identify those gaps, but then built on top of that.

So the idea of ​​mastery learning is to do the exact opposite.

Instead of artificially restricting and fixing when and when to work on something, and almost certainty of A, B, C, D, F fluctuating outcomes, we do the opposite.

What fluctuates is when and for how long students actually need to work on something. What is fixed is whether the student will actually master the content.

And it's important to realize that this not only helps students learn exponents better, but also strengthens the right thinking muscles.

It helps them understand that being 20% ​​wrong at something doesn't mean they somehow have the C brand in their DNA.

It just means you have to keep working.

You need guts. Patience is required. You should take ownership of your own learning.

Now, many skeptics might say, I think this very idea of ​​acquisition-based learning and its connection to the mindset, that student ownership of learning, is itself a great philosophical thing.

It makes a lot of sense, but seems unrealistic.

To really do that, every student needs to be on their own trajectory.

It has to be personalized and you should have a tutor and a worksheet for each student.

And these are not new ideas. There was an experiment 100 years ago in Winnetka, Illinois, where mastery-based learning was done, with excellent results, but was told it would not scale because it was logistically difficult.

Teachers had to give each student a different worksheet and assess as needed.

But today it is no longer unrealistic.

we have the tools to do it.

Can students watch the explanations at their own time and pace?

There's an on-demand video for that.

do they need practice? Need feedback?

There are adaptive exercises readily available to students.

And when that happens, all kinds of lovely things happen.

One is that students are not just mastering concepts in practice, they are building a growth mindset, building grit and perseverance, and taking ownership of their learning.

And all sorts of wonderful things can start happening in the real classroom.

Instead of focusing on lectures, students can interact with each other.

They are able to master the material more deeply.

They can enter into simulations and Socratic dialogues.

Let's do a little thought experiment to understand what we're talking about here and the tragedy of the lost of possibility.

If you go to Western Europe 400 years ago, you'll find that about 15 percent of the population knew how to read and write, even though Western Europe was still one of the most literate regions on the planet at the time.

And if you ask someone who knows how to read, say a clergyman, "What percentage of the population do you think can read?"

They might say, "If you have a great education system, maybe 20 or 30 percent."

However, if we fast-forward to today, we find that forecast is very pessimistic, with almost 100 percent of the population being able to read.

But if I were to ask you a similar question, "What percentage of the population do you think can truly master calculus, understand organic chemistry, or contribute to cancer research?"

Many people might say, "If you have a great education system, maybe 20 to 30 percent."

But what if that extrapolation is simply based on your own experience in a framework you're not familiar with, your own experience, or the observations of your colleagues who are driven at a set pace throughout the class and accumulate all these gaps?

Even if you got 95%, what was the 5% you missed?

And it keeps accumulating. When you reach the advanced class, you will suddenly hit a wall and say, "I'm not going to be a cancer researcher, I'm not going to be a physicist, I'm not going to be a mathematician."

I doubt it is, but if you are allowed to act within a framework of mastery, to actually take ownership of your learning, to accept when you do something wrong, and to see your failure as a moment of learning, then that figure, the percentage of people who truly master calculus or understand organic chemistry, is actually much closer to 100 percent.

And it's not just a "nice to have" thing.

I think it's a social demand.

We have exited the so-called industrial age and are entering the information revolution.

And it's clear that some things are happening.

In the industrial age, society was pyramid shaped.

Human labor was needed at the bottom of the pyramid.

In the middle of the pyramid was the information processing, bureaucratic class, and at the top of the pyramid were the capital owners, entrepreneurs and creative class.

But those of us facing this information revolution already know what's going on.

At the bottom of the pyramid, automation will take over.

Even the middle layer, information processing, is a field where computers excel.

So as a society, we question. All this new productivity is being created thanks to this technology, but who's behind it?

Is it just going to be the very top of the pyramid? What would other people do then?

Or will it do something more ambitious?

Are we really trying to invert the pyramid where there are large creative classes and almost everyone can participate as an entrepreneur, artist or researcher?

And I don't think this is utopia.

I really think this is all based on the idea that people can get there if they let them reach their potential by mastering concepts and allowing them to take ownership of their learning.

And when you think of it as just a citizen of the world, it's very exciting.

I mean, think about what kind of fairness we can afford and how fast civilization can progress.

So I'm pretty optimistic about that.

I think it's going to be a very fun time to live.

thank you.

(applause)

I love challenges and saving the planet is probably a good thing.

We all know the planet is in trouble.

We are currently entering the 6X period, the sixth mass extinction on Earth.

I've often wondered, if there was a federation of organisms (aka "Uh-Oh") (laughs) and all living things had the right to vote, would we be voted on Earth or off Earth?

I believe the vote is taking place right now.

We would like to introduce you to our suite of six mycological solutions using fungi. These solutions are based on mycelium.

Mycelium infiltrates any landscape, holds soil and is very tenacious.

It holds up to 30,000 times more mass.

They are nature's grand molecular decomposers, the soil magicians.

They produce humus all over the landmass of the earth.

We have now discovered that multi-directional nutrient transfer exists between plants and is moderated by mycelium. Thus, the mycelium acts as the mother of nutrients from alder and birch trees to hemlock, cedar, and douglas fir.

Dusty and I often say this is where we go to church on Sundays.

I love virgin forests and I am a patriotic American because I have virgin forests.

Most people are familiar with the portobello mushroom.

And frankly, I'm facing a big stumbling block.

When I talk to someone about mushrooms, they immediately think of portobello or magic mushrooms, cloud their eyes, and wonder if I'm a little crazy.

So I want to keep that prejudice forever in this group.

As for fungi, we call it mycophobia, an irrational fear of the unknown.

Mushrooms grow very quickly.

Days 21, 23 and 25.

Mushrooms produce powerful antibiotics.

In fact, we are more closely associated with fungi than with any other kingdom.

Two years ago, a group of 20 eukaryotic microbiologists published a paper building Opisthokonta, a hyper-kingdom that unites the animal kingdom and the fungi.

We share the same pathogen.

Fungi do not like to be spoiled by bacteria. That's why our best antibiotics come from fungi.

But there are mushrooms that are past their prime here.

It rots after sporulation.

But I would like to propose that a set of microorganisms that occur in rotten mushrooms is essential to forest health.

They give birth to trees and create debris fields that nourish the mycelium.

And here you can see mushrooms sprouting.

The spores then germinate, forming a mycelium that burrows underground.

One cubic inch of soil can have eight or more miles of these cells.

My feet are covered with about 300 miles of mycelium.

This is a photomicrograph of Nick Reed and Patrick Hickey.

And notice that as the mycelium grows it conquers territory and then begins to form webs.

I've been a scanning electron microscopist for many years and have thousands of electron micrographs, but when I was staring at mycelium, I realized it was a microfiltration membrane.

We exhale carbon dioxide, but so does mycelium.

They breathe oxygen just like us.

But these are essentially externalized stomachs and lungs.

And I present to you the concept that these are extended neural membranes.

And within these cavities, these microcavities form and absorb water as they fuse the soil.

These are small wells.

And microbial communities begin to form in these wells.

As such, spongy soils not only resist erosion, but also create a microbial world that gives birth to multiple other organisms.

I first proposed in the early 1990s that the mycelium was the natural internet of the earth.

Looking at the mycelium, it is quite branched.

And even if one branch breaks, it happens very quickly because of the intersecting nodes (what Internet engineers might call hot points), there are alternative pathways for the transfer of nutrients and information.

The mycelium has sensations.

It knows you are there.

As you walk through the landscape, you jump up following the sound of footsteps trying to grab onto the rubble.

Therefore, I believe that the invention of the computer internet is the inevitable result of a previously proven biologically successful model.

Earth invented the computer internet for its own benefit. And we, as the top organisms on Earth, are now allocating resources to protect the biosphere.

For that matter, dark matter conforms to the same mycelium archetype.

I believe matter creates life. Life becomes unicellular. A single cell becomes a string. A string becomes a chain. chain network.

And this is the paradigm we see throughout the universe.

Most people may not know that fungi were the first organisms to reach land.

They reached land 1.3 billion years ago, and plants appeared hundreds of millions of years later.

Is there such a thing?

This is possible because the mycelium produces oxalic acid and many other acids and enzymes that punch rocks and trap calcium and other minerals to form calcium oxalate.

Crush rocks and take the first step in soil formation.

Oxalic acid is two carbon dioxide molecules bound together.

Therefore, fungi and mycelium sequester carbon dioxide in the form of calcium oxalate.

And all other types of oxalates also sequester carbon dioxide through minerals that are formed and extracted from the rock matrix.

It was first discovered in 1859.

This is a photo by Franz Huber.

This photo was taken in Saudi Arabia in the 1950s.

420 million years ago, this creature existed.

It was called prototaxite.

The recumbent prototaxites were about three feet tall.

At the time, the tallest plants on Earth were less than two feet tall.

Dr. Boyce of the University of Chicago published a paper last year in the Geological Journal declaring prototaxites to be giant fungi, giant mushrooms.

Every corner of the planet was dotted with these giant mushrooms.

across most land areas.

And these have existed for tens of millions of years.

Well, we've been through several extinction events, and 65 million years ago, as most people know, we had an asteroid impact as we moved forward.

An asteroid hit the Earth and released a large amount of debris into the atmosphere.

The sun was blocked and the earth was taken over by fungi.

Organisms paired with fungi were rewarded because fungi don't need light.

Einstein University recently discovered that fungi use radiation as an energy source in the same way that plants use light.

Therefore, the possibility that fungi exist on other planets is a foregone conclusion, at least in my own opinion.

The world's largest creature is found in eastern Oregon.

I couldn't miss it. It was 2,200 acres wide, 2,200 acres wide, and 2,000 years old.

The largest organisms on Earth are mycelium mats one cell wall thick.

If we have 5-6 layers of skin to protect us, why is this creature so big and only one cell wall thick?

Mycelium produces mushrooms under the right conditions. It explodes with such force that it destroys the asphalt.

We participated in some experiments.

If possible, here are 6 solutions to save the world.

Battelle Laboratories and I met in Bellingham, Washington.

There were four piles saturated with diesel and other petroleum waste. One was the control stake and the other was the control stake. One pile was treated with an enzyme. One pile was treated with bacteria. And our pile was inoculated with mushroom mycelium.

The mycelium absorbs the oil.

The mycelium produces an enzyme, peroxidase, that breaks carbon-hydrogen bonds.

These are the same bonds that bind hydrocarbons.

So the mycelium was saturated with oil, and when we returned six weeks later the tarp had all been removed and the other piles were all dead, blackened and rancid.

When we got back up the mountain it was covered with hundreds of pounds of oyster mushrooms and the color changed to a lighter shape.

Enzymes remanufactured carbohydrates into carbohydrates, fungal sugars.

Among these mushrooms are also very happy mushrooms.

It's very big.

It shows how much nutrition they were able to take.

But something else happened and it was a revelation in my life.

They form spores, the spores attract insects, the insects lay eggs, and the eggs become larvae.

Then birds came and carried the seeds and our mountains became an oasis of life.

On the other hand, the other three mountains were dead, darkened and foul-smelling, and the aromatic hydrocarbon PAHs decreased from 10,000 ppm to less than 200 in eight weeks.

There is no final image.

The whole mountain was a green forest road of life.

These are gateway species, vanguard species that open doors to other biological communities.

So I invented using storm-blown debris to put jute bags, bunker spawns, and mycelium. These jute sacks can be placed downstream from farms producing E. coli and other wastes and factories containing chemical toxins, leading to habitat restoration.

So they set up a base in Mason County, Washington, and found that the amount of coliform bacteria decreased dramatically.

And here I will show you the graph.

This is a logarithmic scale of 10 to the power of 8.

There are over 100 million colonies per gram, and 10 to the power of 3 equals about 1,000.

These three mushrooms reduced the amount of coliform bacteria 10,000-fold in 48 to 72 hours.

Think about the impact.

It's a space-saving way of using storm debris and can guarantee a storm every year.

Therefore, this mushroom has been of particular interest to us for many years.

This is my wife, Dusty. I have a mushroom called Fomitopsis officinalis (Agaricon).

First described by Dioscorides in AD 65, this mushroom is endemic to primeval forests.

As a remedy for consumption.

This mushroom is native to Washington, Oregon, Northern California, and British Columbia, and is now considered extinct in Europe.

It may not seem that big, but let's get closer.

It is a very rare fungus.

Our team, and we also have a professional team that goes out, did 20 outings in the primeval forest last year.

We have found one sample that can be cultured.

I believe that preserving the genomes of these fungi in primary forests is absolutely critical for human health.

I have participated in the US Department of Defense's Bioshield program.

We submitted over 300 samples of boiled mushrooms and mycelium from which these extracellular metabolites were harvested.

And a few years ago we received results like this.

We have three types of agaricon mushrooms that show high activity against poxviruses.

Dr. Earl Khan, a smallpox expert at the US Department of Defense, says that any compound with a selectivity index of 2 or greater is active.

Anything over 10 is considered very active.

Our mushroom strain was in a very active range.

If you google "stamets" and "smallpox" you will find a vetted press release that has been vetted by the Department of Defense and can be read.

Alternatively, you can visit NPR.org to listen to the live interview.

So, encouraged by this, naturally we went to the flu virus.

So I will show you this for the first time.

We have 3 types of Agarikon that are resistant to influenza viruses.

This is the numerical value of the selectivity index. We saw 10s and 20s against pox, but now show much higher activity against influenza virus compared to the ribavirin control.

And we use natural extracts within the same dosage range as pure pharmaceuticals.

We have tried it against influenza A viruses (H1N1, H3N2) and influenza B viruses.

So, we tried blends and combinations of blends against H5N1, which gave selectivity indices of over 1,000.

(Applause) So I think you can make the argument that we should preserve virgin forests as a matter of national security.

(Applause.) I became interested in entomopathogens, bacteria that kill insects.

Our house had been destroyed by carpenter ants.

So I went to the EPA website and they recommended research using metahidium species, a fungal group that kills carpenter ants as well as termites.

I did what no one else did.

In fact, I chased the mycelium when it stopped producing spores.

These are spores - this is inside the spores.

I was able to change the culture to a non-sporulating form.

That's why the industry has spent over $100 million specifically on bait stations to keep termites from eating your home.

But insects are not stupid and will avoid spores when they come near. So I transformed the culture into a non-spore-forming form.

And I got a plate for my daughter's Barbie doll. Every day, I put it in an area of ​​my house where carpenter ants were creating a rubble field. With no spores, the ants were attracted to the mycelium.

They gave it to the Queen.

After a week there was no sawdust pile at all.

Then, like a delicate dance between dinner and death, the mycelium is eaten and mummified by the ants, and the mushrooms pop out of the ants' heads with a boo.

(Laughter) After sporulation, the spores repel.

The house is therefore no longer suitable for break-ins.

The result is a near-permanent solution to termite re-infestation.

And my house fell apart and I got the first patents for carpenter, termite and fire ants.

Then we tried extracts and, wow, we found that we could direct the insects in another direction.

This makes a lot of sense.

Then I got my second patent. This is a big patent.

This is called the Alexander Graham Bell patent.

It covers over 200,000 species.

It's the most disruptive technology they've ever witnessed, according to agrichemical industry executives.

This could completely overhaul the agrichemical industry around the world.

You can also get 100 Ph.D and fly. Because my guess is that entomopathogenic fungi, prior to sporulation, attract the very insects that are repelled by the spores.

So I needed a delivery system, so I came up with the life box.

The life box -- you get a DVD of the TED conference -- add soil, add water, and it contains mycorrhizal and endophytic fungi, as well as spores like agaricon.

The seed is then mothered by this mycelium.

If you put a tree seed here, a primeval forest could grow out of the cardboard box.

I want to reinvent shipping systems and the use of cardboard around the world so that they have a green footprint.

If you can set up a site like YouTube, you can make it interactive and zip code specific. There, people can participate and see carbon credits sequestered by trees sent from Life Boxes through satellite imagery systems, Virtual Earth and Google Earth.

You can also prepare a cardboard box to deliver the shoes and add water. It was developed for the refugee community. Corn, beans, pumpkins, onions, etc.

I had some containers ready and my wife said if I could do this anyone could. And I ended up growing a seed garden.

I then harvested the seeds and thank Eric Rasmussen for his help. And you will harvest the seed field.

After that, when the grain is harvested, only a few grains are needed.

Add the mycelium to it and then inoculate the corn cobs.

Now you have three cobs of corn and no other grains -- lots of mushrooms start to form.

This population will be closed due to too many withdrawals from carbon banks.

But look what happens here.

The mushrooms are then harvested, but very importantly, the mycelium converts the cellulose into fungal sugars.

So I thought, how can we deal with this country's energy crisis?

And then we came up with Econor.

Mycelium-mediated production of ethanol from cellulose offers all the advantages described so far.

However, I think the transition from cellulose to ethanol is ecologically less intelligent, and we need to be ecologically intelligent about fuel generation.

So we build a carbon bank on the planet and renew the soil.

These are the species we need to join.

I think that making mycelium attractive can save the world.

thank you very much.

(applause)

As a journalist, I like to seek out the untold stories and the lives that quietly unfold beneath the headline screams.

I've also taken on the task of putting down roots, choosing a partner, and having children.

So for the last few years, I've been trying to understand what the good life is in the 21st century. Not only because I am fascinated by the moral and philosophical implications, but also because I desperately need answers myself.

We live in difficult times.

In fact, for the first time in American history, the majority of parents don't expect their children to be richer than they were before.

This is the same for rich and poor, men and women.

Now, some of you may be sad to hear this.

After all, America is deeply invested in the concept of economic transcendence, in which every generation jumps over the previous generation to earn more, buy more, and be more.

We have exported this dream all over the world. So the children of Brazil, China and even Kenya inherit our insatiable desire to dream more.

But reading this historic poll for the first time didn't actually make me sad.

It felt like a provocation.

"Better Life" -- Whose Standard Is It Based On?

Would it be 'better' to find a secure job that you could count on for the rest of your life?

they are almost extinct.

People change jobs every 4.7 years on average, and it's estimated that by 2020, nearly half of Americans will be freelancers.

So why not just numbers?

Is it to earn as much as possible?

We are failing by that peculiar measurement.

Median per capita income, adjusted for inflation, has been flat since around 2000.

Okay, so maybe I should buy a big house with a white picket fence?

Fewer people are doing that.

Nearly five million people were left homeless in the Great Recession, and many more calmed down about going to great lengths—or being duped in many predatory cases—to keep their deeds.

Homeownership rates are at their lowest since 1995.

Well, we don't have regular jobs, we don't make a lot of money, and we don't live in big fancy houses.

Let the bells ring in remembrance of all that has made America great.

But are they the best measure of a country's greatness, its quality of life?

I think what makes America great is that spirit of reinvention.

In the wake of the Great Recession, more and more Americans are redefining what "better life" really means.

Turns out it has more to do with community and creativity than money and cents, after all.

Now, let me be clear: 14.8 percent of Americans living in poverty simply need money.

And we all need policies that protect us from exploitation by employers and financial institutions.

What follows is not meant to suggest that the gap between rich and poor is highly immoral.

However, the conversation often ends there.

We talk about poverty as if it were a monolithic experience. He spoke of the poor as if they were mere victims.

One of the things I've learned through research and reporting is that the arts of living well are often best practiced by the most vulnerable.

Now, I have come to believe that if necessity is the mother of invention, recession can be the father of consciousness.

It confronts us with deep questions, questions that we might be too lazy or distracted to ask in relative comfort.

how should it work?

how should we live?

We are all searching for answers to these questions, consciously or not, with our ancestors whispering in our ears.

My great-grandfather was a heavy drinker in Detroit, but he managed to hold on to some factory work from time to time.

Believe it or not, he had 21 children, one of whom was my great-grandmother, a woman who died of ovarian cancer at the age of 47.

Now that I am pregnant with my second child, I have no idea what she went through.

I did the math and there were 6 pairs of twins.

There, their son, my grandfather, became a traveling salesman and had his ups and downs.

So my dad was a debt collector doorman and I grew up pretending my parents weren't home.

In fact, when his father admitted he didn't have the money to go back to the orthodontist, he used pliers to remove the braces himself in the garage.

So, naturally, my father became a bankruptcy attorney.

You can't write this in a novel, can you?

He was obsessed with providing my brother and I with a safe base.

So I ask these questions through a multi-generational struggle.

My parents ensured that I grew up on a kind of stable foundation that allowed me to question, take risks and leap.

And ironically, and perhaps frustrating them at times, it is their steadfast approach to security that makes them question its value, or at least its value as we have defined it historically in the 21st century.

So let's dig into this first question: how should it work?

We should work like mothers.

that's right. We have spent decades adapting women to a work environment built for corporate men.

And while many have taken backbends to adapt to their environment, others have taken more unconventional paths, creating a patchwork of meaning and money that is flexible enough to do what they need to do for their loved ones.

My mother said it was "just make it work".

Today I hear life coaches call it a “portfolio career.”

Whatever you call it, more and more men are craving this whole life, if not rushed.

They are awakening to the desire and duty of being father and son.

Well, artist Anne Hamilton said, "Work is a way of knowing."

Labor is a way of knowing.

In other words, what we are working with is what we understand about the world.

It is true, and I believe so, that women who have disproportionately cared for young children, sick children, and aged children have disproportionately benefited from the deepest kind of knowledge of the human condition.

By prioritizing care, men are, in a sense, betting their right to the entire sphere of human existence.

Now, this means that 9 to 5 no longer works for everyone.

Like career ladders, punch clocks are becoming obsolete.

Every industry is born and disappears every day.

Everything is non-linear from here on.

So we have to stop asking our children, "What do you want to be when you grow up?"

And start asking, "What do you want to be when you grow up?"

Their work is constantly changing.

They are the common denominator.

Therefore, the more they understand their talents and create the ideal team of collaborators, the better their lives will be.

The challenge ahead is to reinvent social safety nets to fit this increasingly fragmented economy.

We need portable health benefits.

We need policies that reflect that everyone is vulnerable and has the right to care for others who are vulnerable, without falling into poverty.

We need to seriously consider universal basic income.

We need to reinvent labor organization.

The promise of a world of work built to actually fit 21st century values, rather than outdated ideas like bringing home bacon, is long overdue. ask your mother

What about the second question, "How should we live?"

We should live like our immigrant ancestors.

When they came to America, they often shared apartments, survival strategies, and childcare, and always knew how to fill their stomachs no matter how little food was available.

But they were taught that success meant leaving the village in pursuit of the white picket fence that symbolized the American Dream.

And even today, when we see a white picket fence, we think of success or self-ownership.

But when we remove the emotion, it actually divides us.

Many Americans have rejected the white picket fence and the kind of highly privatized life that occurred within it, instead reclaiming village life and reclaiming interdependence.

For example, 50 million of us live in intergenerational households.

This number exploded during the Great Recession, but it turns out that people actually like this kind of life.

Two-thirds of people living with multiple generations under one roof say it improves their relationships.

Some choose to share their homes with other people who understand the health and economic benefits of everyday community rather than family members.

CoAbode is an online platform for single mothers who want to share a home with other single mothers, with 50,000 users.

And people over the age of 65 are especially likely to seek out these alternative living arrangements.

They understand that their quality of life depends on a combination of loneliness and togetherness.

If you think about it, it applies to all of us, young and old.

For too long, we've assumed that happiness is king in the castle.

But all studies prove otherwise.

It shows that the healthiest, happiest, even safest, in terms of everything from climate change disasters to crime, are Americans who live intertwined lives with their neighbors.

Well, I have experienced this myself.

For the last few years I have been living in a shared house.

By the way, here is a 1.5 acre persimmon tree in the middle of downtown Auckland, this prolific blackberry bush meandering around a community garden.

All nine units are made in different sizes and shapes, but are designed to be as environmentally friendly as possible.

With big, shiny black solar cells on the roof, our electricity bills rarely exceed $5 a month.

The 25 of us who live there are all different ages, political views, and occupations, and we live in a house that has everything you would find in a typical house.

Additionally, we share a commercial-sized kitchen and eating area where we have common meals twice a week.

Now, when I tell people that I live like this, I often get one of two extreme reactions.

You say, "Why can't we all live like this?"

Or, "That's horrifying.

So I want you to feel at ease. Not only is there a sacred respect for privacy between us, but we also have a commitment to what we call "radical hospitality." It's not like the Four Seasons advertises, it's like saying, period, end of sentence, that everyone deserves kindness.

What is the biggest surprise for me living in a community like this?

You share all the domestic work—repairing, cooking, weeding—but you also share the emotional labor.

There are as many as 20 others who can talk about a tough day at work or troubleshoot how to deal with an abusive teacher instead of relying solely on the ideal family unit to meet all their emotional needs.

Teens in our community often go to non-parent adults for advice.

This is what Bellhook called "revolutionary parenting," the humble realization that children are healthier when they have more adults to imitate and trust.

Adults were also found to be healthier.

It's a lot of pressure trying to be the perfect family behind a white picket fence.

The “new and better life,” as I have come to call it, is less an investment in a perfect family than an investment in an imperfect village. Whether it's relatives living under one roof, a shared housing community like mine, or just neighbors who have pledged to really know and care for each other.

That's good common sense, right?

Nonetheless, money often leaves us foolish to reach out.

The most reliable wealth is in relationships.

A newly enriched life is never an individual outlook.

In fact, if you're a failure or think you're a failure, I have good news for you. You may be successful by standards you don't yet respect.

Maybe you are a mediocre breadwinner but a great father.

You may not be able to afford your dream home, but you might have a legendary neighborhood party.

If you're a textbook success, what I'm saying might be tougher for you.

You may be a failure by the standards you hold dear, but the world will not reward you.

Only you can know.

I know that even if I made enough money to make all living things comfortable, it wouldn't pay homage to my great-grandmother who lived such a short and cruel life.

Money can't buy the way out of suffering or finding meaning.

No house is big enough to erase the pain she would have endured.

If I could live my life as connected and courageous as possible, I would be honoring her.

In the midst of all this uncertainty, we may actually be feeling uneasy.

But that anxiety can make us vulnerable and flexible.

We can turn inward and lose faith in the power of institutions to change, and even lose faith in ourselves.

Alternatively, you can look outward and develop faith in your ability to reach out, connect, and create.

Ultimately, it turns out, the biggest danger isn't failing to achieve the American Dream.

The greatest danger is realizing a dream that you don't really believe in.

So don't do that.

Do something more difficult and interesting. It's about what you do every day, about structuring a life that aligns as closely as possible with the love, ingenuity, people you put your energy into, and what you believe in.

It's not about making money, it's about respecting your ancestors.

It was a beautiful fight.

thank you.

(applause)

The word concussion evokes fear more than ever these days, and I know it personally.

I played football for 10 years and got hit in the head thousands of times.

But I have to tell you, far worse than that were the two bike accidents that left me with a concussion, and as I stand in front of you guys today, I'm still dealing with the effects of the most recent accident.

