[Music]

The famous political prognosticator, Nate Silver,
wrote a book called "The Signal and the Noise."
And in that book he had a chapter called, "Becoming less
and less and less wrong."
And that's what systems thinking can help us do.
The purpose of systems thinking is to help us to be clear
about our assumptions.
To surface, make them explicit, test them and improve them,
so that over time, we become less and less and less wrong.
And the value of that is become more
and more and more effective.
Let me give you an example of this.
When my son Noah was 14, I had asked him
to take the dog for a walk.
So, I come back an hour later and was very surprised
to see my son coming out of the bedroom
with a big old scrape on his cheek.
I said, Noah, what happened?
He said, well, I really didn't want to miss my opportunity
to play Minecraft, so I thought hey, what if I took the dog
for a walk, I'll tie her to the bike.
And it was working really well until he came almost home.
The neighbor dog, Stella, was Bella's, our dogs, archnemesis.
They took one look at each other and you can picture it,
Noah sailing over the handlebars.
So, what happened?
Well, my son had a mental model.
I want to walk the dog faster and the best way to do that is
to tie the dog to the handlebars.
That's what often happens with our mental models,
we focus on the here and now.
It seemed simple, but the problem was
that there was unintended consequences.
He hadn't thought further out than the 5 feet of the bike
and the dog that he was working with.
When the other dog entered the picture, oof, flying.
And that's how we all do it.
We end up flying over the proverbial handlebars.
Why? Because we don't really think about the implications
of our actions over broader spaces and time dimensions.
And that, quite frankly, is what systems thinking can help us
do better.
Look around you, you'll see many examples
of unintended consequences.
For years we've been using antibacterial products,
antibiotics, soap.
What's happened though, is that the bacteria
that has survived, tends to be stronger.
When community space increased traffic congestion,
they build more roads.
Seems to work for a short time, but what happens is further out,
suburbs become more attractive, people move there
and the roads get congested again.
Corporations, when they get behind
or have profitability problems,

might work their employees harder.
Short run, they may get more results.
In the long run though, people get burned out from stress.
More likely to either create errors, create problems or quit.
Again, negative consequences.
And these happen in all facets of life.
We use our mental models to take appropriate action.
If I want this to happen, what should I do?
Where is it the most important place for me
to focus my energies and attention?
If I do this, what will happen as a result?
Those are places where we would apply our mental models.
In the case of the biggest issues that we're trying
to solve, obesity and chronic disease and other kinds
of issues like that, we want to make a huge difference.
What we're looking for is what I call high leverage.
Let's define high leverage as the ability
to fundamentally improve the performance of a system,
while simultaneously reducing the likelihood
of negative unintended consequences.
You can think about an issue has having 2 attributes.
How much change do we generate?
And how much unintended consequences did we get?
In the place where you make a little bit of change
and a little bit of unintended consequences occur,
what you end up with are tweaks.
Not a whole lot happens.
You may be at a situation where there's not a whole lot
of change that occurs, but there's a lot
of unintended consequences that occur.
In that situation, what we have is firefighting.
Lots of bumps in the rug.
Solve a problem here and it pops up over there.
There are certain situations where you have lots of change,
but also lots of unintended consequences.
Those are disasters.
Certainly don't want those.
The place where we want to be is obvious.
We want to be up here, where we have few unintended consequences
and we've made a big difference.
What I call this quadrant is high leverage.
I'm going to talk a little bit
about how systems thinking can insure the likelihood
that we end up, up here, in the high leverage land.
In order to improve things a lot, we need to have a picture
of the system of how it really works.
We need to understand the physics, as I say,
in order to identify the lever for improvement that we need.
So, in order to do systems thinking well,
we need to expand our boundaries of time and space.
And we need to improve our understanding
of the physics of this system.
You can think of applying systems thinking
as having 3 components.
What you are doing, how you are doing it
and how do you know you've done it well.
What you are doing is, first,

