How to build dynamic systems and use more digital data

Tim O'Reilly

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Abstract: In his lecture, Tim O'Riley talks about scenario planning as a way to predict different futures and achieve a robust strategy, that is, a strategy that serves well to deal with whatever the outcome may be. Within this perspective, Tim brings the concept of government as a platform: a government that makes use of technological innovations such as AI and big data to invest in infrastructure and prepare for possible futures.

Keywords: scenario planning, robust strategy, government as a platform, investment.

LUÍS FELIPE MONTEIRO: First of all, good afternoon everyone. Good afternoon to all of you who are here watching the incredible Innovation Week, this event, now completely remodeled in the context of the pandemic, where we are fully online, closer than ever, closer to all Brazilians. We were talking just now, on the backstage, that there are public servants and participants from all regions of the country, people who could not be here if this event were held in person. So, it's a great satisfaction to be here with everyone, it's a pleasure to be here to debate these issues of innovation, transformation and changes that we are going through with Tim O'Reilly.

Tim O'Reilly, who is basically a myth for us in the technology area. He reinvented many times the technology processes in the Silicon Valley and the knowledge and innovations brought by his company were very important.

Hello, Tim, it's a pleasure to have you here. We've met a few years ago. Now we are virtually connected. It's a pleasure to join you in this session.

Tim O'Reilly is the CEO and founder of O'Reilly Media, which is one of my favorite editors on technology and innovation, books and articles. I was one of those who you impacted personally very much. It's good to have you here, so please tell us more about what you see around the globe. How do you see governments reacting in this new environment? What do you think? How do you think we should evolve in the future? How will governments be from now on? Thank you very much.

TIM O'REILLY: Thank you very much for having me. I am really glad to be with you. Thank you. Given the topic of your program, which is imagining the future, and I think imagining a better future, I thought I would talk about an essay I wrote a few weeks ago, or a few months ago rather, called "Welcome to the 21st century". And the idea that I explored in that essay, and that I'm going to explore today, is just how much we need to challenge our assumptions about what's happening in the world. Now I think we always have to do this because of technology. But COVID has reminded us that much more dramatic changes can come on us quite suddenly, and the question is: how are we, whether we're individuals or business people or people working in government to actually plan and COVID is almost like a practice session for us.

And I start the essay with this idea that the 20th century didn't begin in the year 1900. It began really in 1914 with the beginning of the First World War, which really upended the old order.

So, over those 150 years the people who were on top of the system, the way the system worked, changed fairly utterly. So, you know there was this saying in England, "the sun never sets on the British Empire'' and it was literally true. I mean the British, this tiny island, had possessions all around the world, so the sun literally never did set. But we're not very good at predicting the future, and Juan Enriquez who is a biotech investor wrote a book back in 2005 called "The United States of America '', which tried to transpose the situation of the British to us today. He was a little ahead of his time, but he said that in 1914, the British Empire held sway over a massive amount of the world's population, 23% of the world's population, 24% of its land mass, and yet only 34 years later it was reduced to its original island and a population of 66 million.

But if you had asked the British leadership in 1914 whether they expected their empire to be larger or smaller in 50 years, what might they have said? And I think that's just a really good reminder for us as we face the 21st century that so many of the things we take for granted may be subject to radical change. But the question really is, how much of the current world order and the current world economy do we take for granted? And how much should we question?

Fortunately, there is a discipline called "scenario planning" which helps us to think about the future in an uncertain world. Peter Schwartz is one of the originators of the technique. I read a book called "The Art of the Longview''. I'm quite sure it's available in Portuguese as well. But he describes scenario planning as an imaginative leap into the future, and it's not designed to predict what will happen. But to imagine various things that might happen and to develop strategies.

This is a family picture there with my mother and dad in the lower center, and this Grand House that my father grew up in, you know, farm boy effectively drawing water from the river below the Grand House.

So, let me go forward and get to this point about scenario planning. Salesforce and Deloitte back in April did a set of scenarios for how to respond to how the world might be remade by COVID-19. And they got some things wrong. They got some things right, but it's an illustration of how to think about the future in this scenario driven way, and I want to talk a little bit about that.