Fear of concussions exists, but there is some evidence behind it.

There is information that a history of repeated concussions can lead to early dementia, such as Alzheimer's disease, and chronic traumatic encephalopathy.

It was the subject of Will Smith's movie Concussion.

Everyone is obsessed with soccer and military affairs, but what you may not know is that bicycling is the leading cause of concussions in children, or sports-related concussions.

Another thing you may not know is that helmets worn while bicycling, playing football, and many other activities are not designed or tested for how well they protect children from concussions.

In fact, they are designed and tested for their ability to protect against skull fractures.

So I get this question all the time from parents. "Would you like your child to play soccer?"

Or, "Should I let my child play soccer?"

And I think, as a field, we're a long way from giving an answer with any degree of confidence.

So I'm looking at this question from a slightly different perspective and want to know how we can prevent concussions.

Is that possible?

And while most experts think otherwise, research in my lab is beginning to reveal more details about concussions that can help us better understand them.

The reason helmets can prevent skull fractures is very simple. we know how it works.

Concussions are even more of a mystery.

So, to help you understand what's going on with a concussion, I'd like to show you the video that comes up when you type "What is a concussion?" into Google.

You'll be taken to the CDC website and this video basically tells the whole story.

What you see is the head moving forward, the brain lagging behind, and then the brain catching up and crashing into the skull.

It bounces off the skull and makes its way to the other side of the skull.

And what's highlighted in this video from the CDC, I should note that it was NFL-funded, is that the outer surface of the brain that was supposed to hit the skull is the outer surface of the brain because it appears damaged or damaged.

What I'm trying to say with this video is that it shows what scientists think happens with a concussion, and while there are probably some things that are right, there are probably a lot of things that are wrong about this video.

One thing I agree with is that these dynamics exist in the brain. And I think most experts would agree.

It catches up later than the skull, moving back and forth and vibrating.

It is true that we think so.

However, the amount of brain movement seen in this video probably isn't quite right.

The cranial vault has only a few millimeters of space and is completely filled with cerebrospinal fluid, which acts as a protective layer.

Therefore, the entire brain probably moves very little inside the skull.

Another problem with this video is that the brain is shown as some sort of rigid whole that moves around, which is also not true.

The brain is one of the softest substances in the body and can be thought of like jelly.

So when you move your head back and forth, your brain twists, rotates, distorts, and stretches its tissues.

Therefore, I think most experts agree that concussions are less likely to occur on the outer surface of the brain, but rather much deeper towards the center of the brain.

Now, to understand the mechanism of concussion and figure out whether it is possible to prevent concussion, we are working on this problem and using devices like this.

It's a mouthguard.

It has essentially the same sensors that you would find in a cell phone, including accelerometers and gyroscopes, and if someone is hit on the head, it can tell you how the head moves at 1,000 samples per second.

The principle behind mouthguards is that they “fit to your teeth”.

Teeth are one of the hardest substances in the body.

As such, it can be tightly coupled to the skull and the movement of the skull can be measured as accurately as possible.

People have tried a different approach with helmets.

I've looked at other skin-mounted sensors, but they all move too much, and I've found this to be the only reliable way to get a good measurement.

Now that we have this equipment, we want to go beyond cadavers and study and study living humans, because we can only learn about concussions from cadavers.

So where can you find a group of motivated volunteers who regularly go out and keep banging heads and getting concussions?

Well, I'm one of them, my local friendly Stanford football team.

This is our laboratory. I would like to show you the first concussion measured with this device.

One thing to point out is that the device has a built-in gyroscope that can measure head rotation.

Most experts believe this is an important part of knowing what's going on with a concussion.

Then watch this video.

Announcer: Cougars are late and bring in extra people, but luckily they have time and Winslow is crushed.

i hope he is okay.

(audience groans) At the top of the screen you see him just coming to this little post route to detach and secure.

Here it comes at a really fast speed. This sounds good, doesn't it?

-- David Camarillo: Sorry, maybe 3 is a bit too much.

But you get the idea.

So if you only watch this movie, you'll only know that he was badly beaten and injured.

However, extracting data from the mouthguard he wore would reveal much more detailed and richer information.

And one thing we noticed here is that he got hit in the bottom left of his face mask.

And it did something a little counterintuitive at first.

The head did not move to the right.

It actually rotated to the left at first.

Then, as the neck began to compress, the force of the blow caused it to bounce back to the right.

Therefore, this side-to-side movement was a kind of whiplash-like phenomenon, which probably led to brain damage.

Now, the device is only limited in that it can measure movement in the skull, but what we really want to know is what's going on inside the brain.

So we are working with Svein Kleiven's group from Sweden.

They developed a finite element model of the brain.

This is a simulation using the injury mouthguard data I showed you earlier. What you see here is the brain. Here is a cross-sectional view of the front of the brain twisted and distorted as mentioned earlier.

So you can see that this doesn't look very similar to the CDC's video.

Now, the colors you see indicate how much the brain tissue has been stretched.

So red is 50 percent.

This means that the brain has stretched the tissue in that particular region to 50% of its original length.

And the most noticeable thing is this red spot.

The red spots are therefore very close to the center of the brain and, relatively speaking, we don't often see such color on the outer surface as the CDC video showed.

Now, a little more detail on how we think concussions occur, but one thing I'd like to mention is that we and others have observed that concussions are more likely to occur when the head is rotated in this direction by a blow.

This is common in sports such as soccer, but seems more dangerous. What is going on there?

One thing that makes the human brain different from other animals is that it has two very large lobes.

We have a right brain and a left brain.

And what's important to notice in this diagram is that just below the center of the right and left hemispheres is a large fissure that runs deep into the brain.

Believe me, there are fibrous tissue sheets in the cracks that you can't see in this image.

It's called a scythe, and it runs from the front of the head to the back of the head and is quite stiff.

This allows the force to be transmitted rapidly to the center of the brain as the head rotates from side to side on impact.

So what lies at the bottom of this crack?

It's the wiring of the brain, and in fact this red fascicle at the bottom of this fissure is the single largest fascicle, the wiring that connects the right and left sides of the brain.

It is called the corpus callosum.

We believe that this may be one of the most common mechanisms of concussion, where downward movement of force impinges on the corpus callosum, causing a dissociation of the right and left hemispheres of the brain, which may explain some of the symptoms of concussion.

This finding is also consistent with what I have seen with this brain disease, chronic traumatic encephalopathy.

This is an image of a middle-aged ex-professional soccer player, but what I want to point out is that if you look at the corpus callosum, you can see the size of the corpus callosum in normal versus the size of the corpus callosum in someone with chronic traumatic encephalopathy, turn the page back and the corpus callosum is greatly atrophied.

And the same is true for all ventricular spaces.

These ventricles are much larger.

And all this tissue near the center of the brain disappeared over time.

So what we are learning is certainly consistent.

Well, here's some good news. By the end of this talk, I hope you feel hopeful.

One of the things we noticed about this damage mechanism in particular is that even though the force is transmitted to this crack very quickly, it still takes a certain amount of time.

And what we think is that if we could slow the head enough so that the brain kept up with the skull and moved in sync with it, we might be able to prevent this mechanism of concussion.

So how can we slow down the rotation of the head?

(Laughs) Huge helmet.

In other words, more space means more time. This is a bit of a joke, but you may have seen this before.

This is bubble soccer, a real sport.

In fact, I saw some young people playing the sport on my street the other day, and to my knowledge there have been no reports of concussions.

(Laughter) But seriously, while the principle certainly works, this is going too far.

This is impractical for biking or playing soccer.

So we are working with a Swedish company called Hövding.

Some of you may have seen their work, they utilize the same air principle to give you extra space to prevent concussion.

Children, please don't do this at home.

This stuntman doesn't have a helmet.

Instead he has a collar, and this collar has sensors. The same type of sensor found in our mouthguards that detects when he is about to fall. There are also detonation-activated airbags, which basically work the same as car airbags.

And experiments I've done in my lab with their device have shown that it can significantly reduce the risk of concussion in some scenarios compared to a regular bicycle helmet.

So it's a very exciting development.

But to really realize the benefits of concussion-preventing technology, regulations must be met.

That's the reality.

And while the device is for sale in Europe, it's not in the US and probably won't be available any time soon.

So I wanted to tell you why.

Some are good reasons, and some are not so good.

Bicycle helmets are federally regulated.

The Consumer Product Safety Commission is authorized to approve the sale of bicycle helmets, and this is the test it uses.

This brings us back to the skull fracture we talked about earlier.

That's what this test is for.

And that is important.

It can save your life, but I don't think it's enough.

For example, one thing this test doesn't appreciate is that airbags deploy at the right time and place, and not when they don't.

Likewise, I'm not sure if this helmet has any chance of preventing concussions.

And when we look to unregulated football helmets, they are still tested in a very similar way.

In any case, they are not regulated by the government.

They have trade associations, and that's how most industries work.

But what I can tell you is that this industry group is very reluctant to update the standards.

So, in my lab, we are not only working on the mechanisms of concussion, but we also want to understand how we can set better standards for testing.

And we hope that governments can use this kind of information to encourage innovation by informing consumers about how much protection they are getting while wearing a particular helmet.

And finally, I'd like to go back to the original question I asked. Is it comfortable for a child to play soccer or ride a bicycle?

And this may be the result of my own traumatic experiences.

I'm much more nervous about my daughter Rose riding her bike.

She's a year and a half and already wants to race the streets of San Francisco, anyway.

Here is the bottom of one of these streets.

My personal goal is therefore to develop these technologies further, and I believe this is possible. In fact, in my lab, we are especially working on the optimal use of the space given in the helmet.

And before she's even ready to ride a two-wheeler, I'm confident we'll have something available that will actually reduce her risk of concussion and comply with regulatory agencies.

So what I want to do is, I think this is for people of a more pressing nature, but I've been here for a few years now and I want to be able to say, when parents and grandparents ask, it's safe and healthy for children to participate in these activities.

And we are so lucky to have a great team at Stanford who are so passionate about this.

So I hope to come back to you with the final story in a few years, but for now, just don't be scared when you hear the word concussion.

there is hope

thank you.

(applause)

You see, I never set out to be a parenting expert.

As a matter of fact, I am not very interested in parenting itself.

It's just that there's a certain style of parenting these days that just ruins them and prevents them from growing up to be themselves.

A certain parenting style gets in the way these days.

What I mean is that we spend a lot of time worrying too much about parents who are not fully involved in their children's lives, education and upbringing, and that's right.

But at the other end of the spectrum, there's just as much harm going on there, with parents feeling that their children can't succeed unless they protect and prevent every turn, keep an eye on every event, micromanage every moment, and steer them toward some small subset of colleges and careers.

When we raise our children this way, our children live up to a kind of checklist, because the Lord knows that I tended to do that myself in raising two teenagers.

And here's a childhood on the checklist:

We want to keep them safe, healthy, fed and watered, and we want them to go to the right school, be in the right class at the right school, and get good grades in the right class at the right school.

But it's not just grades and scores that count, it's also accolades, awards, sports, activism, and leadership.

We tell kids, don't just join a club, start a club, because college wants it.

Then check the box for community services.

In other words, show the college that you care about them.

(Laughter) And all of this is done with a degree of expected perfection.

We expect our children to perform to a level of perfection that has never been demanded of us. And with so much to ask for, we naturally think we parents have to argue with every teacher, principal, coach, referee, and act like our child's concierge, personal handler, and secretary.

And with our children, our precious children, we spend a lot of time nagging, soothing, hinting, helping, negotiating, nagging to make sure they aren't failing, slamming doors, ruining their future.

And here's what it feels like to be the kid from the childhood on this checklist.

First, I don't have time to play freely.

I'm not free in the afternoon. Because everything has to be fulfilled.

As if every homework, every quiz, every activity is the moment that will determine the success or failure of this future we envision for them, we exempt them from chores around the house, and even from getting enough sleep so long as they tick off the items on their checklist.

And while in checklist childhood we just want them to be happy, when they come home from school the first thing we ask is homework and grades.

And they see in our faces that our approval, our affection, and our very worth come from A.

And then we walk beside them, rattle them like trainers at the Westminster Dog Show, (laughs) coax them into jumping a little higher and flying a little further, day after day.

And when you become a high school student, you don't say, "Well then, what are you interested in studying or doing?"

They go to a counselor and ask, "What do I need to do to get into the right college?"

And when I start to improve in high school and get a B or, God forbid, a C, I frantically email my friends and ask, "Did anyone get into the right college with these grades?"

And our kids are breathless regardless of where they end up at the end of high school.

It's fragile.

I'm a little burnt out.

They're a little older before that time comes, and they wish they'd told the adults in their lives, "You've done enough, this effort you've put in as a child is enough."

And they are now emaciated with high rates of anxiety and depression, and some wonder if this life was ever worth it.

Well, we parents believe it's worth it.

We seem to be well behaved. It's literally like thinking they have no future if they don't get into one of the little colleges or careers we think of them.

Or maybe they're just worried that they won't have a future where they can put stickers on the back of their cars and brag to their friends.

yes.

(Applause.) But if you look at what we've been doing and have the courage to take it seriously, you'll see that not only do our children think their worth is determined by their grades and grades, but when we live, like our own version of the movie Becoming John Malkovich, always living right inside their precious growing minds, we send them this message:

So with our over-help, over-protection, over-direction, and holding hands, we deprive our children of the opportunity to build self-efficacy. Self-efficacy is a really basic tenet of the human psyche, much more important than the self-esteem our children get every time we clap.

Self-efficacy is built when you understand that your own actions lead to consequences.

(Applause.) When your own actions lead to consequences, not your parents acting for you.

Simply put, if our children want and must develop self-efficacy, they must do more to think, plan, decide, act, hope, manage, trial and error, dream and experience life for themselves.

Now, what I'm saying is that every child is hardworking, motivated, and doesn't need parental involvement or attention in their own lives, and we should just step back and leave them alone?

No no.

(Laughter) That's not what I mean.

My point is that if grades and scores, accolades and awards are treated as early childhood goals in order to encourage aspirations to enter a few colleges or a few professions, that is a too narrow definition of success for children.

And while over-helping may win them the game in the short term, like helping them with their homework boosts their grades, I mean, all of this takes a long-term toll on their self-consciousness.

My point is that we should care less about the specific colleges they might apply to or get into, and much more about whether they have the habits, the mindset, the skill sets and the health to be successful wherever they go.

My point is, kids should stop being a little bit obsessed with grades and scores and be more interested in early childhood when they lay the foundation for success based on things like love and housework.

(Laughter.) (Applause.) Did I just say chores? Did you just say chores? It really was.

But actually, this is why.

The long-term, long-term studies of humans ever conducted are called Harvard University-funded research.

As a result, I found that career success in life is what we want for our children, that success in life comes from doing housework as a child, the earlier the better, the better it is to start, the mindset of rolling up your sleeves and actively participating, the mindset that if there is a job you don't like, someone has to do it, and it would be better for me to do it, and the mindset that you contribute your own efforts to the improvement of the whole, that's how you get ahead in the workplace.

Well we all know this. you know this

(Applause.) We all know this, but exempting children from domestic work in childhood when a checklist was imposed, and then they would still be waiting as young adults at work for a checklist, which does not exist. And more importantly, they lack the urge or instinct to roll up their sleeves and actively participate, look around, and think about how they can help their colleagues.

How can you anticipate what your boss needs a few steps ahead?

The second very important finding from the Harvard Grant study is that happiness in life does not come from love of work, but from love of human beings: the love of one's spouse, partner, friends and family.

Therefore, childhood should teach children how to love. Children cannot love others without first loving themselves, and they cannot love themselves unless we offer unconditional love.

(Applause.) Yes.

So when our precious children come home from school or we come home from work, instead of obsessing over grades and scores, we need to shut down the technology, put away our phones, stare into their eyes and let them see the joy that fills their faces when we see them for the first time hours later.

And I have to say, "How was your day?"

what did you like about today? ”

And when your teenage daughter says "lunch," as I do, I want to hear about math tests, not lunch, and yet you have to be interested in lunch.

I have to say, "What did you like for lunch today?"

They need to know that it's important to us as human beings, not because of our GPA.

Okay, so you're thinking about housework and love, which sounds pretty good, but give me a break.

Universities want the best scores, grades, accolades and awards. I would like to say so.

Big brand schools want it in young people, and here's the good news.

Contrary to what college ranking rackets would have us believe, you don't have to attend the biggest brand name schools to be happy and successful in life.

Happy, successful people went to state schools, went to little colleges no one had heard of, went to community colleges, went to colleges here and dropped out.

(Applause.) The proof that this is true is in this room, in our community.

And if we can open our blindfolds and look at a few more colleges, maybe if we can take our own egos out of the equation, then maybe we can embrace and embrace this truth and realize that it's not the end of the world if our kids don't go to name brand schools.

And more importantly, if their childhood wasn't lived by a domineering checklist, then when they go to college, whichever it is, they will go to college of their own volition, fueled by their own desires, and will be capable and ready to succeed there.

I have to admit to you.

I have the two children I mentioned earlier, Sawyer and Avery.

they are teenagers.

And once upon a time, I think I treated Sawyer and Avery like little bonsai. (Laughter.) I was going to carefully cut and prune it to create a perfect human shape enough to get me into one of the most selective colleges.

But after interacting with thousands of other people's children (laughter) and raising two of my own, I realized that my children are not bonsai.

They are wildflowers of an unknown genus and species -- (laughter) and it is my job to provide them with a nourishing environment, to strengthen them through chores, to love them so that they can love and receive love from others, colleges, majors and careers are up to them.

My job is not to make them look the way I wanted them to look, but to help them become their best selves.

thank you.

(applause)

Did you hear the news?

We are in the midst of a clean energy revolution.

And it seems like every day I live in Berkeley, Calif., I see new solar panels on new roofs and electric cars driving down my driveway.

Germany gets half of its electricity from solar at times, and India is currently working to build 10 times more solar than it has in California by 2022.

Even nuclear power seems to be making a comeback.

Bill Gates is working with engineers in China, and 40 different companies are working together to build the first nuclear reactor that runs on waste, won't meltdown, and is cheaper than coal.

So you might be wondering, "Will this whole global warming problem be solved a lot easier than everyone imagined?"

That was the question we wanted to know, so my colleagues and I decided to take a closer look at the data.

We were a little skeptical about some parts of the clean energy revolution story, but what we found really surprised us.

First, clean energy is on the rise.

This is electricity derived from clean energy sources in the last 20 years.

However, when looking at the share of clean energy sources in global electricity, it has actually decreased from 36 percent to 31 percent.

And if you care about climate change, you need to go the other way, sourcing your electricity from 100% clean sources as soon as possible.

Now you might ask, "What is 5 percentage points of the world's electricity?"

Well, it turns out to be a good amount.

This is equivalent to 60 Diablo Canyon-sized nuclear power plants, the last nuclear power plant in California, or 900 Topaz-sized solar power plants, one of the largest in the world and arguably California's largest.

A big part of this problem is simply that fossil fuels are increasing faster than clean energy.

It is understandable.

There are many poor countries that still use wood, dung and charcoal as their main source of energy and need modern fuels.

But something else is happening. One of these clean energy sources in particular is actually declining not only in relative terms but in absolute terms.

And it's the nucleus.

We can see that that generation has decreased by 7% over the past decade.

We often hear that it doesn't really matter because solar and wind power have made great strides now, and solar and wind power make up for the difference.

But the data tell us something.

It can be seen that the combined power from solar and wind barely makes up for half of the power loss from nuclear power.

Let's take a closer look at America.

Over the past few years, in fact in 2013-2014, we prematurely retired four nuclear power plants.

They were almost completely replaced by fossil fuels, resulting in the disappearance of about the same amount of clean energy electricity that comes from the sun.

And it's not just for us.

People think of California as a leader in clean energy and climate change, but looking at the data shows that California actually reduced its emissions more slowly than the national average from 2000 to 2015.

how about germany?

They use a lot of clean energy.

However, looking at the data, Germany's emissions have actually increased since 2009, and no one can say that it will meet its climate change pledges in 2020.

It's not hard to see why.

Solar and wind provide about 10-20% of the electricity. This means hospitals, homes, cities and factories need electricity even when the sun isn't shining and the wind isn't blowing.

Batteries have come a long way in recent years, but in reality they will never be as efficient as the power grid.

Approximately 20 to 40 percent of the power is lost each time the battery is charged or removed.

That's why when California tries to handle all the solar power it puts on the net, which currently gets about 10 percent of its electricity from the sun, when the sun goes down and people come home from work and turn on air conditioners, TVs, and every other appliance in their homes, they need a lot of natural gas backup.

So what we've been doing is stuffing the mountainside with tons of natural gas.

It worked fine for a while, but it started leaking late last year.

This is Aliso Canyon.

Massive amounts of methane gas were released, equivalent to driving 500,000 cars on the road.

Essentially, all of our climate change commitments for the year have been accomplished.

Well, what about India?

We traveled to India a few months ago because sometimes you have to go to places to actually get the correct data.

We met with all the top officials in the solar industry and others, and they said, 'We actually have a bigger problem than Germany or California.'

No backup. Not all natural gas is there.

And that's just the beginning.

Let's say we want to reach 100 gigawatts by 2022.

However, last year only 5 were achieved and the year before that only 5 were achieved. ”

Let's take a closer look at nuclear power.

The UN's Intergovernmental Panel on Climate Change looked at the carbon content of all these different fuels and found that nuclear power is very low, in fact lower than solar power.

And nuclear power obviously provides a lot of power - 24 hours a day, 7 days a week.

One plant can supply 92% of the electricity for a year.

Interestingly, when looking at countries deploying clean energy of various types, only a few are doing so at the same pace as they are addressing the climate crisis.

I mean, nuclear power seems like a very good option, but there's a big problem with it, and I think you all know, that people really don't like it.

About a year and a half ago, there was a survey that looked at people all over the world, not just in the US and Europe.

And what they discovered is that nuclear power is actually one of the least popular forms of energy.

Even oil is more popular than nuclear.

And while nuclear power has a slight edge over coal, the problem is that people aren't really afraid of coal as much as they are afraid of nuclear power actually acting on our unconscious minds.

So what are we afraid of?

There are actually three.

There are concerns about the safety of the plants themselves, that they might melt and cause damage. There is waste from them. And it has something to do with weapons.

And, naturally, I think engineers are looking at those concerns and looking for technical fixes.

That's why Bill Gates is building a state-of-the-art nuclear reactor in China.

That's why 40 different entrepreneurs are working on this problem.

And I myself am very excited about it.

We produced a report called "How to Make Nuclear Energy Cheap".

In particular, great expectations are placed on thorium reactors.

So when climate scientist James Hansen asked if I'd like to go with him to China to see China's advanced nuclear program, I jumped at the chance.

We were there with engineers from MIT and UC Berkeley.

And I thought in my head that China could do with nuclear what it did with so many other things—start building small nuclear reactors on an assembly line, ship them like iPhones and MacBooks, and send them around the world.

I'm going to buy it at my Berkeley house.

But what I found was a little different.

All the presentations were very exciting and very promising. They are developing multiple reactors.

The time for thorium reactors had come and many of us were excited.

They looked at all the presentations, got to the timeline, and said, "By 2040, we're going to have a thorium molten salt reactor ready for sale to the world."

And I thought, "What?"

(Laughter) I looked at my colleague and thought, "Excuse me, could you speed it up a bit?"

Because we are in a bit of a climate crisis right now.

By the way, your city is really polluted. ”

They replied, "I don't know what you heard about our thorium program, but we don't have a third of the budget, and your Department of Energy isn't very willing to give you the data you have on testing reactors."

And I said, 'Well, I have an idea.

Do you understand that it takes 10 years to demonstrate a nuclear reactor?

Skip that part and let's commercialize it right away.

This will save you money and time. ”

The engineer looked at me and said, "Let me ask you a question. Can you buy a car that has never been demoed before?"

But what about other nuclear reactors?

We have a reactor that is online now and we are starting to sell it.

It is a high temperature gas furnace.

It never melts.

But it's really big and bulky and that's part of the safety and no one thinks it's going to be cheaper than the nuclear reactors we have.

Using waste as fuel is a really cool idea, but we don't really know how to do it.

In fact, there is a risk of even more waste, and most people believe that including waste in the process will only significantly increase the overall cost of the machine and add one more step of complexity.

In fact, there are big questions about how much we intend to do.

So we went to India and asked about their nuclear program.

The government said it would build about 30 new nuclear power plants ahead of the Paris climate change talks.

But when we got there and interviewed people and even looked at internal documents, they said they were going to do about five things right now.

And most countries in the world, especially the wealthy ones, are not talking about building new nuclear reactors.

We are actually talking about shutting down the reactor before it reaches the end of its life.

In fact, Germany is pressuring its neighbors to do so.

I mentioned the United States, which could lose half its nuclear reactors in the next 15 years, wiping out 40 percent of the emissions reductions it could get under the Clean Power Plan.

Of course, Japan has shut down all nuclear power plants and replaced them with coal, natural gas and oil burning, but only one-third to two-thirds are expected to be operational.

So when we looked at the numbers and added them up, the most surprising finding was how many nuclear weapons China and India see in the next 15 years, how many nuclear weapons they see at risk of going offline.

What we have found is that the world is actually at risk of losing four times as much clean energy as it has lost in the last decade.

In other words, we are not in the middle of a clean energy revolution. We are in a clean energy crisis.

So it makes sense for engineers to try to technically solve people's fears of nuclear power.

But given that these are big tasks to do and will take a long time to solve, another problem arises. Is it that those technical fixes really solve people's fears?

Stay safe.

You know, despite what people think, it's hard to find ways to make nuclear power safer.

In other words, all the medical journals that have covered this study -- this is the latest study by the British journal The Lancet, one of the most respected journals in the world -- nuclear power is the safest way to produce reliable electricity.

Everyone is afraid of accidents.

So, looking at the Fukushima, Chernobyl accident data, the World Health Organization found the same thing. Most of the damage is caused by people panicking, and they are panicking because they are afraid.

In other words, the harm caused is not actually caused by machines or radiation.

It is caused by our fear.

And what about the waste?

Everyone worries about waste.

Now, what's interesting about waste is how little waste there is.

This is from a single plant.

If you took out all the nuclear waste we've ever made in the United States, put it on a soccer field, and piled it up, it would only be 20 feet tall.

And people say it's poisoning people or doing something, but it's not, it's just sitting there, being watched.

Not too many.

In contrast, the waste from energy production that we have no control over, which we call “pollution,” kills 7 million people a year and threatens very serious levels of global warming.

And the truth is that even if we manage to use that waste as fuel, there will always be some fuel left over.

That means there will always be people who think it's a big deal for reasons it may not have as much to do with actual waste as we think.

Well, what about weapons?

Perhaps most surprising is the lack of examples of countries with nuclear power. I'm going to go get my weapon.

In fact it works the other way around.