making sure that you frame the problem with an expansive set
of boundaries as possible.
Whereas, Ron Heifetz says, "Getting up on the balcony."
And second, you're looking to understand how things work.
You're developing a picture of the physics.
How you are doing it?
You're developing a shared picture.
You're making sure that all the assumptions are represented
visually, so that people can be on the same page about them.
And how you are doing it?
You're also making sure
that you're applying a scientific method approach.
Realizing that there's no such thing as "the truth,"
you're working on, as Nate Silver says, "Becoming less
and less and less wrong."
You're really just applying a scientific method approach
to building your theories about how the world works.
How do you know you've done it well?
You know that when you've arrived at a solution
or an understanding of the system that is simple
and easily understandable and easy to explain.
In other words, you've made useful sense of reality,
by reducing the complexity of your understanding.
In order to arrive as this simple
as possible shared picture of understanding,
systems thinkers use a variety of tools and activities.
You can think of these tools and activities as running a range
from the amount of time and energy and skill
and resources required to apply them and the amount of value
that you get out of them.
This graphic that I'm showing here was developed
by a colleague of mine, Barry Richmond.
And he used it to teach at Dartmouth College,
how you can think about applying systems thinking.
It's an opportunity at the very low end of the spectrum,
very low intensity with very little skill,
to ask some questions.
You might get some value out of that.
You can spend a little bit more time
and develop some causal maps, your stock and flow maps,
getting more value out of that.
Or start building more simulation models,
which may take more time and skill and energy.
Or you might try to build a very large model.
People who become enamored
with systems thinking immediately begin thinking
that the best thing to do is to build these very large models.
They realize that it requires a lot of skill, time and energy
to learn that skill and become quickly discouraged.
What I'd like you to understand is
that it doesn't require a degree,
a PHD from an academic institution,
in order to apply systems thinking.
The most important part
of systems thinking is the thinking.
It's the mindset that you use.
What I'd like to do is to show you how you can apply

that mindset, even without using a lot of sophisticated tools.
So, back to what you were doing.
The first thing you were doing, is to expand your view
of the problem, you frame it, by making sure
that you are expanding the boundaries.
Questions you can use to expand the boundaries
of inquiry are, what are the trends?
Where are they going?
What will be the future price we pay?
How do we want the future to play out?
What's our dynamic vision?
To get on the balcony across space,
you can ask the following questions.
How does this impact more than just the area of interest?
Who else is concerned?
Are there stakeholders?
If we make a change here, where else where there be a change?
In using systems thinking,
you then start looking for the physics.
Asking how it works questions.
There's a set of questions that get
out how conditions arise and change.
What's accumulating?
What are the key conditions?
What is the rate of change?
In what direction are the important accumulations going?
There are another set of questions that you can use
to understand if there are feedback loops operating
in the system.
These kinds of questions include,
is there a virtuous cycle?
A vicious cycle?
In other words, reinforcing loops.
Is there a pushback in the system?
Does it try to stay in the equilibrium?
Off and balancing loops?
What's happening in terms of these cycles?
Regarding how you are doing it, in using systems thinking,
you are trying to get everyone to see the same thing
to paint a common picture.
You can use visuals and diagrams, of course.
And questions you can ask include,
do we have the same picture of the issue or strategy?
If not, how do we get it?
Is it clear and unambiguous?
Is it rigorous?
In your using the scientific learning approach,
continually presenting, testing and improving the picture,
until there's nothing left to improve.
And you know you've done it well when your mental model
of the issue is as simple as possible.
Questions you can ask include,
how do we build confidence in the theory?
How do we keep it as simple as possible, but no simpler?
Is the mental model too complex?
And could I remove some of that complexity?
Are we able to mentally simulate?

Can we computer simulate?
Sure, you might be able to develop more insight
by using more complex tools, like stock and flow maps
and simulation models.
But those take more time and a lot more skill to do.
And simply by using the questions
that we've just covered, you can improve your understanding.
And this will help you
to develop the systems thinking mindset, the cognitive capacity
to help you to use those tools in the future.
Ultimately, systems thinking requires we possess a certain
amount of humility.
Realizing that we can never possess the truth,
the best we can do is become less and less and less wrong.
We can and should build mental models.
It will help us to avoid our own handlebar experiences.
The right systems thinking mindset, will help us do that.