You start out by identifying things that are radically uncertain. So, if you think back to March and April, there were a set of uncertainties. We still have a lot of them, but they said "look how bad was this pandemic going to be?" Another was, and this was something of a surprising one, that they chose to focus on the level of collaboration within and between countries. And you know, for example, I think very much here in the United States that this turned out to be a very prescient uncertainty because it turned out that there was very little collaboration between the government and the private sector, between the federal government and the states. And so that turned out to be something that generated a whole lot of ideas about what might happen that turned out to be true. Obviously, there's the healthcare response to the crisis. We now see that the healthcare system has gone through some initial crisis and has responded pretty well. We've seen vaccines being developed. I don't think we quite saw how bad the economic crisis consequences were going to be, but this was an uncertainty that you could identify very early. But also identify this question of the level of social cohesion.

Now the thing is that in order to do scenario planning, you can't focus on all the uncertainties. So typically, a group that's working on this picks a couple of uncertainties that are used just to develop these so-called scenarios. These imagined futures help to stretch your thinking about what's available and so in their particular case they chose the severity of the pandemic and the level of collaboration within and between countries. Now that of course is very appropriate for this talk because I'm speaking to an audience that's in public administration, and yes, that became a critical question. Was there going to be a coordinated response, or was it going to be weak and divided? And that turned out to create very different futures based on how things turned out.

Now they developed a set of four scenarios, of course, when you have these two vectors that are crossing, you know they do the typical thing and you divide it into a graph into 4 quadrants and then you do some storytelling about them. So, I'm not going to go into detail about the stories that they told, but you kind of get the idea that there are different futures. And this is the point I really wanted to get to.

That scenario planning doesn't ask you to say: "Oh yeah, that's the one that's going to happen. The one in the upper right is the one that you really have to prepare for". No, they say: "Look, there's a wildly divergent future. Some of them are pretty good. The pandemic wasn't a big deal. Everybody dealt with it well. The other is a real disaster". And then, they say: "Well, is there a strategy you should take?". That is what they call robust, that is, it works well regardless of which scenario turns out to be true.

And then they ask you to say what scenario are you actually preparing for. Which ones are you ignoring? What would you do differently in order to succeed in each of them? And then of course, what capabilities, partnership segments and strategies do you need to learn more about? So, this is a way of thinking about: how do you prepare for unknown futures? And this is a great crossover into the world that I've talked about for years of predicting the future and the present. There's this quote from science fiction writer William Gibson that I've been using in my talks, probably for 20 years:

"The future is already here. It's just not very evenly distributed."

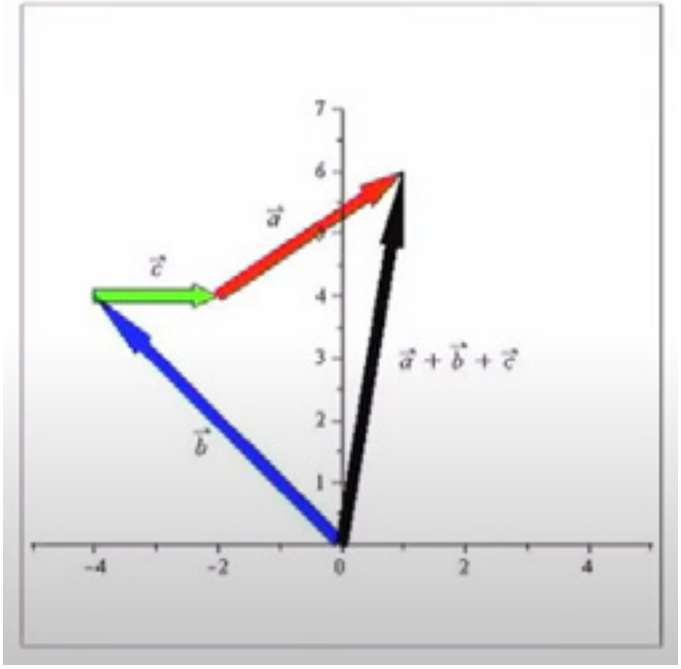
If you look around you can see people who are living in the future today. Those of us who were pioneers of the commercial Internet in the early 1990s, we're living in the future. Now everybody's living in that future.

So, you can kind of look around and say, well what's happening today that teaches us something about the future? And in scenario planning they call this news from the future. You're literally looking for new stories that confirm or disprove some of your ideas about what might happen. Because it's not one future, but many and we really see this with COVID, you know. There's been a number of articles now about the difference between countries, which is really focused on how well their government and the trust between people and government function. And it turns out that in South Korea you know they basically dealt very, very effectively. They've had a total of 487 deaths, while in the United States, in disarray and denial, had 240.000 deaths. And the disease is pretty well managed in Korea, but totally out of control in the United States.