We have discovered that the only way to get rid of the masses of nuclear weapons is to use the plutonium in warheads as fuel for nuclear power plants.

So if we want to rid the world of nuclear weapons, we will need more nuclear power.

(Applause.) As I was leaving China, the engineer who brought Bill Gates to China pulled me aside and said, “Michael, I appreciate your interest in various nuclear supply technologies, but there is a more fundamental problem: there is not enough global demand.

I mean, we can run these machines on the assembly line, we know how to make things cheaply, but there aren't enough people asking for it. ”

So let's do solar and wind and efficiency and conservation.

Let's accelerate our advanced nuclear program.

I think you should triple the amount you spend on it.

But if we are to overcome the climate crisis, I think it is most important to keep in mind that the causes of the clean energy crisis do not come from within our machines, but from within ourselves.

thank you very much.

(applause)

Somewhere out there is a guy who looks a bit like actor Idris Elba, who looked like him at least 20 years ago.

I don't know anything about him except that he once risked his life to save mine.

This man ran across a four-lane highway in the middle of the night to bring me back to safety after a potentially fatal car accident.

And while all of this obviously made me really upset, it also left me with a burning, chomping desire to understand why he did what he did, what made him choose to risk his own life to save the life of a stranger to whom I owe my life.

In other words, what is the cause of his or someone else's capacity for altruism?

But let me tell you what happened first.

That night, I was 19 and on my way back down Interstate 5 to my home in Tacoma, Washington, a little dog jumped out in front of my car.

And I'm exactly what you shouldn't be doing, which is to avoid it.

And now I know why you shouldn't do it.

Anyway, I hit the dog, which put the car in a fishtail, then spun across the freeway, and finally slammed into an oncoming car backwards in the passing lane of the freeway, killing the engine.

At that moment, I knew I was going to die too, but I didn't because of the actions of that brave man who, within seconds of seeing my stranded car, must have decided to stop and run across a four-lane highway in the dark to save my life.

And then he got my car moving again, drove me back to a safe place, made sure I was okay, and then drove again.

He didn't even give me his name and I think he forgot to say thank you.

So before I go any further, I want to pause for a moment and thank that stranger.

(Applause.) I tell you this because what happened that night changed the course of my life to some extent.

I became a psychology researcher dedicated to understanding the human capacity to care for others.

Where did it come from, how did it develop, and what extreme forms did it take?

These questions are very important for understanding fundamental aspects of human social nature.

Many people, from philosophers and economists to ordinary people, believe that human nature is fundamentally selfish and that the only thing that really motivates us is our own well-being.

But if that is true, why would some people, like the stranger who saved me, do such selfless acts as helping others at such great risk and sacrifice to themselves?

To answer this question, we need to explore the roots of the extraordinary act of altruism and what makes those who engage in such acts different from others.

However, until recently, little research has been done on this subject.

The actions of the man who helped me meet the strictest definition of altruism. Altruism is voluntary and costly behavior motivated by a desire to help other individuals.

In other words, it is a selfless act aimed solely at the benefit of others.

What could explain such behavior?

One answer is clearly compassion, which is a key driver of altruism.

But the question arises as to why some people seem to have more of it than others.

And the answer may be that altruistic people's brains are fundamentally different.

But to figure out how to do that, I actually started at the opposite end, Psychopath.

A common approach to understanding fundamental aspects of human nature, such as the desire to help others, is to study people who lack that desire, and psychopaths are just such a group.

Psychopathy is a developmental disorder of strong genetic origin that results in a cold, apathetic personality and a propensity for antisocial and sometimes very violent behavior.

Once, my colleagues at the National Institute of Mental Health and I conducted the first-ever brain-imaging study in psychopathic adolescents. And our findings, and those of other researchers now, show that psychopaths fairly reliably exhibit three characteristics.

First, they aren't generally insensitive to other people's feelings, but they are insensitive to signs that others are suffering.

And it's especially difficult to recognize such a terrifying look.

And a frightening look conveys an urgent need or emotional distress, and usually arouses compassion and a desire to help those who see it. So it's no surprise that people who tend to be less compassionate tend to be desensitized to these cues.

The part of the brain that is most important for recognizing fearful expressions is called the amygdala.

Very rarely, there are individuals who have a complete absence of the amygdala and are severely impaired in recognizing fearful expressions.

And whereas healthy adults and children typically experience a large increase in amygdala activity when they see frightened expressions, the amygdala in psychopaths is less responsive to these expressions.

Sometimes it doesn't react at all, which may be why these cues are so difficult to detect.

Finally, a psychopath's amygdala is about 18-20 percent smaller than average.

Therefore, all these findings are reliable, robust and of great interest.

But remember my main concern is not understanding why people don't care about others.

It's about understanding why they do that.

So the real question is, can extraordinary altruism, the opposite of psychopathy in terms of compassion and desire to help others, emerge from a brain that is also the opposite of psychopathy?

A sort of antipsychotic brain, better able to perceive fear in others, more responsive to this expression, perhaps a larger-than-average amygdala?

As my research has shown, all three things are true.

And we found this out by testing a group of truly extraordinary altruists.

These are people who donated one of their kidneys to a total stranger.

So these are people who have volunteered to undergo major surgery to remove one of their own healthy kidneys and transplant it into a seriously ill stranger they have never met or met.

"Why would anyone do this?" is a very common question.

And the answer may be that the brains of these extraordinarily altruists have certain special properties.

They perceive fear in others better.

They literally know when someone is in pain.

This may be partly because their amygdala is more responsive to these expressions.

And remember, this is the same part of the brain found to be unresponsive in psychopathic people.

And finally, their amygdala is also about 8% larger than average.

Taken together, these data suggest that there is something of a compassionate continuum in the world, anchored by highly psychopathic people at one end and highly compassionate people driven to extreme altruistic acts at the other end.

But let me add that it's not just that they are more compassionate than the average that extraordinary altruists are so different from others.

They are, but what is even more unusual is that they are compassionate and altruistic, not just to their innermost friends and family. right?

Because there's nothing special about having compassion for people you love and empathize with.

The compassion of truly extraordinary altruists extends well beyond that circle, beyond the wider circle of acquaintances, to complete strangers, like the man who saved me, who are completely outside our social circle.

And I now have the opportunity to ask many altruistic kidney donors how they are able to create such a wide circle of compassion as to donate kidneys to complete strangers.

And that turned out to be a very difficult question for them to answer.

I say, "Why are you willing to do this when so many others don't?"

You are one of less than 2,000 Americans who have donated a kidney to a stranger.

What is it that makes you so special? ”

And what are they saying?

They say, 'Nothing.

Nothing special for me.

I am just like everyone else. ”

And I think this is actually a very compelling answer. Because it suggests that these altruist circles are not like this, but more like this.

they have no center.

These altruists literally do not consider themselves to be at the center of anything, superior or inherently important to anyone else.

When I asked one altruist why it made sense to donate a kidney, she replied, "Because it's not about me."

Another said, "I haven't changed. I'm not special."

By studying here, you will find that I am just like you. ”

I think humility best explains this astonishing lack of self-centeredness. In the words of St. Augustine, it is that quality that makes man angelic.

why?

For without the center of your circle there is no inner or outer ring, no one more or less deserving of your care and consideration than anyone else.

And I think this is the real difference between an extraordinary altruist and a normal person.

But I also think that this is a worldview that many people, probably most people, can achieve.

I think so, because at the social level the expansion of altruism and compassion is already happening everywhere.

Psychologist Stephen Pinker and others have shown that around the world, people are becoming less accepting of suffering in an ever-widening circle of others, leading to a decline in cruelty and violence of all kinds, from animal cruelty to domestic violence to the death penalty.

And that has led to an increase in altruism of all kinds.

A hundred years ago people would have thought it ridiculous how common and normal it is to donate blood or bone marrow to a complete stranger today.

Will people 100 years from now think that donating a kidney to a stranger is as normal and commonplace as we donate blood and bone marrow today?

perhaps.

So what underlies all these amazing changes?

In part, it appears to be an increase in wealth and living standards.

As societies become richer and life becomes more prosperous, people shift their focus of attention outward, resulting in an increase in all kinds of altruism toward strangers, from volunteering to charitable donations to even altruistic kidney donations.

But all these changes also produce strange and paradoxical consequences. That is, there is a very common perception that while the world is becoming a better, more human place, the world is also becoming worse and crueler, but in reality it is not.

I don't know exactly why, but perhaps we know more about the suffering of strangers at a distance, and that's why we care more about the suffering of strangers at a distance.

But what is clear is that the changes we are seeing show that the roots of altruism and compassion are as much, if not more, part of human nature than cruelty and violence. While some people seem inherently sensitive to the suffering of others at a distance, I truly believe that the ability to push oneself out of the center of the circle and extend the circle of compassion outward to include even strangers is within reach of nearly everyone.

thank you.

(applause)

How much do you get paid?

Don't answer it out loud.

But keep the numbers in your head.

Now: How much do you think the person sitting next to you makes?

Again, don't answer out loud.

(Laughter) How much do you think the person who sits in the private room or at the desk next to you at work gets paid?

do you know?

should i know?

Let me tell you, it's a little awkward for me to ask you such a question.

But admit it -- you want to know.

Most of us are uncomfortable with the idea of ​​making our salaries public.

Don't talk to your neighbors, and definitely don't talk to your office neighbors.

The supposed reason is that if everyone knew their salary, all hell would break loose.

There will be arguments, there will be fights, and some people may quit.

But what if secrecy was actually the cause of all the conflict?

And what if we took away that secret?

What if openness actually increases the sense of fairness and collaboration within your company?

What if we had full payroll transparency?

Over the last few years, I've studied business and entrepreneurial leaders who question the conventional wisdom about how companies are run.

And then there is the question of salary.

And the answer is nothing short of amazing.

We've found that pay transparency, or the open sharing of pay across the company, makes for a better place to work for both employees and the organization.

Not knowing how your salary compares to your peers can make you feel underpaid and even discriminated against.

Would you like to work in a place that tolerates the idea of ​​feeling underpaid or discriminated against?

But keeping salaries secret is exactly what it sounds like, and it's an age-old practice, even though the law protects the right of employees to discuss salaries in the United States.

In a famous example decades ago, Vanity Fair management actually circulated a memo titled “Prohibiting Discussing Salary Received Between Employees.”

“Prohibit” employees from discussing salaries received.

Well, that memo didn't resonate with everyone.

New York literary figures Dorothy Parker, Robert Benchley, and Robert Sherwood, all members of the Algonquin Roundtable, decided to stand up for transparency and went to work the next day with a bill hanging around their necks with their salaries written on them.

(Laughter) Imagine going to work with your salary written on your chest for everyone to see.

But why would a company want to block the salary debate?

Why do some people agree with it while others disagree with it?

Besides the supposed reasons, it turns out that salary secrecy is actually a way to save a lot of money.

As you know, keeping salaries secret creates what economists call "information asymmetry."

This is a situation in a negotiation where one party has more information than the other party.

And that secret can save employers a lot of money when it comes to hiring, promotions, and annual pay increases.

Imagine how well you could negotiate a raise if you knew everyone's salary.

Economists warn that information asymmetries can cause market turmoil.

When someone leaves their payslip in the copier, suddenly everyone starts yelling at each other.

In fact, they even warned that information asymmetries could lead to complete market failure.

And I think we're getting there soon.

Here's why. First, most employees don't know how their salaries compare to their peers' salaries.

In a 2015 survey of 70,000 employees, two-thirds of those paid at market rates said they felt underpaid.

And of those who felt they were underpaid, 60% said they were planning to leave regardless of whether the pay was low, too high, or in line with market rates.

What would you say if you were in this survey?

Are you underpaid?

Well wait -- how do we know that we're not allowed to talk about it?

Second, information asymmetries and pay secrecy make it easy to ignore the discrimination that already exists in today's market.

A 2011 report by the Institute for Women's Policy found the gender pay gap to be 23 percent.

This is where the $1.77 comes from.

But in the federal government, where salaries are fixed at a certain level and everyone knows what that level looks like, the gender pay gap shrinks to 11 percent -- and that's before regulating some of the factors economists debate whether or not to regulate.

If we really want to close the gender pay gap, we might start by opening up salaries.

If this is the picture of total market failure, openness remains the only way to ensure fairness.

I realize now that it might feel uncomfortable to let people know what I've created, but isn't it more uncomfortable than constantly thinking that I'm being discriminated against or that my wife or daughter or sister is being paid unfairly?

Openness is the best way to ensure fairness, and salary transparency does that.

That's why entrepreneurial leaders and corporate leaders have been experimenting with payroll distribution for years.

Like Dane Atkinson.

Dane is a serial entrepreneur who has launched a number of companies on salary-secrecy terms and has even used the terms to pay two equally qualified people vastly different salaries, depending on how well they negotiated.

And Dane witnessed the resulting conflict.

So when he launched his latest company, SumAll, he made payroll transparency a priority from the start.

And the results were astonishing.

And when you learn, study after study, how you get paid and how that pay compares to your peers, you're more likely to work harder to improve your performance, more likely to be more committed, and less likely to quit.

That's why Dane is not alone.

From tech start-ups like Buffer to Whole Foods' tens of thousands of employees, not only can everyone see salaries, but store and department performance data is available to everyone on the company's intranet.

Payroll transparency takes many forms today.

One size does not fit all.

Some even post their salaries for everyone to see.

Some keep it in-house only.

Some companies post salary formulas, others post salary levels and lock everyone on those levels.

So you don't have to create a sign for every employee to wear in the office.

And you don't have to be the only one wearing a home-made sign.

But we can all go a step further in increasing pay transparency.

For those of you who have the power to move forward for transparency, now is the time to move forward.

And for those who do not have that right, now is the time to stand up for it.

So what is the salary?

And how does that compare to the people you work with?

you should know

And so should they.

thank you.

(applause)

When I opened Mott Hall Bridges Academy in 2010, my goal was simple. It was to open schools to close prisons.

For some, this was an audacious goal. Because our school is located in the Brownsville neighborhood of Brooklyn. The Brownsville neighborhood is one of the most underserved and violent neighborhoods in New York City.

Like many urban schools with high poverty rates, we face many challenges, such as finding teachers who understand the complexities of disadvantaged communities, underfunding technology, low parental involvement, and neighborhood gangs recruiting children as early as fourth grade.

There, I was the founding principal of the district's public secondary school, which initially had only 45 students.

30% of them needed special assistance.

86 percent of them were below grade level in English and math.

And 100 percent lived below the poverty level.

How will we learn if there are no children in our classrooms?

And if they don't learn, where will they end up?

That was evident when I asked a 13-year-old, "Young man, where do you see yourself in five years?"

His answer was, "I don't know if I can live that long."

Or maybe a young woman tells me that working at a fast food restaurant has been her lifelong goal.

For me, this was unacceptable.

It was also clear that they had no idea that the landscape of opportunity existed outside their neighborhood.

We call our students “scholars” because they are lifelong learners.

And the skills you learn today will help you prepare for college or the job market.

I chose the royal colors purple and black because I want them to remember that they are descendants of great men and that through education they are future engineers, scientists, entrepreneurs and even leaders who can and will take over this world.

To date, we've had three graduating classes with grades of 98 -- (applause) 98 percent graduation rate.

That's nearly 200 kids currently attending some of New York City's most competitive high schools.

(Applause.) It was a cold January day when my academic Vidal Chastanet met Brandon Stanton, the founder of the popular blog Humans of New York.

Brandon shared the story of a young man from Brownsville who saw a man pushed off a rooftop and witnessed the violence firsthand.

However, he can still be influenced by the headmaster who founded a school that believes in all children.

Vidal embodies the story of so many underprivileged children struggling to survive. That is why we must prioritize education.

Brandon's post became a global sensation and touched the lives of millions.

As a result, $1.4 million was raised for scholars to participate in college field trips, summer STEAM programs, and college scholarships.

It should be understood that when 200 young people from Brownsville visited Harvard University, they realized that they had a realistic chance of getting into the college of their choice.

And the impossibility imposed on them by disadvantaged communities has been replaced by hope and purpose.

A revolution in education is happening in our schools because of the presence of adults who provide love, structure, support and knowledge.

These are things that inspire children.

But it's not an easy task.

And there are high demands on an imperfect education system.

But I have a dynamic group of educators who work together as a team to determine what the best curriculum is.

They spend time outside of class, come on weekends, and sometimes use their own money to provide resources when we don't have money.

And as a principal, I have to validate my expectations.

As such, I attend classes and make observations to provide feedback. Because we want our teachers to be as successful as the name of Mott Hall Bridges Academy.

And I give them access to me every day. That's why they all have my personal mobile number, including my academics and alumni. Maybe that's why I get calls and texts at 3am.

(Laughter) But we are all connected to succeed, and great leaders do this.

The future of tomorrow is in our classrooms.

And they are our responsibility.

It means everyone here and everyone looking at the screen.

We must believe in their talent and teach and remind them that education does indeed have power.

thank you.

(applause)

Why bother?

The game is rigged.

My vote doesn't count.

The choices are terrible.

Voting is for motherfuckers.

You've probably also wondered:

You've probably said that too.

If so, you are not alone and you are not completely wrong.

Today's public policy game is rigged in many ways.

How does more than half of federal tax cuts go to the richest 5 percent of Americans?

And indeed, our choices are often terrible.

For many people across the political spectrum, Evidence A is the 2016 presidential election.

But in any given year, a quick scan of the ballot will reveal a lot of unmotivated ones.

But despite all this, I still believe that voting matters.

It may sound crazy, but we believe we can restore the joy of voting.

Today I want to talk to you about how and why you can do that.

There was a time in American history when voting was fun, and coming to the polls was more than just a strict obligation.

That era has been called "most of American history."

(Laughter.) From the Revolution to the civil rights era, America had a vibrant, highly participatory, tumultuous voting culture.

There were street plays, open-air debates, fasts and feasts and toasts, parades and bonfires.

In the 19th century, immigration and urban political machinery promoted this voting culture.

The culture grew with each new voter.

During Reconstruction, when new African-American voters—the new African-Americans—began to exercise power, they celebrated with a Jubilee Parade that linked their emancipation with their newly won voting rights.

Decades later, suffragists brought a theatrical spirit to the fight, marching together in white dresses to claim their rights.

And the civil rights movement, which sought to restore the promise of equal citizenship betrayed by Jim Crow, put the right to vote at its center.

From Freedom Summer to the Marches on Selma, that generation of activists knew that voting mattered, and that spectacle and performance of power were key to actually claiming power.

But more than half a century after the Selma and Voting Rights Act, and in the decades since, this in-person voting culture has all but disappeared.

Killed by TV and then the Internet.

Sofas have replaced common areas.

The screen turned the public into an audience.

Sharing political memes on social media is nice, but it's a pretty quiet kind of citizenship.

Sociologist Sherry Turkle calls it "being alone together."

What we need today is an electoral culture that comes together, in person, loudly and passionately, where voting feels like “joining the club,” or even “joining the party,” instead of “eat your veggies” or “do your duty.”

Please try to imagine. Now imagine a concerted effort across the country, in local locations but nationally, to revive the array of face-to-face methods of campaigning and campaigning. An outdoor show that ridicules and praises candidates and their claims in a broad satire style. Soapbox speeches by citizens. A public forum held in a pub. The streets are filled with political art, handmade posters and murals. A Battle of the Bands concert where the performers compete on behalf of the candidates.

Now, all of this may sound a little 18th century, but it really doesn't have to be as 18th century as, say, "Hamilton" on Broadway. In other words, vibrant and contemporary.

And indeed, millions of people around the world vote this way today.

In India, elections are a colorful communal event.

In Brazil, Election Day has a festive, carnival-like atmosphere.

In Taiwan and Hong Kong, the street theater of elections is a spectacular and captivating spectacle.

You may wonder, who here in America would have the time to do something like this?

And I would say the average American watches TV for 5 hours a day.

You may wonder who has the motives for that.

And to all the people who want to be seen and heard as participants, as creators, not as props and storytellers.

So how do we achieve this?

just make it happen.

That's why a group of my colleagues and I have launched a new project called "The Joy of Voting".

In four U.S. cities: Philadelphia, Miami, Akron, Ohio, and Wichita, Kansas, we have launched projects that bring together artists, activists, educators, politicians, neighbors and the general public to promote a culture of voting in local ways.

In Miami, that means partying all night with popular DJs, and the only way to get in is to show that you're registered to vote.

In Akron, that means political drama being staged on flat bed trucks that travel from neighborhood to neighborhood.

Philadelphia hosts a voting-themed treasure hunt throughout Old Colonial Town.

And in Wichita, he's been making mixtapes and doing live graffiti art in the North End to get votes.

There are 20 of these projects, and their beauty and diversity are striking and transforming.

Let's talk about some of them.

In Miami, we commissioned a young artist named Atomico to create vibrant, vibrant images for a new series of "I voted for you" stickers.

But as a matter of fact, Atomico never voted.

He wasn't even registered.

So while working on the artwork for these stickers, he also began to overcome his fear of politics.

He registered, learned about the upcoming primary, handed out stickers on Election Day, talked to voters, encouraged them to vote, and talked to passers-by about the election.

In Akron, a theater company called Wandering Aesthetics puts on a pickup truck play.

To do so, they solicited fragments of speeches, monologues, dialogues, poems and anything else that could be read aloud and woven into a performance.

They received dozens of submissions.

One of them was a poem written by nine students in an ESL class, all Hispanic migrant workers from the Hartville, Ohio neighborhood.

I would like to read this poem to you.

It's called "voting joy".

"I want to vote for the first time because things are changing for Hispanics.

I used to be afraid of ghosts.

People are scared now.

Violence and racism are on the rise.

You can change this by voting.

There are no border walls.

it's just a wall.

What is the wall of shame?

Voting to break down this wall of shame is very important.

I have passion in my heart.

Voting gives me voice and power.

I can get up and do something. ”

The Voting Joy project is more than just fun.

It's about this passion.

It's about feelings and beliefs and it's not just our organization's job.

Today, across the country, immigrants, youth, veterans, people of all backgrounds, red states and Qing states, urban and rural, people of all political backgrounds are creating such passionate and joyful activities around elections.

What they have in common is simply this. Their work is rooted in the field.

Because remember, all citizenships are local.

When politics becomes just a presidential election, we scream, scream, and collapse from exhaustion at our screens.

But when politics is all about us and our neighbors, the rest of the community coming together to create collective voices and experiences of imagination, we begin to be reminded that this is important.

We begin to remember that this is a matter of autonomy.

It puts me back in the first place.

Why bother?

There is one way to answer this question.

Voting is important because it is an act of self-fulfilling belief.

It nourishes the spirit of mutual benefit that makes all societies thrive.

When we vote, even if it's out of anger, we are participating in a collective, creative leap of faith.

Voting helps create the very power we wanted.

It is no coincidence that democracy and theater emerged at the same time in ancient Athens.

Both pull the person out of his private enclosure.

Both create a wonderful public experience of shared ritual.

Both bring the imagination to life in ways that remind us that ultimately our bond is all imaginary and can be re-imagined.

This moment in which we think about the meaning of imagination is so fundamentally important, and our ability to catch its spirit and get the sense that there is something greater out there, is not just a matter of technical expertise.

It's not just about making time or having the know-how.

It's a matter of the spirit.

But let me tell you the answer to the question, "Why bother?"

It's probably a little less spiritual, maybe a little more edgy.

Why bother voting?

Because not voting does not exist.

If you don't vote, you are voting for everything you hate and disagree with.

Not voting can be disguised as passive, principled resistance, but in reality, not voting is actively handing over power to those who are against their own interests and willing to take advantage of your absence.

Not voting is a dupe.

Imagine what would happen to this country if everyone who founded the Tea Party in 2010 decided, as we know, that politics was too confusing and voting too complicated.

There is no chance that our vote will lead to anything.

They did not preemptively silence.

They emerged and in the process changed American politics.

Imagine if all the supporters of Donald Trump and Bernie Sanders decided not to turn the political status quo upside down or blow away the framework of what has been possible in American politics.

They did it by voting.

We are currently living in divided and often very dark times. There is much talk, on both the left and the right, about the need for a revolution and a revolution that destroys everyday democracy.

Now here's the problem. Everyday democracy has already given us a strategy for revolution.

In the 2012 presidential election, young voters, Latino voters, Asian-American voters, and low-income voters were all less than 50%.

Turnout in the 2014 midterm elections was 36%, the lowest in 70 years.

And the average voter turnout in local elections is hovering around 20%.

Please imagine 100%.

Please image 100%.

Mobilize 100% and revolution will happen overnight.

Overnight, the country's policy priorities have changed dramatically, making all levels of government fundamentally more sensitive to all citizens.

What does it take to be 100% mobilized?

Well, we have to oppose the efforts currently underway across the country to make voting difficult.

But at the same time, we must actively create a positive culture of voting that people want to belong to, participate in, and experience together.

we have to create a purpose.

we have to create joy.

Yes, let's make a revolution, a revolution of spirit, thought, policy and participation, a revolution against cynicism, a revolution against self-fulfilling helplessness.

Vote to keep this revolution alive. In the meantime, have fun.

thank you very much.

(applause)

Byzantine emperor Alexios Komnenos led his army against the Scythian hordes.

For good luck, he carried one of Christendom's most sacred relics, the veil that belonged to the Virgin Mary.

Unfortunately it didn't help.

Not only was the army defeated, but the emperor was stabbed in the buttocks while fleeing.

To make matters worse, he hid the relic in a bush as he fled because the strong wind made the relic too heavy to carry.

However, while escaping, he managed to kill some Scythians and rescue some of his comrades.

At least, this is how Alexios' daughter Anna wrote this story almost 60 years later.

She spent the last decade of her long life creating a 500-page history of her father's reign called Alexiad.

Written in Greek, the book is modeled on ancient Greek epics and historical writings.

But Anna had a different and more difficult task than writers of these traditions. As a princess writing about her family, she had to balance her loyalty to her kin with her obligation to accurately portray events, and navigate issues like Alexios' embarrassing stabbing in the buttocks.

A lifelong study and her father's participation in government prepared Anna to undertake this business.

Anna was born in 1083. This was shortly after his father seized control of the Roman Empire after a decade of brutal civil war and rebellion.

When he came to power, the empire was in decline and was under threat from all sides: Seljuk Turks to the east, Normans to the west, and Scythian raiders to the north.

During Anna's childhood and adolescence, Alexios fought constant military campaigns to defend the frontiers of the empire, even making uneasy alliances with the Crusaders.

Meanwhile in Constantinople, Anna fought her own battle.

She was expected to study subjects considered suitable for a Byzantine princess, such as court etiquette and the Bible, but preferred classical mythology and philosophy.

To access this material, she had to learn to read and write ancient Greek by studying in secret at night.

Eventually her parents realized how serious she was and gave her a private tutor.

Anna extended her studies to classical literature, rhetoric, history, philosophy, mathematics, astronomy, and medicine.

One scholar even lamented that her constant requests for more commentaries on Aristotle made her eyes tired.