So why was South Korea able to do so well? And there's been some recent articles that identify the idea that robust government plays an outsized role. Francis Fukuyama wrote an article in foreign affairs a couple months ago called "The pandemic and political order", he said the factors responsible for successful pandemic response have been state capacity, social trust and leadership. Countries with all three – a competent state apparatus, a government that citizens trust and listen to, and effective leaders – have performed impressively, limiting the damage they've suffered. And so that's a robust strategy in a nutshell. A robust government is actually a pretty important bulwark against uncertain futures.

Similarly, following the science is robust. I have an Australian son-in-law; my daughter and my grandchildren and my son-in-law have moved back to Australia because they can live a normal life there. Whereas here in the US we're still vacillating between crackdown and spread of the virus. So, following the science is robust. But now I want to move on to a sort of a much more O'Reilly specific idea for how to think about the future. And it's not, strictly speaking, part of scenario planning, but it's very aligned with it. And I call it thinking in vectors.

So, a vector has both a magnitude and a direction. So, in this simple illustration you can kind of see that if you have that blue line with a force that's taking you over to the left and you have a force represented by the green arrow taking you back to the right and the red arrow taking you back to the right and up they add up into that black arrow. It's not always obvious because there are so many forces in play driving the future. But you can still see that forces pushing in different directions end up with a kind of a clear direction. You know reality is way more complex than this simple illustration, but by getting a sense for vectors for how quantities and directions and trends, how big are they? How fast are they accelerating? What direction are they going? Which ones push against each other?



You can start to get a very powerful sense of the future. And this was very clear in the coronavirus context with a series of articles which you may or may not have seen – they were actually downloaded and read, I think, tens of millions of times around the world, by Tomas Pueyo.

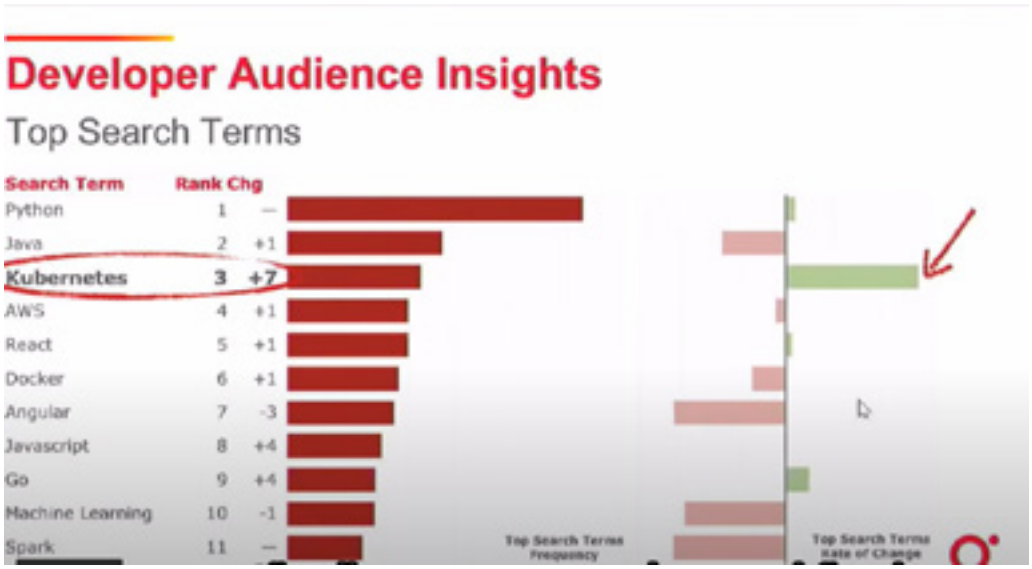
Now, he was not an epidemiologist. He was a Silicon Valley growth marketer and, yet, he was able to read the epidemiology and, using his experience of trends and vectors from Silicon Valley growth marketing, was able to say "These are some different possible futures. Here's what happends if we do nothing; here's if we do light mitigation; here's what happens if we - as we call it - drop the hammer; and then ongoing there'll be a dance". Very, very precedent set of articles back in March. And the fundamental idea of this thinking and vectors is: you look for something and you say, well, what happens if this continues? If this goes on, and then of course you're looking for this news from the future that says "yes", it is going on or it's accelerating or it's slowing down, or there's a new vector that's coming in.