At the age of fifteen, Anna married Nicephorus Brienios to quell old family conflicts and strengthen Alexios' rule.

Fortunately, Anna and Nikephoros shared many intellectual interests, and invited leading scholars of the time to discuss the matter.

Meanwhile, Alexios' military expeditions begin to bear fruit, and much of the Empire's former territories are restored.

As her father advanced in age, Anna and her husband helped their parents with their imperial duties.

During this time, Anna reportedly insisted on treating people fairly in disputes with the government.

After the death of Alexios, Anna's brother John took the throne and Anna returned to philosophy and scholarship.

Her husband had written a history book claiming that her grandfather would have made a better emperor than Alexios, but Anna objected.

She began working on Alexiad, which claimed her father's achievements as emperor.

Spanning late 11th- and early 12th-century Byzantine history, Alexiad recounts the tumultuous events of Alexios' reign and Anna's own reaction to those events, including crying over the deaths of her parents and husband.

She may have included these emotional passages in hopes that her writing would be more acceptable to a society that believes women should not write about battles and empires.

Her loyalty to her father was evident in her favorable accounts of his reign, but she also included criticism and remarks on events.

Centuries after Anna's death, Anna's Alexiad was reproduced many times and remains today a valuable witness to Alexios' reign.

And Anna Komnene has secured her place in history through her epic historical narrative.

I remember the first time I went to a nice restaurant, a really nice restaurant.

It was for a law firm hiring dinner, and I remember a waitress walking around asking if I wanted a glass of wine beforehand, and I said, "Of course I'll have a white one."

She immediately said, "Do you want Sauvignon Blanc or Chardonnay?"

And I remember thinking, "Now, miss, stop speaking fancy French and give me some white wine."

But I used my powers of reasoning to recognize that Chardonnay and Sauvignon Blanc are two different types of white wine. So I told her I would choose the Chardonnay because, frankly, it was the easiest for me to pronounce.

During my first few years as a Yale law student, I had many such experiences. Because, despite my appearance, I am a cultural outsider.

I wasn't from the elite.

I'm not from the Northeast or San Francisco.

I come from a steel town in southern Ohio, which in many ways is a really struggling town, and it shows the widespread struggles of America's working class.

Heroin broke in and killed many people, people I knew.

Families torn apart by domestic violence, domestic violence and divorce.

And it is permeated with a very peculiar sense of pessimism.

Think about the rising mortality rates in these communities and realize that for many people the problems they see are actually causing the rising mortality rates in their own communities. So there is a very real sense of struggle.

I was in the front row watching the fight.

My family has been in that struggle for a long time.

I come from a family that doesn't have much money.

This addiction that plagued my community plagued my family and sadly even my own mother.

My own family also had a lot of problems. Problems caused by lack of money, problems caused by lack of access to resources and social capital, have had a huge impact on my life.

If you looked at my life when I was 14 and thought, "What's going to happen to this kid?"

You would have concluded that I would have suffered from what scholars call upward mobility.

Ascendancy, therefore, is an abstract term, but it applies to something very central to the American Dream.

It is a feeling, a measure of whether children like me who grew up in poor neighborhoods have a better life, whether they have the chance to have a better life materially, or whether they stay in the environment in which they were born.

And, unfortunately, one of the things we've learned is that the upward trend isn't as high in this country as we'd like it to be, and interestingly, it's very geographically dispersed.

Consider Utah, for example.

In Utah, it is very likely that the poor kid is actually doing well, living his or her part, and playing his part in the American Dream.

But given where I'm from, the South, Appalachia, Southern Ohio, it's highly unlikely that such kids would rise.

The American Dream in these parts of the country is really just a dream.

So why is this happening?

So one of the reasons is clearly economic or structural.

So let's think about these areas.

They are plagued by terrible economic trends that are built around industries such as coal and steel and make it difficult for people to get ahead.

That's certainly one problem.

There is also the issue of brain drain. Truly talented people end up moving elsewhere because they can't find highly skilled work at home, and instead of starting a business or nonprofit in their hometown, they go elsewhere and bring their talents home.

Many of these communities have failed schools that fail to provide children with the educational status that will enable them to have opportunities later in life.

These are all important.

But looking back on my life and my community, something else was going on and something else mattered.

Hard to quantify, but still realistic.

First of all, there was a very real sense of hopelessness in the community I grew up in.

Children had a sense that their choices didn't matter.

No matter what happens, no matter how hard you work or how much you try to get ahead, nothing good will come of it.

So it's a difficult feeling to grow around.

It's a difficult mindset to penetrate, and it can sometimes lead to very intriguing places.

So let's take just one affirmative action political issue that's getting a lot of attention.

So, depending on politics, you may or may not think affirmative action is a smart way to promote diversity in the workplace or classroom.

But if you grew up in one of these areas, you'll see affirmative action as a tool to hold back people like yourself.

That's especially true if you're part of the white working class.

I don't think it's just about good or bad policies.

You see it as an active conspiracy working against you by those with political and economic power.

And there are many ways to look at that plot against you — perceived and real, but it's there and it distorts expectations.

So when I think about what I would do when I grow up in that world, I can answer in several ways.

First, you can say, "I'm not going to work hard, because it doesn't matter how hard I work."

Another thing you might say is: "I'm not going to pursue the traditional metrics of success, like a college education or a prestigious job, because people who care about those things aren't like me.

They will never let me in. ”

When I got into Yale, one of my family members asked me if I pretended to be a liberal to get past the admissions committee.

seriously.

And while there were clearly no liberal checkboxes to tick on the application, it speaks to a very real anxiety in a place like this that you have to pretend to be someone you're not in order to overcome various social barriers.

That's a very important question.

Even if you don't give in to that feeling of despair, like your choices matter, you want to make good choices, you want to do better for yourself and your family, but if you grew up in a community similar to mine, it can be hard to even know what those choices are.

For example, I didn't know you had to go to law school to become a lawyer.

I didn't know that elite colleges have higher endowments and can offer more generous financial aid, so tuition is cheaper for low-income kids, as research consistently shows us.

I learned about this when I received a tens of thousands of dollars in financial assistance letter from Yale for my needs. It was a word I had never heard before.

But when I received the letter, I turned to my aunt and said: "I think this is the first time in my life that being poor means having a really good income."

I couldn't access the information because the social networks around me didn't have access to it.

I learned how to shoot and how to shoot better from the community.

I learned a recipe for very delicious biscuits.

By the way, the point is to use frozen butter, not warm butter.

But I never learned how to move forward.

I didn't learn how to make the right decisions about education and opportunities necessary to actually have a chance in this 21st century knowledge economy.

Economists refer to the value we derive from our informal networks, friends, colleagues, and family as “social capital.”

It turns out that the social capital I had was not built for 21st century America.

There is one more very important thing that our community doesn't want to talk about, but it's very real.

Working-class children are much more likely to face so-called childhood adversity experiences (which is just a fancy word for childhood trauma). That is, being hit or yelled at, repeatedly pushed down by a parent, seeing someone hit or hit a parent, seeing someone abuse drugs or alcohol.

These are all examples of childhood trauma that are very common in my family.

The point is, they're not just the norm for my family now.

They are also multi-generational.

So when my grandparents had their first child, they expected that they would raise their child in a uniquely good way.

They were middle class and could earn good wages in steel mills.

But what ended up happening was that they exposed their children to much of their childhood trauma going back generations.

When my mother was 12, she saw my grandmother set my grandfather on fire.

His crime was coming home drunk after she told him, "If you go home drunk, I'll kill you."

And she tried to do it.

Consider how it affects the child's mind.

And while we think these things are particularly rare, a Wisconsin Children's Trust Fund study found that 40 percent of low-income children faced multiple childhood traumas, compared to just 29 percent of high-income children.

And let's see what that actually means.

If you are a low-income child, nearly half have experienced multiple childhood traumas.

This is not an isolated issue.

This is a very important issue.

We know what happens to children who go through life like that.

They're more likely to get into drugs, they're more likely to go to jail, they're more likely to drop out of high school, and most importantly, they're more likely to do to their children what their parents did to them.

This trauma, this domestic turmoil, is and continues to be the worst gift our culture has given our children.

Despair, hopelessness, cynicism about the future, childhood trauma, low social capital, all put together, you start to see why, at 14, I was ready to be just another statistic, another kid who couldn't beat adversity.

But something unexpected happened.

I beat my expectations.

Things turned around for me.

I finished high school, graduated from college, went to law school, and now have a pretty good job.

what happened?

Well, one thing that happened was that my grandparents—grandparents who set someone on fire and became famous—were really grown up by the time I came.

They provided me with a stable home, a stable family.

When my parents weren't able to do what they needed for their children, they took their place.

My grandmother did two really important things in particular.

One is that she provided me with a peaceful home so that I could focus on my homework and what my kids should be focusing on.

But she was also an incredibly insightful woman, despite not even having a middle school education.

She recognized the message my community was sending to me that my choices didn't matter and that I was at a disadvantage.

She once told me, "JD, don't be like the losers who think the deck is against them.

You can do whatever you want. ”

Still, she recognized that life was unfair.

It's a difficult balance to teach a child that life is unfair while at the same time coercing them to recognize and enforce the reality that their choices matter.

But Mamaw was able to strike that balance.

Another thing that really helped me was the US Marine Corps.

So we think of the Marine Corps as a military organization, and of course it is, but for me the United States Marine Corps was a four-year crash course in character education.

She taught me how to make a bed, how to do laundry, how to get up early, how to manage money, etc.

These are things that my community didn't teach me.

I remember the first time I went to buy a car, the dealer offered me a low interest rate of 21.9 percent and I was going to sign the dotted line.

But I didn't accept the deal. I took it to an officer and he said, "Don't be silly, go to your local credit union and get a better deal."

And that's what I did.

But without the Marine Corps, we would never have had access to that knowledge.

Frankly, I would have been a financial disaster.

Finally, I would like to say that I have been blessed with great fortune thanks to the mentors and people who have played such an important role in my life.

People from the Marine Corps, Ohio State University, Yale University, and elsewhere really stepped in and made sure to fill the social capital gaps that I clearly had.

It comes from luck, but many children don't have that kind of luck. I think this raises a very important question for all of us: how do we go about changing that?

We need to ask how we give low-income children from broken homes access to loving homes.

We need to ask how we teach low-income parents how to better relate to their children and partners.

We need to ask how we provide social capital and guidance to low-income children who do not have it.

We need to think about how to teach working-class children not just hard skills like reading and math, but soft skills like conflict resolution and financial management.

I don't have all the answers right now.

I don't know all the solutions to this problem, but this is what I do know. Now, in southern Ohio, there is a child anxiously waiting for his father when he walks through the door, wondering if he will walk calmly or will he stagger drunk.

There is a child whose mother passed out with a needle in her arm. I go to bed hungry that night because I don't know why my mother won't cook me dinner.

There are children who have no hope for the future, but who have a strong desire to have a better life.

They just want someone to show them.

I don't have all the answers, but unless our society starts asking better questions about why I've been so lucky and how to bring that luck to more communities and the children of this country, we will continue to have very serious problems.

thank you.

(applause)

This is the bop.

Bop is a type of ballroom dance.

Dance is a language and ballroom dancing is a community expression.

Ballroom dancing is not choreographed by someone.

It cannot be traced back to any moment.

Each dance has steps that everyone can agree on, but it's about individuals and their creative identities.

So ballroom dancing bubbles, changes, and spreads like wildfire.

They are as old as the history we remember.

African American ballroom dancing shows how over 200 years of African and African American traditions have shaped our history.

The present always contains the past.

And the past shapes who we are and who we become.

(Applause.) The Juba dance grew out of the experience of Africans enslaved on plantations.

Deprived of a common spoken language and brought to the Americas, the dance was a way for enslaved Africans to remember where they came from.

It may have been like this.

Slap your thighs, limp your feet, clap your hands. This is how they circumvented the ban on drumming by slaveholders, improvising complex rhythms in the same way their ancestors used to beat drums in Haiti and Yoruba communities in West Africa.

It was about keeping cultural traditions alive and preserving a sense of inner freedom in captivity.

It was the same subversive spirit that gave birth to this dance. The cakewalk was a dance that parodied the manners of Southern high society, a way for slaves to cast shade on their masters.

The crazy thing about this dance was that the cakewalk was directed at the masters, who never thought they were being made fun of.

This might help.

1920s--Charleston.

Charleston is all about improvisation and musicality, and has evolved into Lindy Hop, Swing Dance and Kid and Play, originally called Funky Charleston.

Started by a tight-knit black community near Charleston, South Carolina, Charleston permeated the dance hall where young women suddenly had the freedom to kick their heels and move their feet.

Well, ballroom dancing is all about community and connection. Knowing the procedure means you belong to the group.

But what if it becomes a global fad?

Enter the twist.

It's no wonder that the twist's origins can be traced back to the 19th century, having been brought to America from the Congo during the days of slavery.

But the twist was popularized by Chubby Checker and Dick Clark in the late '50s, just before the civil rights movement.

Suddenly, everyone had a twist, and white teenagers and Latino kids were being put into songs and movies.

Through ballroom dancing, boundaries between groups are blurred.

The story continues in the 1980s and 90s.

With the advent of hip-hop, African-American ballroom dancing, borrowing from its long past, has gained more attention while shaping and being shaped by culture.

Today, these dances continue to evolve, grow and spread.

why do we dance?

To move, to be released, to express.

why dance together

Healing, remembering, saying "We speak a common language.

We exist and we are free. ”

What I want to do is drag us all the way down the gutter, actually down the sewer because I want to talk about diarrhea.

In particular, I would like to talk about the design of diarrhea.

And when evolutionary biologists talk about design, they actually mean design by natural selection.

This brings us to the title of the talk, "Using Evolution to Intelligently Design Pathogens."

And it also has a nice little subtitle.

But I'm not doing this just to be pretty.

I truly believe that the subtitle describes how a Darwinian aspirant like myself really views my role in entering this field of health science and medicine.

In fact, this is not a very familiar area for evolutionary biologists.

I actually see a lot of potential, but when I try to introduce the idea, there are a lot of people who show a territorial attitude and are actually very resistant.

So all today's talk will be about two general questions.

One is why some pathogens are more harmful.

And a very closely related question, which is how we can control this situation after understanding the answer to the first question.

How can we make harmful microbes more gentle?

Well, I'll start by talking about diarrheal disease microbes, as I said earlier.

And my focus when I talk about diarrheal microbes is to think of the problem from a bacterial perspective, a bacterial perspective, just like when I talk about microbes that cause acute infections.

And especially to think about the basic ideas that I think make sense given the vast changes in pathogenic hazards.

And the idea is that, from a bacterial perspective, pathogens must move from one host to another, and often rely on the health of the host to move from one host to another.

But not always.

In some cases, pathogens can develop that are completely independent of host locomotion during infection.

And if we can do that, evolution tells us that natural selection favors more exploitative, more predator-like organisms.

Natural selection therefore favors organisms that are more likely to cause damage.

Instead, if host mobility is required to infect another host, the race winners would be expected to be milder microbes.

Thus, if pathogens do not require healthy, active hosts and actual selection favors pathogens that utilize those hosts, the winners of the competition will be those who utilize them for their own reproductive success.

But when the host needs to move to transmit the pathogen, the benign host tends to be the winner.

So we start by applying this idea to diarrheal diseases.

Microorganisms that cause diarrheal diseases are transmitted by three basic routes.

They can be transmitted by person-to-person contact, person-to-food and person-to-person when someone eats contaminated food, and can also be transmitted through water.

And when transmitted through water, unlike the first two modes of transmission, these pathogens are independent of a healthy host.

Even if one person is sick in bed, they can infect dozens or even hundreds of others.

To illustrate, this diagram highlights that if the sick person is sleeping, someone will bring up the contaminant.

They intend to clean these contaminants, after which the water may be transferred to the drinking water source.

People may come to places where there is contaminated drinking water, take things back to their families, and drink the water on the spot.

The point is that even an immobile person can infect many others.

Therefore, according to this theory, if diarrheal disease microbes are transported by water, they are expected to be more predatory and more harmful.

And you can test these ideas.

So one way you can test is to look at all diarrheal bacteria to see if bacteria that are easily transmitted by water tend to be more harmful.

The answer is yes.

I've put these names in here for germ geeks, but the point here -- (Laughter) you see there's a lot of names here -- the point here is that all of these data points show a very strong, positive relationship between the extent to which pathogens are transmitted by water and how harmful they are and how many deaths they cause per untreated infection.

So this suggests we are on the right track.

But this suggests to me that I really need to ask some additional questions.

Remember, the second question I posed in the first place is how can we use this knowledge to gently evolve pathogens?

Now, this suggests that if we can stop water-borne infections, we can move pathogens from the right side of the graph to the left side of the graph.

But I don't know how long.

So if this takes thousands of years, it's pointless in terms of controlling these pathogens.

But if that could happen in just a few short years, it could be a very important way to control some of the thornier issues that hitherto were out of control.

In other words, this suggests that we can domesticate these organisms.

It could evolve into something less harmful to us.

So while thinking about this, I focused on this microbe. This is the El Tor biotype of the microorganism called Vibrio cholerae.

And that is the species that causes cholera.

I thought this was such a wonderful creature because we understand why it is so harmful.

It is harmful because it produces toxins, which are released when microbes enter the intestinal tract.

This allows fluid to flow from the cells lining the intestine into the lumen, the lumen of the intestine, and that fluid flows out in the only possible direction: the opposite end.

And wipe out thousands of other competitors that would otherwise make life difficult for the Biblio tribe.

So what happens is, when you have microbes, they produce a lot of toxins.

After being infected for a few days, you will eventually become infected, but the faecal material is not as unpleasant as we might imagine.

It's kind of muddy water.

And if you took a drop of that water, you might find a million diarrheal microbes.

If the organism produces a large amount of toxins, you may find 10 million or 100 million toxins.

If this toxin was not produced in large quantities, it is possible that lower numbers could be found.

The challenge, therefore, is to determine whether blocking waterborne infections can lead to the evolution of such microbes in a benign direction. This allows the organism to be transmitted only through person-to-person or person-to-food contact. In both cases, people need to be mobile and fairly healthy to actually get infected.

Now let's consider some possible experiments.

One is to take different strains of this micro-organism (strains that produce more toxins, strains that produce less toxins) and spit them out in different countries.

Some countries have clean water supplies, so water-borne diseases are not likely to occur. Microorganisms are expected to evolve gently there.

You would expect these organisms to evolve to a high level of hazard in other countries with high levels of water-borne infections, right?

There are some ethical issues with this experiment.

I expected to hear at least a few gasps.

It worries me a little.

(Laughs) But anyway, laughing makes me feel a little better.

And this ethical issue is a big one.

Let me emphasize this, this is what we are really talking about.

Here is a dying girl.

Rehydration therapy rejuvenated her and within days she was a completely different person.

Therefore, I do not want to conduct such experiments.

Interestingly, however, that's exactly what happened in 1991.

In 1991, this Vibrio cholerae strain entered Lima, Peru and spread to nearby areas within two months.

Now, I don't know how that happened and I have nothing to do with it, I promise.

I don't think anyone knows, but I'm willing to see if the predictions we'll make, and the predictions I've made before, will come true if that happens.

In places like Chile, where water supplies are among the best protected in Latin America, could this microbe have evolved into a benign environment?

And has it evolved to be more harmful in the least protected places like Ecuador?

And Peru has something in between.

So, with funding from the Bosak Kruger Foundation, we obtained a number of strains from these countries and measured their toxin production in the lab.

And in Chile, we found that within two months of the invasion of Peru there was a strain that entered Chile. Looking at these strains, you can see at the far left of this graph that there is a lot of variability in toxin production.

Each point corresponds to a different island of people, with different variations in whether natural selection comes into play.

But what's interesting is that, looking back over the 1990s, within a few years organisms evolved more moderately.

They have evolved to produce less toxins.

To give you a sense of how important this is, look back at 1995 and find that on average only one case of cholera was reported from Chile every two years.

In other words, it is controlled.

With this much cholera epidemic in America, I don't think there is a problem here.

they didn't. They solved the chili problem.

But before we get too confident, we should take a look at some other nations and see that the creatures don't always evolve in benign directions.

Well, in Peru it was not.

And remember, Ecuador is the place with the highest potential for water-borne infections. The harm seemed to get worse.

Every case has its variability, but it's about the environments people live in, and I think the only realistic explanation is that it's the degree of water-borne infection, where some places prefer harmful strains and others prefer mild strains.

So this is very reassuring and suggests that with enough money, something we might want to do anyway could actually yield a much greater return on spending.

It evolves these microbes to be mild, and even if people are infected, they will be infected with mild strains.

It will not cause serious illness.

However, there is another very interesting aspect to this, which is that if we can control the evolution of pathogenicity and harmfulness, we should be able to control antibiotic resistance.

And the idea is very simple.

A high percentage of people who become infected with harmful organisms develop symptoms and a high percentage are given antibiotics.

There is tremendous pressure to promote antibiotic resistance, which increases virulence and leads to increased antibiotic resistance.

And as antibiotic resistance increases, antibiotics are no longer able to eliminate harmful strains.

That is, it has a higher level of toxicity.

So this vicious circle occurs.

The goal is to reverse this.

If toxicity can be reduced evolutionarily by purifying tap water, antibiotic resistance should also be reduced evolutionarily.

So we can go to the same country and look around.

Chile may have avoided the problem of antibiotic resistance, but did Ecuador actually have the root of the problem?

If we look to the early 1990s, we also see many changes.

In this case, the Y-axis shows a measure of antibiotic susceptibility, which we will not discuss.

However, in Chile, Peru and Ecuador, antibiotic susceptibility is highly variable, with no year-round trends.

But just 50 years later, at the end of the 1990s, Ecuador was beginning to have resilience problems.

Antibiotic susceptibility was reduced.

And there was still antibiotic hypersensitivity in Chile.

So Chile seems to have dodged two bullets.

They allowed the microbe to evolve to a benign state and not develop antibiotic resistance.

Now, as long as we can understand why some organisms have evolved to be toxic, these ideas should apply across the board.

I've talked a little bit about malaria, so I'll just give you one more example.

And the example that I want to deal with, or the idea that I want to deal with, is the question of what can be done to evolve malaria pathogens into mild cases.

Now, malaria is transmitted by mosquitoes. Usually, if you have malaria and feel unwell, you are more likely to be bitten by mosquitoes.

And just looking at the data in the literature shows that vector-borne diseases are more harmful than non-vector-borne diseases.

But I think there is a very compelling example of what you can do experimentally to demonstrate this in action.

In the case of water-borne infections, we would like to see if we can clear the water supply and allow the microbes to evolve in a gentler direction.

For malaria, what we want to do is a mosquito-proof house.

The logic here is a little more complicated.

If it's a mosquito-proof house, people are sitting on the bed when they get sick, if it's a mosquito-proof hospital, they're sitting on the hospital bed and the mosquitoes can't get close.

So if you get a harmful mutant in a place with mosquito-proof housing, you lose.

The only pathogens that can be transmitted are those that infect people who feel healthy enough to walk outside and get bitten by mosquitoes.

So if you want your home to be mosquito-proof, you should be able to gently evolve these microbes.

And a really nice experiment was done that suggests that we should actually do this.

And the experiment was conducted in northern Alabama.

To give you a little insight into this, I've starred the intellectual heart of the United States in Louisville, Kentucky.

And this truly amazing experiment was conducted by Tennessee Valley officials in northern Alabama, about 320 miles south of there.

They dammed the Tennessee River.

They caused a backflow of water, so they needed electricity, hydropower.

And when the water accumulates, mosquitoes emerge.

They found that in the late 30s, a decade after building these dams, people in northern Alabama were infected with malaria, with about one-third to one-half of them infected with malaria.

This shows the location of some of these dams.

Well, the Tennessee Valley authorities were in a bit of a predicament.

No DDT or chloroquine. what do they do?

Well, they decided to mosquito proof every home in northern Alabama.

they did. They divided northern Alabama into 11 zones and within three years spent about $100 per house to make every home mosquito-proof.

And these are the data.

Every row here represents one of 11 zones.

Asterisks represent the time when anti-mosquito treatment was completed.

Therefore, it can be seen that only mosquito-proof housing contributed to the eradication of malaria.

And this coincidentally appeared in a major malaria textbook in 1949 called Boyd's Malaria.

However, few malaria experts are aware of its existence.

This is important. Because if you have moderate mosquito bite densities, you'll find that a mosquito-proof house can eradicate malaria.

Well, I recommend doing this in many places.

Just like when you enter the malaria zone of Sub-Saharan Africa.

However, it cannot be reliably eradicated once it is moved to an area like Nigeria where the bite rate is very high.

However, in such a case, evolution in a gentle direction should be prioritized.

So for me, this is an experiment waiting to happen, and if it confirms our predictions, it should give us a very powerful tool.

In some ways, it's much more powerful than the kind of tools we're considering. Because most of what is being done today relies on things like anti-malarial drugs.

And while it's great to have these antimalarials available at such a low cost and with such high frequency, we also know that increased availability creates resistance to them.

So it's a short term solution.

This is a long term solution.

What I'm saying here is that instead of having to constantly fight evolution as a problem that hinders our efforts to control pathogens, for example with anti-malarial drugs, we can let evolution go in the direction we want.

So this table is just to emphasize that I've only discussed two examples.

But, as I said earlier, this kind of logic applies and should apply to infectious diseases in general.

Because when we deal with infectious diseases, we are dealing with living systems.

We are dealing with living systems. We are dealing with an evolving system.

So when you do something with these systems, you're evolving in some way.

And what I mean is we need to figure out how they evolve. Therefore, we need to tailor our interventions to maximize their cost-effectiveness so that we can evolve these organisms in the direction we want them to evolve.

So, while I don't have much time to talk about these things, I wanted to put them here so that you can feel that there are indeed solutions to control the destructive evolution of some of the nasty pathogens we face.

And this links to many other ideas that have been discussed.

For example, earlier today there was a discussion about how to actually reduce the sexual transmission of HIV.

What this emphasizes is that you need to understand how it works.

If you change the local economy, maybe it will go down?

If we intervene in ways that encourage people to remain more loyal to their partners, this value may drop.

But the key is to find a way to reduce this value. This is because lowering this value causes an evolutionary change in the virus.

And the data really backs this up. So the virus is actually evolving towards a milder illness.

And it only increases the effectiveness of our management efforts.

So the other thing that I really like about this, besides the fact that it brings a whole new dimension to the study of disease control, is that the kinds of interventions you want or show you should do are often the kinds of interventions that people want anyway.

But people couldn't justify the cost.

So, this is the story.

If we know that providing clean water has even greater benefits, then we can say, let's focus on that aspect of management so that we can actually solve the problem. However, just looking at the frequency of infection would suggest that cleaning the water supply alone is not enough to solve the problem.

Anyway, that's all for now, thank you.

(applause)

I was recently traveling in the highlands of New Guinea and was talking to a man who has three wives.

I asked him, "How many wives do you want?"

And then there was a long silence, and I thought to myself, "Will he say five?"

is he going to say 10?

Are you going to say he's 25? ”

And he leaned over me and whispered, "Nothing."

(Laughter) 86% of human societies allow men to have more than one wife, or polygamy.

However, in most of these cultures, only about 5 to 10 percent of men actually have multiple wives.

Having multiple partners can make your teeth hurt.

In fact, couples sometimes quarrel and even poison each other's children.

Building a harem requires lots of cows, lots of goats, lots of money and lots of land.

We are a paired species.

97% of mammals do not mate and raise their young. Humans do.

I am not saying that we are not necessarily sexually loyal to our partners.

Having observed infidelity in 42 cultures so far, I do understand some of the genetics of infidelity and some of its brain circuitry.

It's very common all over the world, but we're made to love it.

How will technology change love?

I would say almost none.

I study the brain.

My colleagues and I have put more than 100 people into brain scanners, including those who have just been happily in love, recently broken hearts, and long-term lovers.

And it is also possible to continue "love" for a long time.

And I have long argued that humans have evolved three distinctly different brain systems for mating and reproduction: libido, feelings of intense romantic love, and feelings of deep cosmic attachment to long-term partners.

And these three brain systems, along with many other parts of the brain, regulate our sex, love, and family lives.

But they are far below the cerebral cortex, far below the limbic system where we feel and produce emotions.

They are located in the most primitive part of the brain and are associated with energy, focus, craving, motivation, desire and drive.

In this case, it is the urge to win the biggest prize of your life: your spouse.

They evolved over 4.4 million years ago among our first ancestors, and swiping left or right on Tinder doesn't change them.

(Laughter) (Applause) There's no question that technology is changing the way we court. Emails, text messages, emojis to express emotions, sexting, liking photos, selfies...

We are witnessing new rules and taboos on how to court.

But, you know, is this actually dramatically changing love?

What about the late 1940s, when automobiles became so ubiquitous that bedrooms suddenly moved?

(laughs) What about the introduction of oral contraceptives?

Freed from the great threat of pregnancy and social ruin, women were finally able to express their primal, primal sexuality.

Love doesn't change even on dating sites.

I am Match.com's Chief Scientific Advisor for 11 years.

I keep telling them that these are referral sites, not dating sites, and they agree.

Sitting on a bar, coffee house, or park bench, the ancient brain comes to life, like a sleeping cat awakening, smiling, laughing, listening, and parading just like our ancestors did 100,000 years ago.

We can offer a variety of people, all dating sites can offer, but the only real algorithm is your own human brain.

Technology won't change that.

Technology cannot change the people you love.

My research into personality biology has led me to believe that humans have evolved four very broad thinking and behavioral styles, associated with the dopamine, serotonin, testosterone, and estrogen systems.

So I created a direct neuroscience-based questionnaire to measure how well they expressed the traits, or aggregates of traits, associated with each of these four brain systems.

The survey was then sent to various dating sites in 40 countries.

Over 14 million people have now completed the survey, allowing us to observe who is naturally attracted to whom.

And after all, people who are highly expressive of their dopamine system tend to be curious, creative, spontaneous, and energetic. I think there are a lot of people like that in this room, and they are attracted to people who are just like them.

Curious and creative people need people just like them.

People who are highly expressive of their serotonin system tend to be traditional and conventional, rule-following, respectful of authority, and religious. Religiousness is in the serotonin system. Traditional people like traditional people.

That's how you attract similarities.

In the other two cases, opposites are attracted.

People with high testosterone expression tend to be analytical, logical, direct, and decisive, and they aim to do the opposite. That is, we like people who are high in estrogen, who have excellent verbal and interpersonal skills, and who are intuitive, nurturing, and emotionally expressive.

We have a natural pattern of choosing a mate.

Modern technology cannot change the people we love.

But technology creates modern trends that I find particularly important.

It is related to the concept of the paradox of choice.

For millions of years we lived in small hunter-gatherer groups.

Dating sites didn't give you the chance to choose from 1,000 people.

In fact, I've been doing some research on this recently, and I suspect there's a kind of sweet spot in the brain. I don't know what it is, but reading a lot of data, it seems that you can accept between 5 and 9 options, and then you get what academics call "cognitive overload" and you can't choose any of them.

So I began to wonder if this cognitive overload was driving a new form of courtship that I called "slow love."

I came across this while working at Match.com.

For the past six years, we've conducted an annual survey called "America's Singles."

We don't look at the population of matches, we look at the population of America.

We use over 5,000 people, a representative sample of Americans based on the US Census.

We currently have data on over 30,000 people and we see some of the same patterns every year.

When I ask this question every year, more than 50% of people have had a one-night stand in their lifetime, though not necessarily last year, more than 50% have a lifelong beneficial friend, and more than 50% have lived together for a long time before getting married.

Americans think this is reckless.

I doubted it for a long time. The pattern is too strong.

I need a Darwinian explanation -- not many people are crazy.

Then I came across a statistic that made a lot of sense.

It's a very interesting academic paper that found that 67 percent of single long-term singles in America today have not yet married for fear of divorce.

They fear the social, legal, emotional and financial consequences of divorce.

So I came to think that this was not reckless. I think it's a warning.

Today's singles want to know everything about their partner before they get married.

I learn a lot during the sheets, not just how someone loves one another, but whether they are kind, if they can listen, if they have a sense of humor at my age.

(Laughter) And I think in this day and age where there are so many choices, so little fear of pregnancy and illness, and no sense of shame about premarital sex, people are taking their time to love.

And what's really happening is that what we're seeing is that the pre-marriage pre-commit phase is really expanding.

Marriage used to be the beginning of a relationship, but now marriage is the finale.

But the human brain -- (laughter) the human brain always wins, in fact, today in the United States, 86 percent of Americans are married by age 49.

And even in cultures around the world where marriage is infrequent, they end up settling down with long-term partners.

So I started thinking: During this long pre-contractual phase, if bad relationships can be removed before marriage, perhaps a happier marriage may result.

So I did a survey of 1,100 married Americans (not Match.com, of course). And I asked them many questions.

But one of the questions was "Will you remarry the person you are currently married to?"

And 81% said yes.

In fact, the biggest change in modern love and family life isn't technology.

It's not even slow love.

In fact, cultures around the world are increasingly entering the job market with women.

For millions of years, our ancestors lived in small hunter-gatherer groups.

Women commuted to work to pick fruits and vegetables.

They brought home 60-80 percent of their dinner.

A dual-income family was the norm.

And women were seen as economically, socially and sexually powerful just like men.

Then, about 10,000 years ago, the environment changed and we began to settle on farms, mandating that men and women, in effect, marry the right people of the right background, religion, kinship, social and political ties.

Men's work became more important, they had to move rocks, cut trees, and till the land.

They brought their produce to the local market and brought back the equivalent money.

Along with this, we see the rise of different beliefs. The belief in one's virginity at the time of marriage, an arranged marriage, or a strictly arranged marriage. The man is the head of the household, the wife's position is in the home, the most important thing is to honor the husband, and the belief that "until death do us part".

These are gone.

They are gone, but in many places they are gone.

We are in the middle of a marriage revolution right now.

We are abandoning 10,000 years of agricultural traditions and moving towards equal relations between men and women. I think this is very compatible with the ancient human mind.

I'm not Pollyanna I cry a lot.

I have studied divorce in 80 cultures and infidelity in many cultures. Problems pile up.

Poet William Butler Yeats once said, "Love is a perverse thing."

"Nobody gets out alive," I add.

(Laughter) We all have problems.

But really, I think the poet Randall Jarrell puts it best.

"The dark and uneasy world of family life," he said, "where the greatest can fail and the humblest can succeed."

But let me just say this. Love and obsession win, but technology cannot change that.

And I conclude that understanding relationships requires considering one of the most powerful determinants of human behavior: the irrepressible, malleable, primal human urge to love.

thank you.

(Applause) Kelly Stotzel: Thank you very much, Helen.

As you know, we have another speaker here who works in the same field as you.

She approaches the issue from a different perspective.

Esther Perel is a psychotherapist who works with couples.

You study the data and Esther studies the stories the couple tells her when they come to them for help.

Let her join the stage.

ester?

(Applause.) So, Esther, when you listened to Helen's talk, were there any parts of it that you wanted to resonate with and comment on through the lens of your own work?

Esther Perel: That's interesting. Because on the one hand, the need for love is omnipresent and universal.

But I think the way we love, the meaning we create from it, the rules that govern our relationships are fundamentally changing.

We come from a model that has hitherto been largely regulated around obligations and obligations, collective needs and loyalty.

And we have transformed it into a model of free choice and individual rights, self-actualization and happiness.

So my first thought is that the needs don't change, but the circumstances and the way these relationships are regulated change a lot.

As for the paradox of choice, you know, on the one hand, I think we enjoy the novelty and playfulness of being able to have so many choices.

And at the same time, when you're talking about this cognitive overload, I see so many people falling into...

Those who fear the uncertainty and self-doubt that comes with this Massa choice create a case of 'FOMO' and then lead us – FOMO, fear of missing out, or fear of missing an opportunity – like, 'How do I know I've found 'that person', the right person?'

So I created what I call "stable ambiguity".

Stable ambiguity is when you're afraid to be alone, but you're not really committed to building intimacy.

It's a set of tactics that prolongs not only relationship uncertainty, but breakup uncertainty as well.

There are three main things on the Internet.

One is icing and stew. It's a great stalling strategy that provides a kind of holding pattern that highlights the ill-defined nature of the relationship while also giving you enough comforting consistency and enough freedom from undefined boundaries.

(laughs) Is that so?

Then comes ghosting.

And ghosting is basically the disappearance of you from this mass of text on the spot. And you don't have to deal with the pain you inflict on others. Because you make it invisible to yourself.

(laughs) Is that so?

So I was thinking - these words came to mind while listening to you. It's about how vocabulary creates reality. At the same time, that is the question for you. Do you think that the nature of love remains the same even though the context has changed?

You study the brain and I study people's relationships and stories, so I think there are positives to everything you say.

But I don't always know how much the context will change...

Does it start changing at some point -- if the meaning changes, do the needs change, or are the needs clear from the overall context?

HF: Wow! Well -- (Laughter) (Applause) Now, three points here.

First of all, there is no question that we have changed, that we want loved ones. And for thousands of years we had to marry the right person with the right background and the right blood relationship.

In fact, I survey 5,000 people each year and I ask them, "What are you looking for?"

And each year, over 97 percent say -- EP: The list is growing -- HF: Right.

The bottom line is that over 97% of people want someone who respects them, who they can trust and confide in, who makes them laugh, who makes enough time for them, and who they find physically attractive.

It never changes.

It certainly does -- you know, there are two parts -- EP: But do you know what to call it?

That's not what people used to say -- HF: Exactly.

EP: They said they wanted a relationship, financial help, kids.

We have moved from a production economy to a service economy.

(Laughter.) We've done that in the larger culture, and we're doing it in marriage as well.

HF: Well, no question about that.

Interestingly, though, millennials actually want to be very good parents, while older generations want very good marriages but don't focus as much on being good parents.

We know all these nuances.

Personality has two basic parts. It's your culture—everything you were raised to do, believe, and say. And temperament.

Basically, I'm talking about your temperament.

And that temperament will certainly change with the changing times and changing beliefs.

And when it comes to the paradox of choice, there's no question that this is a pickle.

There have been millions of years of trying to find a kind boy on the other side of the waterhole.

EP: Yes, but you -- HF: I have one more thing to say.

The bottom line is that hunter-gatherer societies tended to have two or three partners throughout their lives.

It wasn't square!

I'm not advocating that, but the bottom line is that we always had alternatives.

Humanity has always, indeed, the brain is well constructed in what we call 'equilibrium', trying to determine 'am I coming or am I staying'. Would you like to go or stay?

What are the opportunities here?

So how do we deal with that?

And I think we're seeing that new development now.

KS: Well, thank you very much to both of you.

I think we have a million dinner partners tonight!

(Applause.) Thank you, thank you.

Imagine the world again.

I would like to show you some of Ben Henning's maps of this planet in a way that most of you have never seen before.

Here is an image you are familiar with.

I'm old enough to actually be born before seeing this image.

Apparently some of my first words were "moona, moona", but I think it was my mom who had a particular illusion about what a baby boy could see on a flashing black-and-white TV screen.

It's only been a few centuries since most of us actually thought the Earth was spherical.

When we first saw these images in the 1960s, the world was changing at an incredible rate.

In my own little field of human geography, a cartographer named Waldo Tobler was drawing a new map of the Earth. And these maps are now widespread. I'm going to show you one of them.

This map is a world map, but it looks a little strange.

Areas with many people are drawn large, and areas with few people such as the Sahara and the Himalayas are drawn on a reduced scale.

Everyone on earth is given equal space.

The city will appear shining brightly.

Lines indicate submarine cables and trade routes.

And there is a special line from the Chinese port of Dalian, through Singapore, through the Suez Canal, through the Mediterranean to Rotterdam.

And it shows the route of this ship, which just a year ago was the largest in the world. The ship was loaded with so many containers of goods that it would have reached 100 kilometers in length if all the trucks had been sailing in platoon when it was unloaded.

This is how our world is now connected.

This is the amount of goods we are currently moving around the world in five weeks on just one ship in one voyage.

We have lived in cities for a long time, but most of us have not lived in them.

This is Çatalhöyük, one of the first cities in the world.

In its heyday 9,000 years ago, people had to climb over other people's roofs to get to their homes.

A careful look at the city map reveals that there are no streets. Because the streets are what we invented.

The world changes.

It will change through trial and error.

Slowly and gradually we seek ways to live in a better way.

And the world is changing incredibly fast these days.

It wasn't until the last six, seven, or eight generations that we realized we were actually a species.

It is only in the last few decades that such maps have become available.

Again, the underlying map is a map of world population, but on top of that are arrows showing how humans spread from Africa and dates showing where they supposedly reached at a certain time.

I have to redraw this map every few months because someone discovered that certain dates are wrong.

We are learning about ourselves at an incredible rate.

And we are changing.

Many changes happen gradually.

Landing.

Our lives are short, 70, 80, 90 if we're lucky, so we don't notice the changes.

This graph shows the annual population growth rate of the world.

It was very low until about 1850, but then the rate of population growth started to rise, and when I was born, when I first saw images from the Earth's moon, the world's population was growing at 2 percent per year.

If it continued to grow at 2 percent a year for a few more centuries, the entire planet would be covered in boiling masses of humans touching each other.

And people were scared.

They feared population growth and what they called the "population bomb" in 1968.

But if you look at the edges of the graph, growth is starting to slow.

This decade, the 70's, the 80's, the 90's, the 2000's, and even more rapidly this decade, has slowed population growth.

Our planet is stabilizing.

By the end of this century the population will reach 9, 10 or 11 billion.

There is confusion in that change.

You can watch World War II.

You can see the 1918 flu pandemic.

You can see the great famine in China.

These are the events we tend to focus on.

We tend to focus on tragic events in the news.

We don't tend to focus on gradual change or good news.

we care about people

I wonder how many there are.

We worry how we can escape from people.

But this is another modification of the world map to make the areas wider and people farther away from each area.

If you want to get away from everyone and know where to go, this is the place.

And every year we are coming out of land all over the world, so these areas are expanding year by year.

We are expanding into cities.

Packed more tightly.

Wolves are reappearing in Europe, and wolves are migrating west across the continent.

Our world is changing.

I'm worried.

This is a map showing where water falls on Earth.

we know that now.

And if you look at Çatalhöyük, where the three continents of Africa, Asia and Europe meet, you will find that many people live in areas with little water.

You can also see areas with a lot of rain.

And you can make it a little more sophisticated.

Instead of shaping the map by humans, water could shape the map and change it monthly to show how much water falls on every small part of the earth.

And you can see the monsoons moving around the earth, and the earth seems to be beating.

And all this was only possible while I was alive, and I realized that this is where we live.

We have enough water.

This is a map showing where we grow food around the world.

This is the region we rely on most for rice, maize and maize production.

People worry that they will not have enough food, but we know there is enough food for all, as long as we eat less meat and feed less crops to our animals, as long as we think of ourselves as one group.

And we also know what we are doing very badly today.

You have probably seen this world map once.

This, if you recall the satellites around the Earth in the first slide I showed you, is a map made by taking satellite images and creating an image of what the Earth looks like at night.

Normally, when you look at that map with a regular map that most people are familiar with, you think you're looking at a map of where people live.

Where the light shines is where people live.

But now remember that we have unfolded the map again in terms of the image of this world.

Same population density everywhere on this map.

Uninhabited areas have shrunk and disappeared.

Therefore, we make everyone stand out equally.

Now that people are everywhere, the lights no longer show where people are.

Now, the lights on the map, the lights of London, the lights of Cairo, the lights of Tokyo, the lights of the East Coast of the United States, show where people live who can afford to waste energy and spend power on lights that light up the sky. So satellites can paint images like this.

And dark areas on the map are either areas where people don't have as much energy available, or areas where people have energy but have learned to stop lighting the sky.

If you show this map animated over time, you'll see that Tokyo is actually getting darker. Since the Japanese tsunami, Japan's nuclear power plants have shut down, so the electricity it depends on has to be cut by a quarter.

And the world wasn't over.

It's just that less light shines in the sky.

There is a huge amount of good news in the world.

Infant mortality is declining, and it is declining at an incredible rate.

A few years ago, the number of babies dying in their first year of life worldwide dropped by 5 percent in just one year.

More children are going to school, learning to read and write, connecting to the Internet and attending college at an unprecedented rate. Women, not men, make up the largest proportion of young people in the world attending college.

We can give you a barrage of good news that things are getting better on Earth, but we tend to focus on short-term bad news.

I think Rebecca Solnit did a great job of expressing that. "A gradual, invisible accumulation of change that constitutes progress and radically changes our age from the past"--a past that was much more stable--"a contrast obscured by the non-dramatic nature of gradual change punctuated by occasional turbulence."

Sometimes scary things happen.

Such horrifying events are on the news every night.

Nothing is said about the declining population.

We are not talking about the world becoming more connected.

No mention is made of the astonishing increase in comprehension.

It doesn't say how we are beginning to learn to waste less and consume less.

This is my final map.

In this map, we have removed the seas and oceans.

Right now you are just looking at about 7.4 billion people on a map drawn in proportion to those people.

China has over a billion cities, and China has the world's largest city in sight, but we don't know its name.

You can see that India is at the center of this world.

You can see that Europe is in crisis.

And today in Exeter we are at the edge of the earth.

We are on a small rock off the coast of Europe, where less than 1 percent of the world's adults and less than 0.5 percent of the world's children live.

We live in a stabilizing world, an urbanizing world, an aging world, a connected world.

There are many things to be afraid of, but we don't have to be so afraid of each other. We have to understand that we are now living in a new world.

thank you very much.

(applause)

Talk about a failed intuition that many of us suffer from.

It is precisely the unawareness of certain dangers.

I'm going to describe a scenario that I think is both terrifying and plausible, but after all, it's not a good combination.

Still, most people will find what I'm talking about kind of cool rather than scary.

It explains how the progress we've made in artificial intelligence could ultimately destroy us.

And in truth, I find it very difficult to understand how they do not destroy us or encourage us to destroy ourselves.

Still, if you're like me, you'll find these things fun to think about.

And that reaction is part of the problem, too.

OK? That reaction should worry you.

And if I were to convince you in this talk that climate change or some other catastrophe is likely to cause us to suffer global hunger and that your grandchildren and their grandchildren are very likely to live like this, you wouldn't think so.

I like this TED talk. ”

Hunger is no fun.

Sci-fi death, on the other hand, is fun, but one of my biggest concerns about AI developments at the moment is that we seem to be failing to organize the right emotional responses to the dangers ahead.

I have not been able to organize this response and am giving this talk.

It's as if we are standing in front of two doors.

Behind Door 1, progress in building intelligent machines stops.

Our computer hardware and software stop improving for some reason.

Now let's consider why this happens.

In short, given how valuable intelligence and automation are, we intend to continue improving our technology where possible.

What can stop this?

All-out nuclear war?

global pandemic?

Asteroid collision?

Will Justin Bieber become President of the United States?

(Laughter) The point is, something has to destroy civilization as we know it.

You have to imagine how bad it would be for us to be forever unable to make technology improvements for generations to come.

Almost by definition, this is the worst event in human history.

So the only option, which is what's behind Door 2, is for us to continue to improve our intelligent machines year after year.

At some point, we start building machines that are smarter than us, and when they are smarter than us, they start improving themselves.

And we run the risk of what mathematician I.J. Goode calls an “intelligence explosion,” in which the process is alienated from us.

Now, this is often satirically portrayed as the fear that an army of malevolent robots will attack us, as I have portrayed here.

But that's not the most likely scenario.

It's not that our machines are naturally malicious.

The real concern is that we build machines so much more capable than we are that the slightest deviation between their goals and ours can doom us.

Consider how we relate to ants.

we don't hate them

We don't bother to hurt them.

In fact, sometimes we struggle to do them no harm.

We run over them on the sidewalk.

But whenever their existence seriously contradicts one of our goals, for example when building a building like this, we do not hesitate to exterminate them.

The concern is that one day we will build machines that may ignore us the same whether we are conscious or not.

Now, I'm sure a lot of people think this is outlandish.

Some of you may doubt that superintelligent AI is possible, let alone inevitable.

But you should find something wrong with one of the following assumptions.

And they are only three.

Intelligence is the problem of information processing in physical systems.

In practice, this goes a little beyond the assumption.

We already have narrow intelligence built into our machines, and many of these machines already operate at levels of superhuman intelligence.

And because our brain manages it, we know that mere matter can produce what we call "general intelligence," the ability to think flexibly across multiple domains. right?

So, there are just atoms here, and as long as we continue to build systems of atoms that exhibit increasingly intelligent behavior, we will eventually build general intelligence into machines, unless they are interrupted.

It's important to realize that the speed of progress doesn't matter, because any progress is enough to get you to the end zone.

There is no need to continue Moore's Law. No need for exponential progress.

just have to keep going.

The second premise is that it will continue.

We will continue to improve our intelligent machines in the future.

And given the value of intelligence, intelligence is either the source of everything we hold dear, or it is necessary to protect all that we hold dear.

It's our most valuable resource.

So we want to do this.

We have a problem that desperately needs to be resolved.

We want to cure diseases such as Alzheimer's disease and cancer.

We want to understand the economic system. We want to improve climate science.

So do this if possible.

The train has already left the station and there are no brakes to pull.

Finally, perhaps we are not at the pinnacle of intelligence, or anywhere near it.

And this is a really important insight.

This is what makes our situation so volatile and our intuitions about risk so unreliable.

Now think of the smartest person who ever lived.

John von Neumann is on nearly everyone's shortlist.

In other words, von Neumann's impression on those around him and on the great mathematicians and physicists of his time is well documented.

Even if only half the stories about him are half true, there is no doubt that he is one of the smartest people to ever live.

So let's think about the range of intelligence.

Here we have John von Neumann.

And then there's you and me

I also eat chicken.

(laughs) Sorry, it's a chicken.

(Laughter) There's no reason to make this story unnecessarily depressing.

(Laughter) But it seems overwhelmingly likely that the reach of intelligence extends much farther than we currently think. And if we build machines that are more intelligent than we are, they will very likely explore this range in ways we cannot imagine, and surpass us in ways we cannot imagine.

And it's important to realize that this is true for speed reasons only.

right? Now imagine building a superintelligent AI on par with your average team of researchers at Stanford University or the Massachusetts Institute of Technology.

Electronic circuits work about a million times faster than biochemical circuits, so this machine should be able to think about a million times faster than the brains that built it.

In other words, if you run it for a week, you're doing 20,000 years of human-level intellectual work week after week.

How can this kind of progressive mind be understood, much less constrained?

Frankly, the other thing that worries me is imagine the best-case scenario.

So imagine you came up with a superintelligent AI design that has no safety concerns.

The perfect design is completed even the first time.

It's as if you've been handed an oracle that does what it's intended to do.

Well, this machine would be the perfect labor-saving device.

We can design machines that can be built to do any physical task, powered by the sun, at more or less the cost of raw materials.

So we are talking about the end of human monotonous work.

We are also talking about the end of most intellectual work.

So what would apes like us do in this situation?

Well, we are free to play Frisbee and give each other massages.

Add in LSD and questionable wardrobe choices, and the whole world can become like Burning Man.

(Laughter) That might sound pretty good, but ask yourself what would happen under our current economic and political order.

We will likely see levels of wealth inequality and unemployment never seen before.

Without the willingness to immediately put this new wealth to the service of all mankind, trillions of millionaires will grace the covers of business magazines while the rest of the world will starve to freedom.

And what will Russians and Chinese do when they hear that a company in Silicon Valley is about to introduce super-intelligent AI?

This machine is capable of waging war with unprecedented power, whether on the ground or in cyber.

This is a winner-take-all scenario.

To be six months ahead of your competition here means to be at least half a million years ahead.

So it seems that even a mere rumor about a breakthrough of this kind could drive our species into a berserk.

In my opinion, one of the scariest things right now is the kind of reassurance AI researchers say.

And the most common reason to be told not to worry is time.

This is a long time ago, don't you know?

That's probably 50 or 100 years away.

"Worrying about AI safety is like worrying about overpopulation on Mars," said one researcher.

This is Silicon Valley's version of "Don't worry about your pretty head."

(Laughter) No one seems to realize that the timeline reference is completely unfair.

Intelligence is just a matter of information processing, and if we continue to improve machines, we will produce some form of superintelligence.

And I don't know how long it will take to create the conditions to do it safely.

Let me say it again.

I don't know how long it will take to have the conditions to do it safely.

And, in case you haven't noticed, 50 years isn't what it used to be.

50 years when converted to months.

How long has it been since we've had iPhones?

This is how long "The Simpsons" has been on TV.

Fifty years is not a long time to meet one of the greatest challenges humanity has ever faced.

Again, we seem to be failing to have the appropriate emotional reactions to what we believe is coming.

Computer scientist Stuart Russell provides a great analogy here.

Imagine, he said, that we received a message from an alien civilization that said, "Dear Earthlings, we will arrive on your planet in 50 years.

Please be prepared. ”

And now are we just counting down the months until the mothership lands?

We will feel a little more urgency than we do.

Another reason we are told not to worry is that these machines are literally extensions of ourselves, so we cannot help but share our values.

They would be implanted in our brains and we would essentially become their limbic system.

Let's think for a minute here. The safest and only sensible method recommended is to implant this technology directly into our brains.

In fact, it may be the safest and only sensible way to go, but usually safety concerns about technology need to be pretty much worked out before it can take root in your mind.

(Laughter) The more serious problem is that building a superintelligent AI on its own is likely to be easier than building a superintelligent AI and having perfect neuroscience that can seamlessly integrate our minds.