And obviously this is true in many other areas that affect public policy. Climate change is quite clear. There's a vector there and it's accelerating. We should be very concerned about that, particularly when we see that carbon dioxide goes just about vertical, you know. So, there are some people who are accepting science and building public policy around it, but far too few. And far too few taking it seriously. Income inequality, you know it's not as clear as coronavirus growth or global CO2 concentrations, but it's pretty clear that inequality is becoming a serious problem around the world. It affects life expectancy, infant mortality, the homicide rate, mental illness, drug and alcohol addiction, social mobility.

How do we understand these kinds of trends and who is trying to shape public policy to deal with them? And I think the very first thing we do is we start to recognize them. We start to say "Well, if we're not even sure of what's going to happen, how do we build a robust strategy?" The same question of vectors is really illustrated wonderfully in a talk that's given by Google's chief economist, Hal Varian. He has a talk that he calls "Bots vs Tots". Now some of you know there's been a lot of talk about, well. Are robots going to take all our jobs? And thinking like an economist, you start to say, well, there's a supply and the demand curve and the question is, well, how many more children are there? And is it going up or is it going down? How fast are the robots coming? Is it going up or is it going down? And there's going to be an interaction between these two vectors, which is going to satisfy the supply curve.

Anyway, I won't go through his whole argument, but he comes to the conclusion at the end that for many countries if the robots come to do many more jobs, they'll be coming just in time because the supply of new children growing up into, you know, working age adults is going down. And so, you can again look at trends. You can look at them and do the math and you can see the future. So, what you want to develop is a kind of radar. Whatever you're dealing with, you look around, you watch events a little bit like they're incoming aircraft or weather, you know, storms, remembering that things come from different directions and at different speeds. And you don't just do it in times of crisis like coronavirus; it's something that you should be doing every day.

Now just to bring this home, you know, to my business, we do it every day. We have to predict what books we should publish about up and coming technologies; what courses should we put on in our online learning platform about upcoming technologies; so, we're always trying to study and say well "what's growing and what's not?" And in particular, we were very concerned with how fast things are growing. So we look for examples at the search patterns on our online platform. And we say, ok, yeah, Python's the number one search term. But look at this number three, ok, Kubernetes. The graph over the right shows how fast it's growing. It's growing at about 30% a year, whereas Python is growing only a very small amount and a lot of technologies that you hear a lot about in the news are actually shrinking, so we pay attention to that rate of change, so to speak.



So, because we're used to thinking like that, we were much more prepared than a lot of companies when COVID hit. We actually had one of our largest events, the "Strata Conference" on big data and it was due to be happening at the San Jose Convention Center for about 8000 people, just as COVID was hitting. And about two weeks before the event, we decided that we had better cancel it. People were starting to get very nervous and a lot was going on. But we didn't just cancel that one event. We actually ended up shutting down our entire events business. Our events business and everybody was like "that was fast" and much later of course everyone said what wow, how were you so pressing? Why did you do this so soon?

And the answer was pretty clear because we think in vectors. And we came to the conclusion that, whether it was short or it was long; whether it was really severe or whether it was not so severe, in different scenarios: in all of these scenarios, the best thing to do is to shut down. Why? Because the uncertainty alone was going to cripple all of our future events. We were already seeing this immense drop-off where nobody was signing up. And so all of the costs would still be there.

In fact, the further we went on closer to the events we'd have more sunk costs in terms of commitments to hotels and venues and food and marketing, etcetera. And we could just see that just the uncertainty alone, even if it only lasted a few months, was going to be incredibly damaging to the business.

And meanwhile, we've already been developing an approach to online events as part of our platform. And the actual content curation for physical events was done by the same team that curates content for our online platform. So, the robust strategy, regardless of what happens, was to accelerate the pivot to online. So, we were able to cancel the in person event and put on an online live event only a week or two after the original date, which also drew many thousands of people. In fact, I think we had more people attend the online event than we had the original event. And we were able to act very quickly because we were able to recognize what was happening and the implications, we were able to see the future in the present.