And given that the companies and governments doing this work are likely to perceive themselves to be in a race with everything else, and given that winning this race is the same as winning the world, unless it destroys it the next moment, it seems likely that whatever is easy to do will be completed first.

Unfortunately I have no solution to this problem other than to encourage more people to think about it.

I think we need something like the Manhattan Project on the subject of artificial intelligence.

Not to build, but because we think we will inevitably do so, but to understand how to avoid an arms race and to build in a way that is in our best interest.

When you're talking about superintelligent AI that can make changes to itself, it seems like you only have one chance to get the initial conditions right, but you still have to absorb the economic and political impact of getting the initial conditions right.

But the moment we acknowledge that information processing is the source of intelligence, that some appropriate systems of computation are the foundation of intelligence, that we continually improve these systems, and that the horizons of our knowledge are perhaps far beyond what we know at present, we must admit that we are in the process of constructing a kind of God.

Now would be a good time to confirm that it is God with whom we can live.

thank you very much.

(applause)

So, have you heard of CRISPR?

I would have been shocked if I didn't.

It's a technology for genome editing that's so versatile and so controversial that it's sparking all sorts of very interesting conversations.

Should I get my woolly mammoth back?

Should human embryos be edited?

And my personal favorite, how can we justify using this technology to wipe out entire species from the planet that are considered harmful to humans?

This kind of science is progressing much faster than the regulatory mechanisms that govern it.

So, over the last six years, I've made it my personal mission to help as many people as possible understand this kind of technology and its implications.

CRISPR is now heavily promoted in the media, and the most commonly used words are 'easy' and 'cheap'.

So what I want to do is dig a little deeper and investigate the myths and realities surrounding CRISPR.

If you're trying to CRISPR your genome, the first thing you have to do is damage the DNA.

Damage occurs in the form of double strand breaks through the double helix.

And then the cell's repair processes kick in, convincing those repair processes to make the necessary edits instead of the natural edits.

That's how it works.

It is a two-part system.

There is a Cas9 protein and something called a guide RNA.

I like to think of it as a guided missile.

So Cas9 -- I love to anthropomorphize it -- is like Pac-Man trying to chew up the DNA, and the guide RNA is like the strands that keep the DNA away from the genome until it finds the exact spot where it matches.

The combination of these two is called CRISPR.

It's a system we stole from our ancient bacterial immune system.

The amazing thing about this is that only 20 letters of guide RNA target the system.

It is very easy to design and very cheap to buy.

So this is the modularized part of the system. everything else remains the same.

This makes for a very easy to use and powerful system.

Together, the guide RNA and Cas9 protein complex bounce along the genome, and when the guide RNA finds a matching spot, it inserts between the two strands of the double helix, tearing them apart and causing cleavage of the Cas9 protein. And suddenly the cell goes into a complete panic. Because part of the DNA is broken.

what is it for?

It calls first responders.

There are two main routes of repair.

The first is just taking the DNA and pushing the two pieces back.

This is not a very efficient system as sometimes bases will drop out or more bases will be added.

This might be a good way to knock out genes, but it's not the kind of genome editing we really want to do.

The second repair pathway is even more interesting.

This repair pathway requires homologous DNA segments.

By the way, diploid organisms like humans have one copy of their genome from their mother and one from their father, so if one chromosome is damaged, the other can be used to repair it.

This is it from here.

Repairs have been made and the genome is safe again.

A way to hijack this is to give it a fake piece of DNA, one with homology at both ends but different in the middle.

Now you can put anything you like in the center and the cells will be fooled.

That means you can change letters, remove letters, but most importantly, like a Trojan horse, you can pack new DNA into it.

CRISPR will be amazing in terms of facilitating various scientific advances.

What makes it special is this modular targeting system.

I mean, we've been pushing DNA into organisms for years, right?

But thanks to the modular targeting system, you can actually place it exactly where you want it.

The problem is that it's cheap and easy, and that's a lot of talk.

And I run a community lab.

I started getting emails like, "Hey, can I come to your open night and use CRISPR to manipulate my genome?"

(Laughter) Yes, seriously.

I said, "No, you can't do that."

(Laughter) "But I hear it's cheap. I hear it's easy."

I'll do some research on that.

So how cheap are they?

Well, it's cheap by comparison.

The average cost of materials for an experiment is in the thousands to hundreds of dollars, and the time is greatly reduced.

It can be shortened from weeks to days.

That is wonderful.

You still need a specialized lab to do this work. You won't be able to do anything meaningful outside of a specialized lab.

I mean, don't listen to people saying you can do this at your kitchen table.

It's really not easy to do this kind of work.

Needless to say, there is a patent war going on, so even if you invent something, the Broad Institute and UC Berkeley are in this amazing patent war.

Really interesting to see that happen. Because they're accusing each other of fraudulent charges, and people say, "Oh yeah, I signed notes here and there."

This will not be resolved for years.

And if it does, I'm pretty sure I'll be paying someone a very hefty license fee to use it.

So is it really cheap?

Well, if you do basic research and have a laboratory, it's cheap.

how about easy? Let's look at that claim.

The devil is always in the details.

We don't know much about cells.

They are still like black boxes.

For example, it is not known why some guide RNAs work so well and some do not.

It is not known why some cells prefer to implement one repair pathway and some prefer to implement the other.

Added to that is the overall problem of getting the system into the cell in the first place.

In a petri dish it's not too difficult, but if you try to do it with the whole organism it becomes very difficult.

It's okay to use something like blood or bone marrow. They are currently the subject of much research.

There was a great story about a girl who saved her from leukemia by taking blood, editing it, and putting it back in with CRISPR precursors.

And this is a series of studies that people will do from now on.

But at this point, if you want to infiltrate your entire body, you'll probably have to use a virus.

So you take a virus, put CRISPR in it, and let the virus infect cells.

But now this virus is in there and I don't know what effect it will have in the long run.

In addition, CRISPR has some off-target effects, albeit a very small percentage, but they still exist.

What will happen to it over time?

These are not easy problems and there are scientists trying to solve them and hopefully they will be solved eventually.

But it's not plug and play and it's never easy.

So: is it really that easy?

Well, if it works out over a few years on a particular system, yes.

The other is that we don't know much about how to change specific parts of the genome to achieve specific things.

For example, figuring out how to feed pigs with feathers is a long way off.

Alternatively, an extra leg will do. I would be happy with an extra leg.

That's kind of cool, right?

But what's happening is that CRISPR is being used by thousands of scientists for really important research, such as creating better models of animal diseases, tracing pathways to produce valuable chemicals and introducing them into industrial production in fermenters, and even doing really fundamental research into how genes work.

This is the CRISPR story we have to tell, and I don't like it when its flashy side drowns out all this.

Many scientists have put a lot of effort into making CRISPR a reality, but what's interesting to me is that these scientists are supported by our society.

please think about it.

We have an infrastructure that allows a certain percentage of people to spend all their time on research.

This makes us all CRISPR inventors and we are all CRISPR shepherds.

We are all responsible.

So I want you guys to really learn about this kind of technology. Because only by doing so can we guide the development and use of these technologies so that they ultimately result in positive outcomes for both the planet and us.

thank you.

(applause)

When Dorothy was little, she was obsessed with goldfish.

The father explained that fish swim by rapidly wagging their tails to propel themselves through the water.

Little Dorothy answered without hesitation, "Yes, Daddy, fish shake their heads and swim backwards."

(Laughter.) In her mind, it was as true as any other fact.

The fish shakes its head and swims backwards.

she believed it.

Our lives are full of backwards swimming fish.

We make assumptions and false leaps of logic.

we are prejudiced.

We know we are right and they are wrong.

We fear the worst.

We strive for unattainable perfection.

We tell ourselves what we can and cannot do.

In our minds, the fish is swimming backwards, head bobbing frantically, but we don't notice it.

I will tell you 5 facts about myself.

There is one fact that is not true.

1: I graduated from Harvard University with an honors degree in mathematics at the age of 19.

2: I currently run a construction company in Orlando.

3: I was in a TV sitcom.

4: I lost my sight to a rare genetic eye disease.

5: I have served as a legal clerk for two U.S. Supreme Court justices.

Which fact is not true?

In fact they are all true.

yes. they are all true.

(Applause.) Right now, most people only care about TV shows.

(laughs) I know this from experience.

Well, that show was NBC's "Saved by the Bell: The New Class."

And I played Weasel Weasel on the show. He's kind of a silly, nerdy character on the show, and it was such a huge acting challenge for me as a 13-year-old boy.

(Laughter) Now, did you have a hard time with my fourth visual impairment?

why is that?

We make assumptions about so-called disabilities.

As a blind person, I face misconceptions about my abilities on a daily basis.

But today I'm not talking about my visual impairment.

It's about my vision.

Being blind taught me to live with my eyes wide open.

Taught me how to spot the backwards-swimming fish our minds have created.

When it comes to blinds, they are the focus.

What is it like to see

It is immediate and passive.

When you open your eyes, the world spreads out there.

seeing is believing. Sight is real.

right?

Well that's what I thought.

After that, from age 12 to 25, my retina gradually deteriorated.

My sight became more and more strange, a carnival funhouse hall of mirrors and illusions.

The store clerk who found it at the store and was relieved was a mannequin.

When I reached out to wash my hands and my fingers touched its true form, I suddenly knew I was touching a urinal, not a sink.

A friend described a photograph in my hand, and only then could I see it painted.

Objects appeared, transformed, and disappeared in my reality.

It's hard to see and I'm tired.

I pieced together fragmentary and ephemeral images, consciously analyzed clues, searched for logic in a crumbling kaleidoscope until I saw nothing.

I have learned that what we see is not a universal truth.

It is not an objective reality.

What we see is a unique and personal virtual reality expertly constructed by our brains.

Let me explain with a little layman's neuroscience.

The visual cortex occupies about 30% of the brain.

By comparison, touch is around 8 percent and hearing is 2-3 percent.

Your eyes can send two billion pieces of information to your visual cortex every second.

The rest of the body can only send another billion dollars to the brain.

In other words, vision is one-third the volume of the brain and can account for about two-thirds of the brain's processing resources.

So it's no surprise that optical illusions are so fascinating.

But don't get me wrong. Sight is an illusion.

Now comes the interesting part.

To create visual experiences, your brain references your conceptual understanding of the world, other knowledge, memories, opinions, emotions, and mental attention.

All of this, and more, is tied to vision in your brain.

These connections work in both directions and usually occur subconsciously.

For example, what you see affects how you feel, and how you feel can literally change what you see.

Many studies have demonstrated this.

For example, if asked to estimate the walking speed of a man in a video and asked to think of a cheetah or a turtle, the answer would be different.

Hills can seem steep if you've just worked out, and landmarks can be seen in the distance if you're carrying a heavy backpack.

We have reached a fundamental contradiction.

What you see is a complex mental structure of your own making, but you passively experience it as a direct representation of the world around you.

You create your own reality and believe in it.

I believed in my ideas until it broke.

The deterioration of my eyes shattered that illusion.

As you know, vision is just one of the ways we shape our reality.

We create our own reality in many other ways.

Consider fear as just one example.

Your fear distorts your reality.

Under the twisted logic of fear, anything is better than uncertainty.

Fear fills in the blanks at all costs, pretends that you know you are afraid, presents the worst in place of reason in place of vague assumptions.

Psychologists describe it with the wonderful word "terrible."

(laughs) Right?

Fear replaces the unknown with the frightening.

Well, fear is self-actualization.

When faced with our greatest need to look outside ourselves and think critically, fear hides deep within us, narrows and distorts our vision, and drowns our capacity for critical thinking in a flood of destructive emotions.

When faced with a compelling opportunity to act, fear tempts you to take no action, to passively watch that prophecy come to pass.

When I was diagnosed with the disease of blindness, I thought that blindness would ruin my life.

Blindness was a death sentence for my independence.

It was the end of an achievement for me.

Being blind meant I would live a mediocre, small, sad, and possibly lonely life.

i knew it.

This is a fiction born out of my fear, but I believed it.

It was a lie, but like a fish swimming backwards in little Dorothy's mind, it was my reality.

If I hadn't faced the reality of my fear, I would have lived in fear.

I am sure of it.

So how do you live your life with your eyes wide open?

It's a learned discipline.

it can be taught. You can practice.

Very easy to summarize.

Take responsibility for every moment, every thought, every detail.

Look beyond your fear.

Recognize your assumptions.

Harness your inner strength.

Silence your inner critic.

Clear up misconceptions about luck and success.

Accept your strengths and weaknesses and understand the differences.

Open your heart to an abundance of blessings.

Your fears, your detractors, your heroes, your villains, they are your excuses, justifications, shortcuts, justifications, your surrender.

They are fictions that you perceive as reality.

Choose to see them through.

Choose to let them go.

you are the creator of your reality.

With that power comes full responsibility.

I decided to step out of the tunnel of fear into the unknown, undefined territory.

I chose to build a blessed life there.

I am not alone and share a beautiful life with my beautiful wife Dorothy, the triplets we call the Tripsky family, and our lovely new addition to the family, baby Clementine.

what are you afraid of?

what lies do you tell yourself

How do you cover up your truth to write your own fiction?

What reality are you creating for yourself?

A backward-swimming fish can do you great harm in your work, personal life, relationships, and heart and soul.

These take the toll of missed opportunities and unrealized possibilities, creating anxiety and distrust in our search for fulfillment and connection.

Please look for it.

Helen Keller said the only thing worse than being blind is being blind with sight.

For me, going blind was a deep blessing. Because blindness gave sight.

I hope you can see what I see.

thank you.

(Applause) Bruno Giussani: Isaac, just one question before I leave the stage.

This is an audience of entrepreneurs, doers and innovators.

You're the CEO of a company in Florida, and many of you are probably wondering what it means to be a blind CEO.

What specific challenges are you facing and how are you overcoming them?

Isaac Lidsky: Well, the biggest challenge has been the celebration.

You don't get visual feedback from people.

(laughs) BG: What's that noise? IL: Oh.

So, for example, no facial expressions or gestures are seen at a leadership team meeting.

I learned to ask for more verbal feedback.

I basically force people to say their opinion.

In this regard, as I said earlier, I am very grateful to both myself and the company. Because we communicate on a much deeper level, avoid ambiguity, and most importantly, my team knows their thoughts really matter.

BG: Isaac, thanks for coming to TED. IL: Thank you Bruno.

(applause)

The language I speak now is about to become a universal language, for better or for worse.

Let's be honest, English is the language of the Internet, the language of finance, air traffic control, popular music, and diplomacy. English is everywhere.

Now more people speak Chinese, but the number of Chinese learning English is greater than the number of English speakers learning Chinese.

Last I heard, there are currently 20 universities in China, all of which teach in English.

English has taken over.

In addition, by the end of the century, nearly all of the languages ​​in existence today (there are about 6,000) are projected to be unspoken.

Only a few hundred will remain.

What's more, not only is it now possible to translate live audio on the fly, it's getting better every year.

The reason I'm repeating these things to you is because I know we're at a point where we're asking: It is, "Why should you learn a foreign language unless English happens to be unfamiliar to you?"

Almost everyone in the world can communicate in one language, so why bother learning another?

I'm sure there are many reasons, but first I'd like to address the one you've most likely heard of. Because it's actually more dangerous than you think.

It's the idea that language guides your thinking, and that the vocabulary and grammar of different languages ​​gives everyone a different kind of acid trip, so to speak.

It's a very attractive idea, but a little messy.

So it's not completely false.

For example, in French and Spanish, the word for table is marked as feminine for some reason.

So, "La Table" "La Mesa", just deal with it.

If you happen to be a speaker of one of these languages ​​and are asked by chance how you would imagine yourself speaking at a table, it has been found that far more often than chance a speaker of French or Spanish would answer that the table would speak in a high, feminine voice.

So for a French or Spaniard, the table is like a girl, as opposed to an English speaker.

You can't help but love such data, and many would say that it means that if you speak any of its languages, that worldview exists.

But be careful. Because if someone put us under a microscope, imagine it's us native English speakers.

What is the view of the world seen from English?

For example, consider an English speaker.

Bono is on the screen.

he speaks english

I think you have a worldview.

Well, it's Donald Trump.

His way, he also speaks English.

(Laughter.) And here's Ms. Kardashian, she speaks English too.

Here are three speakers who speak English.

What worldview do these three people have in common?

What kind of worldview is being shaped through the English language that unites them?

It's a very difficult concept.

And there is a growing consensus that while language can shape thought, it tends to be a rather lovely, vague psychological shift.

It's not about offering different glasses all over the world.

If so, why should we learn a language?

If that doesn't change your mindset, what else could be the reason?

There are several.

One is that if you want to assimilate a culture, if you want to absorb it, if you want to be part of it, it doesn't matter if the language conveys it - and it seems doubtful - if you want to assimilate a culture you have to have some control over the language in which it happens to be used.

There is no other way.

There is an interesting illustration about this.

It should be said a little vaguely, but find it in practice.

There is a film by Canadian film director Dennis Arkand. If you want to find out about him, the page "Dennis Arkand" will read it out in English.

He made a movie called "Jesus of Montreal".

And many of the characters are lively, funny, passionate, interesting French-Canadian French-speaking women.

The scene closest to the end is when you have to take your friend to an English-speaking hospital.

You have to speak English in the hospital.

Now they speak English, but it's not their native language, so they'd rather not speak English.

And they speak more slowly, have accents, and are less idiomatic.

These characters you fell in love with suddenly become shells of themselves, shadows of themselves.

To go inside a culture and process people only through such a scrim curtain will never truly understand that culture.

And as long as there are hundreds of languages ​​left, one reason to learn them is that the mere fact that it is their norm is the ticket to becoming part of the culture of those who speak it.

That's one reason.

Second reason: Speaking two languages ​​has been shown to make you less likely to develop dementia and possibly better at multitasking.

These are early elements that should give juniors and juniorlets a sense of when to give lessons in another language.

Being bilingual is healthy.

And third, languages ​​are a lot of fun.

Much more fun than we are often told.

For example, in Arabic, "Kataba" he wrote, "Yaktub" he wrote, she wrote.

Write "Uktab" in imperative form.

What do they have in common?

What these all have in common is that the consonants sit in the middle like pillars.

They stand still, with vowels dancing around consonants.

Who wouldn't want it rolling in their mouth?

It can be derived from Hebrew, or it can be derived from Ethiopia's main language, Amharic.

It's fun.

Or the word order differs depending on the language.

Learning how to speak in a different word order is like driving on a different side of the road when you're in one country, or the tingling sensation you get when you put witch hazel around your eyes.

Language makes it possible.

For example, "The Cat with the Hat Comes Back" is a book that everyone likes to read over and over again, like Moby Dick.

The phrase in it is, "Do you know where I found him?"

do you know where he was He was eating cake in the bath, yes he was! ”

are you OK. Now, if you want to learn this in Mandarin, you have to master "You see, I found where he found it?"

He was chomping on the cake in the tub, definitely chomping! ”

It just feels good.

Imagine being able to do that for years at a time.

Or have you ever learned Cambodian?

So am I, if that were the case, thirty different vowels would roll in Cambodian mouths like bees in a beehive, gurgling and oozing in Cambodian mouths, instead of the dozen bakery vowels of English.

That's what language gives you.

More importantly, we live in a time when learning another language on your own has never been easier.

I used to have to go to class, and there was a diligent teacher, a genius teacher, who was in class only at certain times, and then I had to go, and then most of the time I didn't go.

you had to go to class

Even without it, there would have been something called a record.

I thought about them seriously.

Records, cassettes, and even curios known as CDs had a limited amount of data.

That's exactly what it was, except there were books that didn't help.

Starting today, you can teach yourself the language of your choice with great sets such as the Rosetta Stone while lying on the floor of your living room, sipping bourbon.

The lesser known Glossika is also highly recommended.

You can do it at any time, so you will get better and better at it.

You can enjoy your morning fun in different languages.

I read "Dilbert" every morning in different languages. It can enhance your skills.

Twenty years ago, the idea of ​​having your favorite language in your pocket from your mobile phone would have sounded like science fiction to the most sophisticated people.

Therefore, I highly recommend self-studying a language other than the one I speak. There has never been a better time to do it.

It is very fun.

It won't change your mind, but it will definitely surprise your mind.

thank you very much.

(applause)

Good evening.

My journey to this stage began when I came to America at the age of 17.

As you know, I am one of 84 million Americans who are immigrants or children of immigrants.

Each of us has a dream when we come here. That dream usually has to be rewritten and constantly reused.

I was one of the lucky ones too.

A modified dream led me to the work I do today. training immigrants to run for public office and leading the movement for inclusive democracy.

But I don't want you to think that it was an easy win for America to welcome me with open arms.

haven't done that yet.

And I learned some lessons along the way and wanted to share them with you. Because we believe that together we can make American democracy better and stronger.

I was born in India, the world's largest democracy, and at the age of four my family moved to Belize, perhaps the world's smallest democracy.

At the age of 17, he immigrated to the world's greatest democracy, the United States.

I came here to study English literature.

As you know, when I was a kid, I buried my nose in books and wondered if I could make a living doing it when I grew up.

But after graduating from college with a graduate degree, I found myself in a series of less-than-ideal jobs.

Perhaps it was the optimism I had for America that took me long to realize that things weren't going to change.

The door I thought was open was actually only slightly open. The doors of this America are wide open if you have the right name, the right skin color and the right network, but having the wrong religion, the wrong immigration status and the wrong skin color can get you slammed in the face.

And I couldn't accept it.

So I started my career as a social entrepreneur and started an organization for young people like me to follow that tradition across the Indian subcontinent. I was young when I started the organization.

In that work, I became an advocate for South Asians and other immigrants.

I reached out to members of Congress on policy issues.

I volunteered to do exit polls on Election Day.

But I couldn't vote and I couldn't run for office.

So in 2000, when it was announced that the citizenship application fee would more than double from $95 to $225, I decided it was time to apply before I ran out of money.

I filled out a lengthy application and answered questions about current and past affiliations.

And once the application was submitted, I was fingerprinted, there was a test to study, and I had to wait in line for hours.

That might be called extreme judging.

And in December of 2000, I joined hundreds of other immigrants in a hall in Brooklyn, pledging allegiance to the country I had long considered home.

My journey from being an international student to becoming an American citizen was 16 years, which is short compared to other immigration stories.

And just after I took the formal steps to becoming an American, the September 11, 2001 terrorist attacks changed the immigration landscape for decades to come.

My city, New York City, was going through a period of turmoil and recovery, and in the midst of that, we were in the middle of an election.

In dealing with loss and recovery in New York City, two things happened.

Voters elected New York City Mayor Michael Bloomberg.

It also voted to establish an Immigration Service in New York City.

Five months after that election, the newly elected mayor appointed me as the first Immigration Commissioner in this newly created position.

I want you to go back to those days.

I was a young immigrant woman from Belize.

I was basically struggling in America with a variety of jobs until I started a community-based organization in the basement of a church in Queens.

The September 11th attacks shocked my community.

People who were part of my family, the young people I worked with, experienced harassment at school, at work and at the airport.

And now I was going to speak their concerns to the government.

I have never had a more perfect job.

And there are two things I learned when I became Commissioner.

First, well-meaning New Yorkers in government positions in city officials had no idea how much immigrants feared law enforcement.

Most of us don't really know the difference between the sheriff, the local police, and the FBI.

And most of us are curious, if not concerned, when we see people in uniform walking around our neighborhood.

I mean, if you're an illegal parent, you don't know how likely you are to see your child at the end of the day when you say goodbye to them every day, drop them off at school, and go to work.

Because a raid at work or a chance encounter with the local police can change the course of your life forever.

The second thing I learned is that when people like me who understand that fear, who have learned new languages ​​and navigated new systems, are sitting at the table, we advocate for the needs of the community in a way that no one else can or does.

I could understand what that feeling of fear was like.

People in my family were going through it too.

The young people I worked with were harassed not only by their classmates but also by their teachers.

My husband, who was my boyfriend at the time, traveled a lot and thought twice before backpacking or growing a beard.

In 2001, I learned that my vote matters, but so does my voice and position.

And I believe that these three things help strengthen our democracy: immigrant votes, voices, and advantages.

Indeed, we have the power to change the outcome of elections, introduce new issues into the policy debate, and change the face of the pale, masculine, outdated leaders we have today.

So how do we do that?

Well, let's talk about voting first.

It should come as no surprise that the majority of American voters are white.

But you might be surprised to learn that 1 in 3 voters is black, Latino or Asian.

But the point here is that it doesn't matter who can vote, it matters who votes.

In other words, half of Latino and Asian American voters didn't vote in 2012.

And it's not just presidential elections where these votes matter.

They are important in local and state elections.

In 2015, Ran Diep, the eldest son of a political refugee from Vietnam, ran for San Jose City Council.

He lost the election by 13 votes.

This year, he dusted off his campaign shoes and ran for the seat again, this time winning by 12 votes.

Our vote counts.

And when people like Ran sit at the policy table, change can happen.

We need those voices.

We need these voices in part because America's leaders are not like the people of America.

There are over 500,000 local and state offices in America.

Less than 2 percent of these positions are held by Asian Americans and Latinos, our two largest immigrant groups.

Yakima, Washington, where 49 percent of the population is Latino, had never elected a Latino to the city council until this year.

Three newly elected Latinx women joined the Yakima City Council in 2016.

One of them is Carmen Mendes.

She is a first generation college student.

She grew up partly in Colima, Mexico and partly in Yakima, Washington.

She is a single mother and advocate for her community.

Her voice on the Yakima City Council speaks out on behalf of the Latino community and all Yakima residents.

And she's also a role model for her daughter and other Latinos.

But the third most undertapped resource in American democracy is the advantage immigrants bring.

We fought to get here.

We came for financial and educational opportunities.

We came for political and religious freedom.

We came in search of love.

That dedication, that commitment to America, also carries over to public service.

People like Athena Salman, who just last week won the primary for a seat in the Arizona legislature.

Athena's father grew up in the West Bank and moved to Chicago, where he met her mother.

Her mother is Italian, Mexican and German.

Together they emigrated to Arizona and built a life.

When Athena gets to the state capitol, she will fight for education and more so that families like her can achieve the financial stability we all seek.

Immigrant votes, voices, and vantage points are what we all need to work on to include in American democracy.

It's not just my job. It's yours too.

And it's not easy.

I don't know what happens when you put the new element into the equation.

And it's a little scary.

You're afraid I'll take your place at the table, and I'm afraid I'll never get a place at the table.

And we are all afraid of losing this country we know and love.

I'm afraid you'll take it from me, and you're afraid I'll take it from you too.

You see, this has been a tough election year. It was a reminder that people with my immigration background could be excluded at the whim of their leaders.

But I have fought to live in this country and I will continue to fight every day.

So my optimism never wavers. Because I know there are millions of immigrants like me before, behind, and around me.

It is also our country.

thank you.

(applause)

It was April of last year.

I was out at night with my friends to celebrate my friend's birthday.

We hadn't been together for weeks. It was a perfect evening as we were all reunited.

At the end of the evening, I took the last tube train back to the other side of London.

The trip was smooth.

I returned to the local train station and walked home for about 10 minutes.

I could see my house in front of me, and as I turned the corner I heard footsteps behind me that seemed to be coming from nowhere and picking up the pace.

Before I realized what was happening, they slapped my hands around my mouth so I couldn't breathe, then the young man behind me dragged me to the ground, repeatedly slammed my head against the pavement until my face was bleeding, beat me by kicking my back and neck, ripping my clothes off and telling me to 'shut up' as I struggled to scream for help.

Every time I hit my head on the concrete, a question echoed through my mind and still haunts me. "Is this the end of everything?"

Little did I realize that I was being followed from the moment I left the station.

And hours later, I was standing topless and barefoot in front of the police, who were being photographed with cuts and bruises on my naked body for forensic evidence.

Now, there are few words to describe the all-consuming feelings of vulnerability, shame, upset, and injustice I had in that moment and over the next few weeks.

But I wanted to find a way to condense these feelings into an orderly thing I could work with, so I decided to do what felt most natural to me. It was to write about it.

It started as a cathartic movement.

I wrote to the assailant, personifying him as “you,” confirming that he was part of the very community he had violently abused that night.

Emphasizing the tidal wave effect of his actions, I wrote: "Have you ever thought about the people in your life?

You never know who the people in your life are.

I don't know anything about you

But I know this much. You didn't just hit me that night.

I am a daughter, I am a friend, I am a sister, I am a student, I am a cousin, I am a niece, I am a neighbor. I'm an employee who served coffee to everyone at the cafe under the overpass.

And all the people who have created these relationships with me make up my community.

And you attacked them all.

You committed the truth that I will never stop fighting for and that all of these people stand for, the truth that there are infinitely more good people than bad people in the world. ”

But I was determined not to lose faith in my community and in the unity of humanity as a whole, and I remembered the 7/7 terrorist attacks on London Transport in July 2005, the then Mayor of London, and indeed my parents, who insisted we all go back to the Underground the next day to avoid being dictated or changed by those who made us feel unsafe.

I said to the attacker, 'You carried out the attack, but now I'm going back to the tube.

My community doesn't think it's dangerous to go home after dark.

We take the last metro ride home and walk the streets alone. Because you don't instill or submit to the idea that you're putting yourself in danger by doing so.

We will continue to stand together like an army when members of our community are threatened.

And this is a battle that cannot be won."

As of this writing -- (Applause) Thank you.

(Applause.) At the time of writing this letter, I was studying for exams at Oxford, where I was working on writing for the local student newspaper.

Luckily friends and family supported me, but it was a lonely time.

I didn't know anyone who had an experience like this before. At least I didn't think so.

I had read news reports and statistics and knew how common sexual assault was, but I could not name a single person I had ever heard speak out about this type of experience.

So I decided, in a way, a natural decision to publish a letter in the student newspaper, hoping to reach out to other people in Oxford who might have had a similar experience and felt the same way.

At the end of the letter, I asked others to write about their experiences using the hashtag #NotGuilty, emphasizing that victims of assault can express their feelings without feeling ashamed or guilty about what happened to them, showing that we can all stand up to sexual assault.

What I did not anticipate was the rapid spread of this published letter almost overnight.

Soon, I started receiving hundreds of stories from men and women around the world, and I started publishing them on the website I set up.

And the hashtag became a campaign.

An Australian mother in her 40s said a man stalked her to the bathroom and repeatedly grabbed her by the groin while she was out at night.

A Dutch man said he was raped on a date while visiting London and was not taken seriously by anyone he called.

I received personal Facebook messages from people in India and South America. “How can we get the campaign message to India and South America?”

One of our first posts was from a woman named Nikki who said she grew up being sexually abused by her own father.

And my friends opened up to me about experiences I had no idea about, from what happened last week to what happened years ago.

And the more I received these messages, the more I received the messages of hope. People feel empowered by this community of voices standing against sexual assault and victim blaming.

After describing how she was attacked by someone she trusted and cared about for a long time, a woman named Olivia said: "I've read many stories posted here and I feel hopeful that if so many women can move forward, so can I.

I have been inspired by many people, and someday I hope to be as strong as them.

I'm sure you will. ”

People around the world started tweeting under this hashtag and the letter was republished, featured in national newspapers and translated into other languages ​​around the world.

However, there is one thing that struck me about the media attention this letter received.

In order for something to be front-page news, it must be something new, or something amazing, given the word "news" itself.

But sexual assault is nothing new.

Sexual assault, like other types of injustice, is constantly in the media.

But throughout the campaign, these injustices were positioned not just as news stories, but as first-hand experiences that impacted real people, and they were uniting others to create what they needed and so far lacked: a space to speak up, a reassurance that they are not alone, a reassurance that they are not responsible for what happened to them, and an open discussion that helps reduce stigma on the issue.

Rather than the voices of journalists and social media commentators, the voices of those directly affected were at the forefront of the narrative.

That's why this story is news.

We live in an incredibly interconnected world due to the pervasiveness of social media. Social media is, of course, a great resource for influencing social change.

At the same time, however, we are becoming more and more reactive, from minor annoyances like "the train is late" to the biggest injustices of war, genocide and terrorist attacks.

Our default response has become to tweet, Facebook, and hashtag to jump in and respond to all sorts of complaints to show others that we are responding too.

The problem with reacting en masse like this anyway is that sometimes it doesn't mean actually doing something, it actually means not reacting at all.

It might make you feel better like you contributed to the group's mourning and outrage, but nothing really changes.

Moreover, injustice can drown out the voices of those directly affected and whose needs must be heard.

It is also concerning that some reactions to injustice tend to be quick to blame and build up even more walls in hopes of providing simple solutions to complex problems.

One British tabloid published my letter with the headline "Oxford students launch online campaign to humiliate attackers".

But the campaign was never meant to put anyone to shame.

It meant getting people to talk and others to listen.

Divisive Twitter trolls quickly created even more injustice by commenting on the ethnicity and class of my attackers to advance their own bigoted agenda.

And some have even accused me of going all out to further my “feminist policy of man-hating.”

(laughs) You know what?

It's as if I want to say, "Hey guys! I'm sorry, I can't go. I'm busy hating all men by the time I'm 30."

(Laughter) Now, I'm almost certain these people wouldn't say it to their faces.

But it's almost like they're behind a screen, so social media from the comfort of their own home seems to make people forget that what they're doing is a public act, meaning that other people can read it and be affected.

Going back to the back-on-the-train metaphor, another major concern I have with this noise escalating from our online response to injustice is that it can be so easy to fall into portraying us as affected parties, which can lead to feelings of defeat and a kind of mental barrier to finding opportunities to move forward or change after a negative situation.

A few months before the campaign started, or something like this happened to me, I went to a TEDx event in Oxford and saw Nelson Mandela's former private secretary, Zelda La Grange, speak.

One of the stories she told really struck me.

She described how Mr Mandela was taken to court by the South African Rugby Union after he requested an investigation into a sporting matter.

In court, he went to the South African Rugby Union lawyers, held hands and conversed in their respective languages.

And Zelda wanted to protest that they had no right to respect Zelda after this injustice they had caused.

He turned to her and said, "Never let the enemy determine the basis of your battle."

When I heard this word, I didn't really understand why it was important, but I felt that it was important, so I wrote it down in a notebook I had on hand.

But I've been thinking a lot about this line ever since.

Expressing revenge and hatred towards those who have wronged us may feel like a human instinct in the face of injustice, but if we want to turn negative events of injustice into positive social change, we need to break out of this cycle.

If we don't, we will continue to let the enemy determine the grounds for fighting, and a dualism will arise in which we who have been harmed become victims and confront the enemy, that is, the perpetrator.

And just as we're back in the subway, platforms for interconnectivity and community cannot be places of indulgence of defeat.

But I'm not going to block the social media reaction. Because the development of the #NotGuilty campaign is almost entirely thanks to social media.

But I would like to encourage a more considered approach to how it is used to respond to injustice.

First, I think you need to ask yourself two questions.

First, why do I feel this unfairness?

In my case there were several answers for this.

Someone hurt me and those I love. They were under the assumption that they didn't need to be held accountable or aware of the damage they caused.

Not only that, but thousands of men and women suffer sexual abuse every day, often in silence, and this issue is still one that we haven't given the same airtime as others.

It's still an issue that many blame the victims for.

Then, knowing these reasons, ask yourself how can you reverse them?

For us, this held my attackers and many others accountable.

It was calling them out on the impact they caused.

It gave airtime to the issue of sexual assault, opened up discussions among friends, family and media that have been closed for too long, and emphasized that victims should not feel responsible for what happened to them.

We may still have a long way to go to completely solve this problem.

But in this way we can start using social media as a positive tool for social justice, as a tool for education, as a tool to foster dialogue and make people in positions of authority aware of issues by listening to those directly affected.

Because these questions may not be easy to answer.

In fact, it rarely does.

However, this does not mean that we cannot yet provide them with a considerate response.

Even if you can't think about how to overturn this feeling of unfairness, you can probably think about what you can't do instead of what you can do.

Fighting injustice with more prejudice and more hate will not build more walls.

We cannot speak of those directly affected by injustice.

And just because the rest of Twitter has moved on doesn't mean you can't react to injustice and just forget about it the next day.

Ironically, not reacting right away is sometimes the best immediate action we can take.

Because while we may be angry, upset, and uplifted by injustice, consider how we respond.

Don't be ashamed of yourself and fall into a culture that thrives on injustice, hold people accountable.

Remember the often forgotten distinction between criticism and insult by Internet users.

Remember to think before you speak, even if you have a screen in front of you.

And when you make noise on social media, don't drown out the needs of those affected, but rather amplify their voices. Then the internet becomes a place where you can speak up about what really happened to you.

All of these thought-out approaches to injustice evoke the very cornerstones, networks, signals and connections on which the Internet was built. All these terms imply to bring people together rather than to keep them apart.

Because if you look up the word "justice" in the dictionary, before punishment, before the administration of laws and judicial powers, you will find "maintenance of what is right."

And I think there are few things in this world that are more "right" than unions, to unite people.

And if we allow social media to do that, it can actually be a very powerful form of justice.

thank you very much.

(applause)

One hot October morning, I got off an overnight train in Mandalay, the ancient royal capital of Burma (now Myanmar).

Then out into the street I met a group of rough men standing beside a bicycle rickshaw.

Then one of them came and offered to show me around.

The price he offered was exorbitant.

It was cheaper than what I would pay for a chocolate bar at home.

So I got into his tricycle and he started pedaling slowly between the palace and the tower.

And while doing so, he told me how he came to this city from the village.

He had a degree in mathematics.

His dream was to become a teacher.

But of course, life is tough under a military dictatorship, so for now this was the only way he could make a living.

He told me that many times he actually slept in a tricycle to catch the first visitors from an overnight train.

And it soon became clear that in some ways we had a lot in common. We were both in our twenties and fascinated by foreign cultures. And he invited me to his house.

So we headed off the wide, crowded streets and into rough, rough alleyways.

There were broken huts all over the place.

I found myself really lost where I was and not knowing what would happen to me now.

You could be robbed, drugged, or worse.

nobody will know.

Finally he stopped and took me to a hut with only one small room.

Then he crouched down and reached under the bed.

And something inside me froze.

I waited to see what he would bring out.

And finally he took out the box.

Inside were all the letters he had ever received from foreign visitors, pasted within which were small black-and-white snapshots of his new foreign friends.

So when we said goodbye that night, I also realized that he had given me some travel tips. It's about taking the plunge, not only on the outside, but also on the inside, going places you'd never otherwise go, venturing through uncertainty, ambiguity, and even fear.

At home, it's dangerously easy to assume we're on track.

In the outside world, we are constantly reminded that we are not, and we cannot get to the bottom of things.

Ralph Waldo Emerson reminded us everywhere, "People want to be settled, but only so long as we are not settled is there any hope for us."

At this conference, we were lucky enough to hear some exciting new ideas and discoveries, and all the ways knowledge is excitingly moving forward.

But at some point the knowledge leaks.

And that is the moment when your life is really decided. you fall in love you lose a friend The lights go out.

And only when you feel lost, anxious, and absorbed in yourself do you know who you are.

I do not believe that ignorance is happiness.

Science will definitely make our lives brighter, longer and healthier.

And I am eternally grateful to the teachers who taught me the laws of physics and pointed out that 3 times 3 equals 9.

You can count on your fingers at any time of the day or night.

But when a mathematician says, "Minus 3 times minus 3 is 9," it's a kind of logic that almost seems credible.

In other words, the opposite of knowledge is not necessarily ignorance.

It may be strange.

Or a mystery.

possibility.

And in life, I realized that what I don't know lifts me up and pushes me forward more than what I know.

Also, what I don't know often makes me get along better with the people around me.

Recently, for eight consecutive Novembers, I traveled throughout Japan with the Dalai Lama.

And of all the words he said every day, the one that seemed to give people the most comfort and confidence was "I don't know."

“What about Tibet?”

"When will world peace come true?"

"What is the best way to raise a child?"

"Frankly," says the wise man, "I don't know."

Nobel Prize-winning economist Daniel Kahneman has spent more than 60 years studying human behavior, and his conclusion is that we are always overly confident in what we think we know.

As he impressively puts it, we have an “infinite capacity to ignore our own ignorance.”

We know our team is going to win this weekend, quoting or not. And we remember that knowledge only on rare occasions when we are right.

Most of the time we are in the dark.

And that's where real intimacy exists.

Do you know what your lover will do tomorrow?

do you want to know?

Our parents, some call them Adam and Eve, did not die as long as they ate of the tree of life.

But the moment they began to nibble on the tree of knowledge of good and evil, they fell from innocence.

They became embarrassed, frustrated, and self-conscious.

And they learned, perhaps a little too late, that there are indeed some things we should know, but much more that we should not explore.

Well, when I was a kid, of course I knew everything.

I spent 20 years gathering facts in the classroom, actually in the information business, writing for Time magazine.

And so I traveled to Japan for the first time for two and a half weeks and came back with a 40-page essay detailing every inch of Japanese temples, fashion, baseball, and soul.

But underneath it all, something I don't understand moved me, and for reasons I can't yet explain, I decided to go and live in Japan.

And I've lived there for 28 years, and I couldn't say anything about my familiar home.

That is wonderful. Because every day it means I'm making new discoveries, and in the process it means looking around the corner and seeing hundreds of thousands of things I'll never know.

Knowledge is a precious gift.

But the illusion of knowledge can be more dangerous than ignorance.

Thinking you know your lover or enemy can be more dangerous than admitting you never knew them.

In Japan, the sun hits my small apartment every morning, so I'm very careful not to rely on the weather forecast. Using the weather forecast as a guide can be cloudy and distracting, even when the sun is out.

I have now been a full-time writer for 34 years.

And one of the things I've learned is that transformation happens when you're not responsible, when you don't know what's next, when you can't assume you're bigger than everything around you.

The same is true in moments of love or crisis.

Suddenly we are back on the tricycle again and run off the wide, bright street. And we are reminded of the first law of travel, and thus of life. In other words, a person only gets stronger if he or she is ready to surrender.

After all, perhaps being human is much more important than being perfectly knowledgeable.

thank you.

(applause)

"We are committed to fighting cancer and by 2015 we will win this war."

That's what the US Congress and the National Cancer Institute declared just a few years ago in 2003.

Well, I don't know about you, but I don't stand for it.

We still don't think we've won this war outright, and I don't think anyone here will question it.

Now, I would argue that the main reason we are not winning this battle with cancer is because we are fighting it blindly.

First, I would like to talk about my best friend.

His name is Ehud. A few years ago, Ehud was diagnosed with a brain tumor.

And not just all kinds of brain tumors. He was diagnosed with one of the deadliest brain tumors.

In fact, it was so deadly that doctors told him he only had 12 months to live and that he must find a cure during those 12 months.

They have to find a cure and if no cure is found he will die.

Well, the good news is that there are tons of different treatments to choose from, but the bad news is that it takes, well, three months or so to decide if a treatment works.

So they can't try so many things.

Ehud is now undergoing his first treatment, and during that first treatment, when I met him a few days after he started treatment, he said, 'Adam, I think this is working.

I think we were really lucky here. something is happening ”

And I ask him, "Really? How do you know that, Ehud?"

And he says, "Well, I feel really bad inside.

Something must be happening.

I have to do it. ”

Unfortunately, three months later I got the news that it didn't work.

Ehud will then undergo a second treatment.

And same story again.

"I feel so sick, something must be at work."

And three months later, I got bad news again.

Ehud has undergone a third treatment and will be undergoing a fourth treatment later.

And as predicted, Ehud dies.

Now, when someone really close to you is going through such a great difficulty, you get really overwhelmed with emotions.

A lot of things run through my head.

For me it was mostly anger.

I was just outraged, why is this the best we can offer?

And I started looking into this further.

After all, this is not only the best that doctors can offer Ehud.

Brain tumor patients in general don't just have the best doctors available.

In fact, overall it's not going so well with cancer.

I covered one of those stats. I'm sure some of you have seen these stats before.

This gives the actual number of cancer deaths in the United States since the 1930s, in this case women.

You'll notice that not a lot has changed.

It's still a big problem.

However, you will see some changes.

For example, we see that lung cancer is on the rise.

Thank you tobacco.

We can also see, for example, that stomach cancer, which was once one of the biggest killers of all cancers, has basically been eradicated.

Now why? By the way, does anyone know?

Why are humans no longer attacked by stomach cancer?

What was the huge technological advance that came to our world that saved mankind from stomach cancer?

Was it perhaps a new drug, or perhaps a better diagnostic?

you are right, yes

It's the invention of the refrigerator and the fact that we no longer eat rotten meat.

So the best thing that has ever happened to us in the medical field of cancer research is the fact that the refrigerator was invented.

(Laughter) So -- yes, I understand.

Not so good here.

I don't want to scale back progress in cancer research or all that has been done.

Over 50 years of excellent cancer research have discovered important things that can tell us about cancer.

But that being said, we still have a lot of heavy lifting ahead of us.

Again, I would argue that the main reason why this is happening and why we are not doing it remarkably well is because we are actually fighting blindly here.

This is where medical imaging comes into play.

This is where my own work comes into play.

So, for a sense of the best medical imaging that brain tumor patients, or indeed all cancer patients, have to offer today, take a look at this PET scan right here.

let's see. Let's go.

This is a PET/CT scan. What this PET/CT scan tells us is that the CT scan shows the location of the bones and the PET scan shows the location of the tumor.

Now, what you can see here is essentially a sugar molecule with a tiny little tag added to it that's signaling to us outside the body, "Hey, I'm here."

These sugar molecules are then injected into the patient in billions and scurry around the body in search of cells that want the sugar.

For example, you can see a heart glowing there.

That's because the heart needs a lot of sugar.

You can also see that the bladder is lit.

That's because the bladder is removing sugar from our body.

And some other hotspots appear, but these are actually tumors.

Well, this is really cool technology.

For the first time, we can examine the human body in a non-invasive way and ask, "Hey, did the cancer spread?" without having to pick each cell and place it under a microscope.

where is it? "

And the PET scan here shows very clearly where the hotspots are, where the tumors are.

This may seem like a miracle, but unfortunately it's not that great.

Look, there's a little little hotspot right there.

Can anyone guess how many cancer cells are in any of these tumors?

In other words, there are about 100 million cancer cells, but let me confirm how many of these numbers are actually included.

Each tiny little blip seen on the image must have at least 100 million cancer cells to be detected.

Now, this may seem like a very large number, but it is a very large number.

This is actually an incredibly large number. Because all you really need to find something fast enough to do something about it, and do something meaningful about it, is find a tumor that's a few thousand cells, ideally a few cells.

So we are obviously quite far from this.

So let's do a little experiment here.

Here, I would like you to play as if you were a brain surgeon.

And you are now in the operating room. I have a patient in front of me. Your job is to make sure the tumor is removed.

That is, looking down at the patient, you are looking at the brain as the skin and skull have already been removed.

All we know about this patient is that he has a tumor the size of a golf ball in the right frontal lobe of his brain.

And more or less that's it.

That is, from below, everything looks the same, unfortunately. Because brain tumor tissue and healthy brain tissue actually look the same.

So start pushing the brain a little bit with your thumb. Tumors tend to be a little hard and hard, so go in a little like this and say, "Looks like the tumor is right there."

Then take out a knife and start cutting the tumor bit by bit.

And when you're removing the tumor, you get to a point where you're like, "Okay, I'm done. I've removed everything."

And at this stage, if it all sounded pretty crazy so far, you're about to face the hardest decision of your life right now.

Because I need to stop here and decide if I should let this patient go, risking the possibility that there are cancer cells left behind that I didn't see, or should I take an extra margin (usually about an inch or so) around the tumor to make sure I've removed everything.

So this is not an easy decision. Unfortunately, this is a decision brain tumor surgeons have to make every day as they see their patients.

So I remember talking to some friends in the lab and saying, "There must be a better way."

But it's not the same as telling a friend that there must be a better way.

There has to be a better way.

This is really unbelievable.

So we looked back.

Remember all the PET scans and sugar I talked about.

We said, "Instead of using sugar molecules, let's use very small particles made of gold and program interesting chemical reactions around them."

Let's program it to look for cancer cells.

And then we're going to inject these gold particles again in billions into these patients and let it go all over the body and, like a secret agent, walk by every cell in the body, knock on that cell's door and ask, "Are you a cancer cell or a healthy cell?"

If you are a healthy cell, move on.

If you're a cancer cell, we're invading and glowing, telling us, "Hey look at me, I'm here."

And they do it through some interesting cameras that we have developed in the lab.

Knowing that might guide brain tumor surgeons to remove only the tumor and leave the healthy brain alone.

So we tested it and well, this works.

So I'll give you an example from now on.

What you see here is an image of a mouse brain, and this mouse brain was implanted with a tiny little tumor.

And this tumor is now growing in this mouse's brain. And we asked the doctor to operate on the mouse as if it were a patient and remove the tumor piece by piece.

And while he does it, he takes images to see where the gold particles are.

So we start by injecting this gold particle into this mouse. And the image on the far left here is an image showing where the gold particles are.

The cool thing is that these gold particles actually get to the tumor, and then they glow and let us know, "Hey, here we are, here's the tumor."

Now I can see the tumor, but I haven't shown it to my doctor yet.

We ask the doctor to start removing the tumor. You can see that the doctor just took the first quadrant of the tumor and that first quadrant is gone.

The doctor then examined quadrants 2 and 3. And now it looks like that's all.

And at this stage the doctor came back to us and said:

Should I leave it as is, or should I give it a little more slack? ”

And we said, "Well, wait a minute."

We told the doctor, "You're missing those two spots, so just remove those tiny little areas instead of taking a big margin around them."

Let's take it out and take a look. ”

So the doctor took them away, and lo and behold, now the cancer is completely gone.

Now, the point is, the cancer didn't just disappear completely from this person's brain or this mouse's brain.

Most importantly, there was no need to ingest large amounts of healthy brains in the process.

And now we can actually imagine a world where doctors and surgeons actually know what to remove when they remove a tumor, and no longer have to guess with their thumbs.

Here's why it's so important to remove any small remaining tumors.

The remaining tumor, even if it's just a handful of cells, will grow and cause the tumor to recur, and the tumor will recur again.

In fact, the reason 80 to 90 percent of these brain tumor surgeries ultimately fail is because of the tiny extra margin left behind as positive, the tiny little tumor left behind.

This is obviously very nice, but what I really want to share with you is where do you think we are going from here?

So in my lab at Stanford University, students and I are asking: What should we do now?

And I think the goal of medical imaging is the ability to look at the human body and actually see each of these cells individually.

With this kind of capability, we can actually find tumors much earlier in the process, long before there are 100 million cells inside, so we can actually do something.

Being able to look at each cell might allow you to ask insightful questions.

The lab is now getting to the point where we can actually ask these cancer cells real questions, such as whether they are responding or not responding to the treatments we are doing.

Therefore, if there is no response, you know that treatment should be discontinued immediately after a few days instead of 3 months.

And so that patients like Ehud, who are undergoing nasty and nasty chemotherapy, don't suffer the dreaded side effects of drugs when in fact they don't help.

So, frankly here, realistically, we are far from winning the battle against cancer.

But at least I'm hopeful that we should be able to fight this war in a non-blind way and with better medical imaging technology.

thank you.

(applause)

I wrote this poem after hearing a pretty famous actress say to a very famous interviewer on TV.

I just wish it was more organized. ”

So...

(Laughter) If I controlled the Internet, I could auction your heartbreak on eBay.

receive the money go to Amazon. Buy a phone book for a country you've never been to. Call randomly until you find someone who can flirt really well in a foreign language.

(Laughter) If I were an Internet person, I could mapquest my lover's mood swings.

Hang to the left when you're moody, hang to the right when you're crazy, then make a U-turn and go back to quiet therapy until you kiss your tongue and get along and make love.

You can navigate and understand every emotional crossroads.

Depending on the day, it can be as shallow as a baking sheet, but it still stretches for miles in all directions.

If I owned the Internet, Napster, Monster, and Friendster.com would be one big website.

That way, you can listen to cool music while pretending to be looking for a job, but you're really just chatting with your friends.

(Laughter) See, if I ran the web, I could email dead people.

(Laughter) They didn't email you back (Laughter) -- but you get an auto-reply.

(Laughter) You've got their name in your inbox (Laughter) -- anyway, that's all you wanted.

And the message "Hello, it's me. I miss you."

(Laughter) Listen, you'll find that dying is a dandy.

Now let's get back to parenting and peace activism and candy cravings. ”

If I designed the Internet, children.com would be the loop of a boy in an orchard, with a ski pole instead of a sword, a trash can lid instead of a shield, and shouting, "I am the Emperor of Oranges."

I am the orange emperor. I am the orange emperor. ”

Come on, follow me, okay?

(laughter) Grandma.com has biscuit recipes and spit bath instructions.

1 2 3。

It links to hotdiggitydog.com.

that's my grandfather

They take you to a grumpy ex-policeman dad from his fourth marriage.

He's attached to his mother, who is kind of daunting, but still sends ginger snaps at Christmas, who downloads the orchard boy, the Emperor of Orange, who grows up to be me—a man who's always gone too far.

So if I were the emperor of the internet, would I still die?

But at that point, I'd probably already minimized my mortgage and had the biggest penis possible (laughs). So I will ban spam on my first day in office.

you won't need it.

I want to be like an internet genius, and I want to upgrade to God, and maybe like that, Pop! -- I would like to go wireless.

(laughs) What? Perhaps Google will adopt this.

Until the World Wide Web is as clever, wild, and organized as I think modern miracles and oracles can be, it can slip through servers and firewalls like a virus, but oops, do you want to bet how much your Mac or PC will be shocked and freed from it when I'm rocking Hot Shit Hot Shot God.net?