So, I want to move on here and talk about this idea of robust strategy as a societal level. And that is we have to prepare for the unexpected. You know, whether it's the pandemic, climate change, financial collapse, war, or something else entirely. That kind of forethought is one of the fundamental roles of government. But when we also think about robust strategy, I think it's important to understand that social cohesion, fairness and justice are robust. They're far more robust than inequality. And we have to rethink our economic priorities. So, a wonderful phrase from Erica Liu and Nick Hanauer where they say:

"We all do better when we all do better."

And I think that's absolutely right. Government needs to invest in 21st century infrastructure. I'm going to talk a little bit about what that means. We have to start. We have to think about how we protect the future from the past. We want to nurture new industries, not protect old ones. And that's why I've been talking a lot in the last few years about building the next economy. What does it look like? And that brings me to this idea that I've talked about for the last 10 years or so, which is government as a platform. And when I first began talking about that, I focused a little bit on the idea of procurement versus platform, and I was inspired when I talked about this in 2008 by the iPhone, which had recently opened up the App Store. And when the initial iPhone was released in 2007, it had like every other phone 15 or 20 apps. You could do a few things. And now you know in 2020 there are millions of apps. Apple opened up and unleashed a market. Now many people took this to be the beginning and end of the idea of government as a platform. Let's just open up data and people will come.

But I thought that was only one of many lessons for technology from the government. It means way more than open data. In a lot of ways, we have to think about the government building the infrastructure for society to prosper. And that means the rule of law, ensuring safety, fairness, justice, and equity. And also, the rules of the road. Now that's different than the rule of law, because of a great example of what's called a "Nash Equilibrium" in economics, after John Nash, who was the mathematician who was the subject of that movie, "A Beautiful Mind". And that is, there's an equilibrium in which everybody agrees to do the same thing, but they could agree differently.

For example, in the UK, people drive on one side of the road. In the United States, they drive on another. And this is super important in technology because interoperability and standards like the Internet, like TCP/IP, have been enormous enablers for the future, and I think government, particularly when it's focused on antitrust and big companies needs to actually enforce and insist on standards and interoperability so that one company does not effectively hijack the rules of the road.

Government provides financial stability and investment capital provides common infrastructure, it invests in strategic futures and it regulates and manages markets. So, contrary to what you hear from a lot of people, I think governments are really good at creating markets, and I think a great example of this is the notion of self-driving cars. You think of everything the government did to enable that new market. First of all, the roads are generally funded through taxes and it's a shared infrastructure. Think about the global positioning satellites. Again, the government provided infrastructure, which was opened up to the world using standards and interoperability, so everybody, every phone can have a little radio in it that can find its location. All the mapping data that's used by companies like Google to provide Google Maps. Again, the government provided open data. And then the original grand challenge from DARPA, The Advanced Projects Agency, here in the US, which basically kicked off the self-driving car market.

But also, financial markets. That's the First National Bank in the US, the Internet. So, I highly recommend, if you have not read it, economist Mariana Mazzucato's book "The Entrepreneurial State", where she talks a lot about the role of government in advancing technology. But the government is not so good at managing markets or capturing value for their citizens. And we see this right now in the question of how much should coronavirus vaccines cost. The government has invested billions of dollars in accelerating vaccine development.

In fact, most research is done by governments, it's funded by governments, yet most of the profits, including fairly large monopoly profits, tend to be basically taken away by the pharma companies. And governments are often the customers who are paying. And they're not negotiating on behalf of their citizens, who are the ultimate ones who are paying. So, we have to ask how should the return on government investment be shared? How much should go to companies? How much of it should go to taxpayers? And this idea of who gets what and why is the fundamental question of economics.

Alvin Roth got a Nobel Prize for his work. He worked on markets without money like kidney transplants. But he really points out that you can actually improve the design of the marketplace and have better outcomes. And I think there's a real opportunity to do that today with technology. Mariana Mazzucato again says:

"Markets are outcomes."

They're the result of design decisions and those design decisions are typically made by governments. She's written a lot about this in a more recent book called "The Value of Everything". But this is also the fundamental question of digital government. Tom Steinberg, the founder of MySociety, pointed out back in 2012 that good governance and good policy are now inextricably linked to the digital. The problem is that government and central bank statistics, economic modeling and regulations are often too slow for the pace and scale of the modern world.