I think it's the same as life.

It's not a question of whether it can be done, it's a question of "Can it be done?"

Interfaces can be interfered with.

Every time you're lucky enough to log on, you can make "You've got Hallelujah" the anthem of cyberspace.

you don't say a prayer

you don't write psalms.

Do not chant "Om".

Send a congratulatory email to someone you care about at dah-da-la-dat-da-dah-da-la-dat.com.

Thank you TED.

(applause)

i am a painter

I'm painting a big metaphorical picture, that is, a person like this.

But I'm here tonight to tell you about my work and something personal that changed my perspective.

It's something we all go through and I hope my experience helps someone else.

A little bit of my background: I grew up as the youngest of eight children.

Yes, my family has 8 children.

I have 6 older brothers and 1 younger sister.

To describe what it was like, when my family went on vacation, there was a bus.

(laughter) My supermom drove us around town to various after-school activities instead of taking the bus.

I had a regular car.

She took me to art class. It wasn't one or two.

From the time I was 8 to 16, she took me to every art class. Because that was all I wanted to do.

She also took my classes in New York City.

Now that I am the youngest of eight siblings, I have learned some survival skills.

Rule #1: Don't let your brother see you doing something stupid.

So I learned to be quiet, decent, and careful to follow the rules and stand in line.

But painting was where I made the rules.

It was my private world.

By the time I was 14, I really wanted to be an artist.

My big plan was to become a waitress and support the painting.

So I continued to hone my skills.

I went to graduate school, got my master's degree, and at my first solo exhibition my brother asked me, "What does the red dot on the side of the painting mean?"

No one was more surprised than me.

The red dot meant that the painting could be sold and the painting could pay the rent.

My apartment now has four outlets, so I couldn't use the microwave and toaster at the same time, but I could still pay the rent.

That made me very happy.

Here is a picture from that time.

It had to be as realistic as possible.

It had to be specific and believable.

This was a place where I was isolated and in complete control.

Since then, I have been working on drawing figures in water.

The bathtub and shower were perfectly enclosed.

It was intimate and private, and water was this complex subject that kept me busy for ten years.

I made about 200 of these paintings, some 6-8 feet like this one.

I made this picture by mixing flour in the bath water to make it cloudy, floating cooking oil on it, and immersing the girl in it.

I was driven by this kind of impulsive curiosity and was always looking to add something new: vinyl, steam, glass.

I tried putting Vaseline on my head and hair once and see what happens.

Please don't do that.

(Laughter) So it worked.

I was finding my way

I was enthusiastic, motivated, surrounded by artists, and constantly attending openings and events.

With some success and recognition, I moved into an apartment with 4 or more outlets.

My mom and I would stay up late at night discussing the latest ideas and inspiring each other.

She made beautiful pottery.

I have a friend named Bo. He drew this picture of my wife and I dancing on the beach, and he called it Light Years.

When asked what that means, he said: "That's when you step into adulthood. You're no longer a child, but you're not yet weighing down the responsibilities of life."

that was it. It was a light year.

On October 8, 2011, the light year came to an end.

My mother was diagnosed with lung cancer.

It had metastasized to her bones and was also in her brain.

I fell to my knees when she told me this.

I lost completely.

And when I pulled myself together and looked at her, I realized that this wasn't about me.

This is about finding a way to help her.

My father is a doctor, so having him in charge was a huge advantage. Her father did a wonderful job of taking care of her.

But I also wanted to do everything I could, so I wanted to try anything.

We all were.

I have researched alternative medicine, diets, juices, acupuncture and more.

Finally, I asked her, "Is this what you want me to do?"

And she said "no".

She said, "Take it easy. I'll need you later."

She knew what was going on, and she knew what doctors, experts, and the internet didn't know: how she wanted to go through this situation.

I just wanted to ask her.

I realized that I would miss it if I tried to fix it.

So I just started being with her and just listen to her seriously no matter what that means or whatever the situation is.

Even if I resisted before, now I surrendered, abandoned trying to control the uncontrollable, and just stood there with her.

Time passed slowly and dates became irrelevant.

We developed a routine.

Early every morning, I crawled into bed with her and slept with her.

I was so happy when my brother came over for breakfast and heard his car drive down the driveway.

So I got her up, took her hands and helped her walk to the kitchen.

She loved drinking her coffee in a big mug she made herself, and she loved Irish soda bread for breakfast.

There was a shower afterwards and she loved this part.

She loves hot water, so I made it a spa-like luxury.

My sister also helped me from time to time.

Warm towels and slippers were provided right away, so she didn't get cold for a second.

I blow dry her hair.

In the evening the brothers would bring the children and that was the highlight of her day.

Over time we used a wheelchair and she didn't want to eat as much and used the tiniest little teacups she could find for her coffee.

I could no longer hold her by myself, so I hired an assistant to help her take a shower.

These simple, everyday acts became our sacred rituals, which we repeated daily as the cancer grew.

It was humbling and painful, but exactly where I wanted to go.

We named this time "Beautifully Terrible".

She passed away on October 26, 2012.

One year and three weeks have passed since the diagnosis.

she is gone.

My brother, my sister, my father and I all worked together in a supportive and caring way.

It was as if all the vitality and established roles for all of us in the family had disappeared and we were just together in this unknown, feeling the same and caring for each other.

I am very grateful to them.

As someone who spends most of my time working alone in the studio, I never thought this kind of connection would be so important and soothing.

This was the most important thing.

It was what I always wanted.

So after the funeral it was time for me to go back to the studio.

So we packed up in the car and headed back to Brooklyn. Drawing was what I always did, so I did it.

And what happened?

It's like everything that was unraveling inside me has been released.

It was a myth, though very carefully portrayed a safe place, which I have created in all my other paintings.

It didn't work.

And I was so scared that I didn't want to paint anymore.

So I went into the woods.

I thought I'd go out and give it a try.

I got paint. I wasn't a landscape painter, but I wasn't the type to paint, so I had no attachments or expectations, and that allowed me to be reckless and free.

I actually left one of these wet paintings outside overnight next to a light in the woods.

By morning it was full of bugs.

I didn't mind though. It didn't matter. It didn't matter.

I took all these paintings back to the studio and rubbed them, carved them, poured thinner on them, put more paint on them, and painted on them.

I had no plans, but I was watching what was happening.

This is the one with all bugs included.

I didn't try to represent the real space.

It was the chaos and imperfection that fascinated me, and something began to happen.

I'm interested again.

This one also comes from the forest.

However, there was a caveat here.

You couldn't control your paint like you used to.

It had to imply or suggest rather than explain or explain.

And its imperfect, chaotic, untidy surface told a story.

I started to have the same curiosity as when I was a student.

So my next thought was that I wanted to put people and people in these paintings. I loved this new environment and wanted to include both the people and the atmosphere.

I felt nauseous and dizzy when I came up with the idea of ​​how to do this. This is probably just an adrenaline rush, but to me it's a very good sign.

So this time, I would like to introduce what I have been working on.

It's something I haven't shown yet, maybe a preview of my upcoming show, something I've got so far.

Spacious space rather than a separate bathtub.

Go outdoors instead of indoors.

Loosen control, savor imperfections, allow, allow imperfections.

And in that imperfection we can find vulnerabilities.

I could feel my deepest intentions, what was most important to me, the human connection that can happen in a space without resistance or control.

I want to draw a picture with that theme.

So here's what I learned:

We will all experience great losses in our lives, whether in jobs, careers, relationships, love, or youth.

We will lose our health, we will lose our loved ones.

Such losses are beyond our control.

They are unpredictable and bring us to our knees.

So I say, let them.

get down on your knees Please be humble.

Let go of trying to change it or even wanting it to be different.

That's exactly right.

And there is space, and in that space feel your weaknesses, your most important things, your deepest intentions.

And be curious about actually being here and connecting with the awake and alive.

That's what we all want.

Take advantage of the opportunity to find beauty in the unknown, the unpredictable, and even the terrible.

thank you.

(applause)

Have you ever noticed that when you ask someone to tell you about the changes they're making to improve their personal lives, they're usually very energetic?

Whether it's training for a marathon, picking up an old hobby, or learning a new skill, a self-transformation project occupies a very positive emotional space for most people.

Self-transformation is empowering, energizing, and even exhilarating.

So let's take a look at some self-help book titles. 'Awakening the Giant Within', 'Practicing the Power of Now', or this is a great book we can all relate to, 'You're Bad: How to Stop Doubting Your Greatness and Start Living a Great Life'.

(laughs) When it comes to self-transformation, you can't help but get excited.

But there is another type of change that occupies a completely different emotional space.

Organizational transformation.

If you're like most people, when you hear the words, "Our organization is about to start a transformation," you think, "Oh."

(Laughter) "Layoffs."

His face is bleeding, his mind is running wild, and he desperately seeks a place to escape and hide.

Well, you can run away, but you can't really hide.

Most of us spend the majority of our waking hours involved with organizations.

And the reality is that our organizations must constantly adapt due to changes due to changes in globalization, technological advances and other factors.

In fact, I call this the era of the "always connected" transformation.

When I shared the idea with my wife Nicola, she said, "Always-on makeover?

That sounds tiring. ”

And that could be exactly what you're thinking, and you'd be right.

Especially if we continue to work on organizational change as we have in the past.

But you can't hide it, so you have to sort out two things.

First, why is change so exhausting?

And second, how do I fix it?

First of all, let's admit that change is hard.

People naturally resist change, especially when change is imposed.

But what organizations do can make change more difficult and exhausting than it needs to be.

First of all, leaders often take too long to act.

As a result, everything is in crisis.

Of course, it tends to be exhausting.

Or, given the urgency, they focus only on short-term results, which gives them hope for the future.

Or they will simply take a superficial and ad hoc approach, hoping to get back to business as usual as soon as the crisis passes.

This kind of approach is like how some students approach standardized test preparation.

In order to raise the test score, the teacher will give instruction according to the test.

Well, that approach works. Test results often go up.

But it fails the basic goal of education, which is to prepare students for long-term success.

So, given these obstacles, how do you turn your organization into a transformational method that actually empowers and energizes rather than exhausts it?

To do that, we need to focus on five strategic imperatives. They all have one thing in common. It means putting people first.

The first imperative to putting people first is to inspire through purpose.

Most transformations have financial and operational goals.

While they are important and can be energizing for leaders, they tend to be less motivating for most people within an organization.

To motivate broader, change must be coupled with a deeper sense of purpose.

Take Lego for example.

The LEGO Group has become an extraordinary global company.

Under their highly capable leadership, they have actually gone through a series of transformations.

Each of these has a very specific focus, but Polaris has been LEGO's powerful purpose to connect and guide them all, to inspire and develop the architects of tomorrow.

Expand globally?

It's not about increasing sales, it's about making LEGO bricks accessible to millions more children.

Investment and innovation?

It's not about developing new products, it's about having more children experience the joy of learning through play.

Not surprisingly, that deep sense of purpose tends to motivate LEGO employees.

The second imperative to putting people first is to do your best.

Too many transformations are just an exercise in downsizing. Staff reduction under the guise of reform.

Faced with unrelenting competition, it's very likely that you'll have to make the tough decision to downsize, much like you have to lose weight to run a marathon.

But losing weight alone won't get you across the finish line in winning time.

To win, you have to give it your all.

You have to do your best.

Rather than just cutting costs, you need to think about your efforts to win in the medium term, your efforts to drive growth, your efforts to fundamentally change the way your company operates, and very importantly your investments in leadership and talent development.

A third imperative to putting people first is being able to support the talent you need to succeed during and after the transformation.

Over the years, I have competed in numerous triathlons.

Frankly, I'm not very good at it, but I do have one distinct ability. I find my bike surprisingly fast.

(Laughter) By the time I finished my swim, almost all the bikes were gone.

(Laughter) Real triathletes know that each leg of the swim, bike or run actually requires a different ability, a different tool, a different skill and a different technique.

Similarly, when transforming your organization, you need to ensure that your employees have the skills and tools they need along the way.

Chronos, a global software company, recognized the need to move from building software products to building software as a service.

To enable our employees to make that change, we first invested in new tools that allow them to monitor feature usage and customer satisfaction with new services.

We also invested in skills development to help employees resolve customer service issues on the spot.

And, very importantly, it also strengthened the collaborative behaviors required to deliver a seamless end-to-end customer experience.

Thanks to these investments, instead of being overwhelmed by the transformation, Khronos employees actually felt energized and empowered for their new roles.

In the era of “always on” transformation, change is constant.

So my fourth duty is to instill a culture of continuous learning.

Satya Nadella, who became CEO of Microsoft in February 2014, embarked on an ambitious transformational journey to prepare the company to compete in a mobile-first, cloud-first world.

This includes changes in strategy, organization and, very importantly, culture.

Microsoft's culture at the time was one of silos and internal competition, which was never conducive to learning.

Nadella took this seriously.

He rallied leadership around a vision of a vibrant learning culture, shifting from a fixed mindset where the role was to be the smartest person in the room to a growth mindset where the role was to listen, learn and bring out the best in people.

Microsoft employees were already aware of this cultural shift early on. This is clear evidence that Microsoft puts people first.

My fifth and final order is directed specifically to leaders.

In change, leaders must have a clear roadmap with vision and milestones, and then hold people accountable for results.

In other words, it should be directive.

But it also has to be inclusive to win people's hearts.

Inclusive leadership is essential to putting people first.

I live in the San Francisco Bay Area.

And now our basketball team is number one in the league.

We won the championship in 2015 and have a good chance of winning again this year.

There are many explanations for this.

They have great players, but one of the main reasons is that head coach Steve Kerr is an all-encompassing leader.

When Kerr came to the Warriors in 2014, they were looking for a big change.

They hadn't won a national championship since 1975.

Kerr came in, had a clear vision, and got to work right away.

From the beginning, he reached out to the players and staff and was proactive.

He created an environment of open discussion and solicited suggestions.

During the game, he often asked. "What do you think I'm missing?"

One of the best examples of this happened in Game 4 of the 2015 Finals.

The Warriors were trailing 2 games to 1 when Kerr made the decision to change the starting lineup. A bold move no matter how you look at it.

The Warriors won the game and won the championship.

And that move is widely seen as the pivotal move to victory.

Interestingly, it wasn't actually Kerr's idea.

This was the idea of ​​his assistant, Nick Ulen, 28.

Kerr's leadership style made Uhlen feel comfortable pushing the idea forward.

And Kerr didn't just listen, he put the idea into action, and then evaluated Uhlen all the way. All of that action was consistent with Kerr's very inclusive approach to leadership.

In the era of “always-on” transformation, organizations are constantly transforming.

But it doesn't have to be tiring to do so.

We owe it to ourselves, our organizations, and society at large to boldly change our approach to change.

To do that, we need to start putting people first.

thank you.

(applause)

(music) (applause) Trevor Kopp: When "Dancing with the Stars" first aired, it wasn't.

(Laughter) Jeff and I were full-time ballroom dancing instructors when ballroom dancing was all the rage on TV, and it was incredible.

So one day, when we said "foxtrot," people were like, "fox trotting."

(Laughter) And the next day they gave us the finer points of a good feather step.

And this blew our minds.

So all the ballroom dancing nerdiness we've always done about why salsa moves differently than a competitive rumba, or why a tango moves differently than a waltz, just hit the public consciousness and changed everything.

But parallel to this excitement, there was also this excitement that suddenly somehow we were cool, (laughs) this reservation.

Why this and why now?

Jeff Fox: When Trevor and I get together for training seminars or just for fun, we take a break from having to constantly lead, throwing and mixing each other.

As a way to take turns and play fairly, we also devised a system to switch between lead and follow while dancing.

Only after using the system as part of a small festival performance did we get an important pat on the shoulder.

Playwright and director of the Center for Playwrights, Lisa O'Connell, pulled us aside after the show and said, "Do you see how political that was?"

(Laughter) So began an eight-year collaboration to create the play. The play not only further developed the switching system, but also explored the impact of being locked into a single role, or worse, defined by that single role.

TC: Of course, classical Latin and ballroom dancing are not just dance systems. It is a way of thinking, a way of being, a way of relating to each other that captures the values ​​of the whole era.

However, one thing is consistent. Men lead and women follow.

So street salsa, championship tango, it's all the same - he leads and she follows.

This was gender training.

You weren't just learning to dance, you were learning 'man' and 'woman'.

It's a relic.

As for relics, you can't throw them away, but you should know that this is the past.

This is not now.

It's like Shakespeare. Honor it and revive it. That's excellent.

But know that this is history.

This does not represent our thinking today.

So we asked ourselves. What is the heart of the partner dance if all is taken away?

JF: Well, the basic principle of partner dancing is that one person leads and the other follows.

The machine works the same regardless of who plays which role.

Gender doesn't matter much in the physics of motion.

(Laughter) So if you're updating an existing form, it needs to be more representative of how we interact here in 2015.

When you look at the ballroom, don't just look at what's there.

Notice what is not.

Couples are always male and female only.

together.

that's all.

ever.

In other words, same-sex and non-gendered couples simply disappear.

At most mainstream international ballroom competitions, same-sex couples are rarely allowed on the floor and are often prohibited entirely by the rules.

TC: Try this. Search Google for the image 'professional Latin dancer' to find real Latinos.

(laughter) I will be there for days.

What you get is page after page of white straight Russian couples spray tanned to mahogany.

(Laughter.) There are no blacks, no Asians, no mixed race couples, so basically non-whites are gone.

She can't be tall and he can't be short, even within the white, heterosexual couples only paradigm.

She couldn't be more daring, and he couldn't be more gentle.

If you turn ballroom dancing into dialogue and then turn it into a movie, we as a culture would never support this.

She responds when he commands.

A relationship that we don’t consider to be utterly healthy and functional, gay or straight, doesn’t look like it, but somehow it airs in prime time, it puts on makeup, it sparkles, it puts it out in motion, not text, and we as a culture listen to it and applaud it.

We honor our absence.

Too many people have disappeared from partner dancing.

(music) (applause) JF: Well, you saw two men dancing together.

(Laughter) And you thought it was...

A little strange.

Interesting, even charming, but a little strange.

Even die-hard fans of the same-sex ballroom circuit testify that same-sex partner dance is dynamic, powerful and exciting, but it just doesn't fit.

Aesthetically speaking, if Alida and I had a classic ballroom closed hold...

This is considered beautiful.

(Laughter) But why not?

(Laughter.) See, the standard image that leaders have to be big and masculine and followers have to be small and feminine, this is a stumbling block.

TC: So we wanted to look at this from a completely different angle.

So what if we could keep the notion of lead and follow, but drop the notion that this is gender related?

And what if couples could switch between leading and following each other?

And switch again?

What if it was like a conversation where we take turns listening and speaking, just like we do in life?

What if you could dance like that?

We call it "Liquid Lead Dancing".

JF: Latin dance, try salsa.

Salsa has an important transitional step called crossbody lead.

Used as punctuation to separate improvisations.

It can be a little hard to find if you're not used to looking, so here it is.

Cheap seats again.

(Laughter) And now let's look at the action again. It's a nice, slow action.

Now, applying the liquid lead mindset to this transitional phase, the crossbody lead is the point where lead and follow switch.

The trailing person can choose to take over the lead, or the leading person can choose to surrender the lead, essentially becoming a counter-crossbody lead.

Looking at slow motion is like this.

When I danced at the opening dance, it was like this.

This simple adjustment transforms the dance from dictation to negotiation.

Anyone can lead. Anyone can follow.

And more importantly, you can change your mind.

Now, this is just one example, but anything can happen after the blinker goes off.

TC: Let's see how the idea of ​​liquid reeds can be applied to a classical waltz.

Because, of course, this is not just a system for exchanging leads. It's a mindset that can actually make the dance itself more efficient.

In other words, it's a waltz.

A waltz is a spinning dance.

For the lead, this means spending half the dance moving completely blind and backwards.

And because of their position, no one can see where they are basically going.

(laughter) Imagine you're here on the floor and it's coming towards you.

JF: Raaaaaa!

(laughs) TC: In fact, there are many accidents caused by this blind spot.

But what if you allow your partner to change posture for just a second?

Many accidents could be avoided.

Even if one person were to lead the entire dance and allow this transition to occur, it would be much safer and would bring a new aesthetic to the waltz.

Gender doesn't matter in physics.

(laughs) JF: We've now danced Liquid Reed on stages in North America and Europe in clubs, convention centers, and as part of the play "First Dance" that I made with Lisa.

And it never gets involved.

So beyond the rare spectacle of two men dancing together, it's always exciting and engaging.

but why?

The secret is why Lisa considered our first demonstration "political".

It's more than just swapping leads and followers. It's that we stayed consistent in our presence, our personality, and our power, no matter what role we played.

we were still us

And there lies true freedom. Not just the freedom to switch roles, but the freedom not to be defined by which role you're playing, the freedom to stay true to yourself at all times.

Forget what leads and followers should be.

Be a masculine follower or a feminine lead.

Be yourself.

Obviously, this applies beyond the dance floor, but it gives us the perfect opportunity to renew old paradigms, reinvigorate old relics and make them more representative of our time and the way we are today.

TC: Jeff and I have always danced with women and men as dance partners and I love it.

But we dance with the awareness that this is a historical form that can create silence and invisibility across the spectrum of identities we enjoy today.

We invented Liquid Reed as a way to strip away all ideas that don't belong to us and bring partner dancing back to what it was all about: the art of caring for each other.

(music) (applause)

You are a high-ranking soldier deployed to Afghanistan.

You are responsible for the lives of hundreds of men and women and your base is under attack.

Mortar shells are exploding around you.

Help the wounded and crawl to a nearby bunker, struggling to see through the dust and smoke.

Conscious but dazed by the explosion, you lie on your side and try to make sense of what just happened.

When I regain my vision, I see a bloodied face staring at me.

This image is terrifying, but you'll soon find out it's not real.

This vision continues to visit you many times a day and even during your sleep.

You choose not to tell anyone for fear of losing your job or being seen as vulnerable.

We named this vision "Bloody Face in Bunker", abbreviated as BFIB.

You locked BFIB in your mind and secretly haunted it for the next seven years.

Now close your eyes.

Can you see the BFIB?

Hopefully, the invisible wounds of war, commonly known as post-traumatic stress disorder or traumatic brain injury, are beginning to surface.

I wouldn't say I have post-traumatic stress disorder, but I wasn't far from it.

When I was little, I used to visit my grandparents every summer.

It was my grandfather who taught me about the mental effects of combat.

My grandfather had a bullet in his neck while serving in the Korean War as a Marine and was unable to scream.

He watched as the sergeant overtook him, declared him deceased, and left him to die.

Years later, after returning home from physical wounds, he spoke little of his waking experience.

But at night I could hear him yelling obscenities from the room across the hallway.

And during the day I announced myself as I entered the room, being careful not to frighten or upset him.

He spent the rest of his days in isolation and tight-lipped, never finding a way to express himself, and I still didn't have the tools to guide him.

I didn't name my grandfather's illness until I was in my twenties.

Pursuing a graduate degree in art therapy, I was naturally drawn to the study of trauma.

And as I sat in class learning about Post-Traumatic Stress Disorder, or PTSD for short, my mission to help servicemen who were suffering like my grandfather began to take shape.

Throughout the history of warfare, post-traumatic stress has been given many names. For example, Homesickness, Soldier's Heart, Shell Shock, A Thousand Yard Stare.

And while I was working on my degree, a new war raged, and modern bulletproof vests and military vehicles enabled soldiers to survive blast injuries they never experienced before.

But invisible scars have reached new levels, prompting military doctors and researchers to truly understand the effects of traumatic brain injury (TBI) and PTSD on the brain.

Advances in technology and neuroimaging have shown that Broca's area, the speech and language area of ​​the brain, actually shuts down after an individual experiences trauma.

This physiological change, or unspoken fear, coupled with mental health stigma, fear of being judged, misunderstood, and even removed from current duties, has created an invisible struggle among military personnel.

Generations of veterans have struggled with loneliness, choosing not to share their experiences.

When I got my first job as an art therapist at Walter Reid, the largest military medical center in the country, I found the perfect job for me.

After several years working in a confined patient psychiatric ward, I eventually transferred to the National Intrepid Center of Excellence (NICoE), which leads traumatic brain injury care for active duty military personnel.

Well, I believed in art therapy, but I had to convince military men, big, strong, strong, manly military men and some women to try art-making as psychotherapy.

The results were astonishing.

Vivid and iconic works of art have been created by military personnel, and every piece of art tells a story.

We observed that the art therapy process circumvents speech language problems in the brain.

Art-making accesses the same sensory areas of the brain that encode trauma.

Military personnel can use art-making to engage with their experiences in a non-threatening way.

They can then apply the words to their physical creations to reintegrate the left and right hemispheres of the brain.

I've found this works for all forms of art (drawings, paintings, collages), but it seems to work best for mask making.

Finally, not only do these invisible scars have names, they also have faces.

And when military personnel create these masks, they are literally able to face their own trauma.

And it's amazing how often they break through the trauma and begin to heal because of it.

Remember BFIB?

It was a real life experience for one of my patients and I was able to let go of that haunting image when I created the mask.

At first it was a daunting process for the military man, but eventually he came to see the BFIB as a mask rather than a scar, and would walk away from each session, hand me the mask and say, "Melissa, take care."

Ultimately, we put BFIB in a box to further contain him, and when that trooper attempted to leave NICoE, he chose to leave BFIB behind.

A year later, he met the BFIB only twice, and both times the BFIB was smiling and the soldier was not afraid.

Now, he continues to paint whenever the soldier is haunted by traumatic memories.

Each time he paints these disturbing images, he sees them less or not at all.

For thousands of years, philosophers have taught that the power to create is very closely related to the power to destroy.

Science now shows that the part of the brain that records traumatic wounds may also be the part of the brain where healing occurs.

And art therapy shows us how to make that connection.

We asked one military man how mask making has affected his treatment. Here's what he had to say.

(Video) Soldier: You look like you're dazed with your mask on.

Zone out to drawing, but for me it just freed the block so I was able to do it.

And when I saw it two days later, I was like, 'Oh my God, this is the picture, this is the key, this is the puzzle,' and from there it was a blast.

I mean, because when I lost sight of my treatment from there, they were like, 'Kurt, explain this, explain this.

And for the first time in 23 years, I was able to openly talk about things with practically anyone.

Now that it's unlocked, you can talk about it now if you want.

It's just amazing.

And because of that, I've been able to bring together 23 years of PTSD and traumatic brain injury in one place like never before.

sorry.

Melissa Walker: Over 1,000 masks have been made in the last five years.

Pretty amazing, isn't it?

thank you.

(Applause.) I wish I could have shared this process with my grandfather, and he will be overjoyed that we have found ways to help the servicemen of today and tomorrow heal, that they have found within them resources they can call upon to heal themselves.

thank you.

(applause)

Let's talk about trust.