Jeff Jonas, the former IBM Fellow, said: "would you cross the street with an information that was five seconds old?" So, the great IBM ad that he did a few years back. Tom Loosemore, the Former Deputy Director of the UK Government Digital service, now with public digital, says: "why is policy still educated guesswork with the feedback loop measured in years?". We need to have real time digital regulatory systems. Now we have them in the private sector, Google search quality, social media, feed organization, e-mail spam filtering, credit card fraud detection, risk management and hedging in the financial sector. These are all real time digital regulatory systems, but the government lags far behind. It tends to basically promulgate rules but not measure their results, not respond in real time, not update them.

So, I've been focused a lot in advocating for this kind of 21st century government regulatory system. I think it was about 2012, I wrote an article called "Open Data and Algorithmic Regulation", I was meditating a lot on what we learned from the way that Google manages its search through a variety of signals. And the conclusions I came to was that the regulatory system has to operate at the speed and scale of the system it's trying to regulate. It has to incorporate real time data feedback loops. It has to be robust in the face of failure and hostile attacks. Think about the struggles that Facebook is having today. It has to focus on outcomes, not on rules.

I'm going to come back to that, and have to address the incentives that lead to misbehavior. In other words, if you can spam a system and get paid for it, you're going to do it. So, you have to be able to identify those kinds of problems. This last thing has to be constantly updated to meet ever changing conditions. Google is continually adjusting its algorithms for the outcome. Facebook is continually adjusting its algorithms. It's focused on the outcome, not on the rules, whereas government regulation tends to say "well, here's the rule and very little measurement of whether that rule achieved its intended effect".

Now we see how this had an impact in the real world in terms of South Korea's real-time testing infrastructure because they had previously had a brush with another epidemic in 2004. They put real time testing infrastructure in place. Temperature checks at airports, rapid testing infrastructure, and they basically had a very effective government response because they had the forethought returning to the earlier theme. Now to be able to deploy real time response, not just in the digital realm, but in the physical world.

My wife, Jen Palka, who is the founder and executive director of Code for America but also the founder of the United States Digital Service, has written a lot about delivery driven government. That is where you have to really put the delivery of service and the effectiveness of service delivery. And the user sentiments of service delivery and data about what's working are really at the center of policy development, not just a digital service that is added on at the end.

So that's where I come back to this idea of focusing on outcomes, not on rules because algorithmic systems – which is what you need to have a real-time digital response – they all have what's called an objective function. Google looks for relevance. "Did people actually click on the things that we served up to them?" If they clicked on the 3rd result in a search set of search results rather than the first, maybe that means the 3rd result is better and one of the Google signals is "Did people go away and come back and click on something else again, or did they go away satisfied?" And that is literally a feedback loop that changes Google search results. Facebook on the other hand, said "well, we want people to show more of what they spend time with." And it turned out to have a very different impact. It was like, "wow, let's show them more things that make them angry. Let's show them more things that make them upset". Facebook thought that showing people more of what they liked would bring people together would also make them profits, but they did not understand the social impact.

So, we have to ask ourselves in the same way with government tax policy, when we incentivize capital markets versus employment, what are we trying to achieve? I'm not sure that the government is always as clear about that as it should be. We have to ask: what is the objective function of our policy? And of course, because when platforms get their objective function wrong, there can be serious consequences.

Facebook is the poster child for that today, but when you ask what is the objective function of our government regulated financial markets, in the US at least, and I think in many other parts of the world, we basically have doubled down on an idea that was put out by economist Milton Friedman in 1970 that the social responsibility of business is to increase profits. And of course, that has had the intended effect. I hear about our corporate profits after tax in the US. They've gone up pretty steeply since 1970. But at the same time, we see this divergence of productivity and real median family income. The profits are going to fewer and fewer people, leading to social instability. We have to ask, was that really what we wanted? Was that really the right goal? Because tax incentives are algorithmic economics, just as surely as Google's algorithm economics or Facebook's, they're just in slow motion.

They don't change very often, and they're not focused on what the outcomes are, so we have to ask ourselves constantly as we start thinking about 21st century policy. How do we build more dynamic responsive systems? And we have to understand we're getting what we wanted. My friend, Andrew Singer once told me:

"The art of debugging is figuring out what you've really told your program to do rather than what you thought you told it to do".

Are we doing it with public policy? What do we actually think we meant to do? But we do have new tools. Paul Cohen, who was the DARPA program manager for AI, is now Professor of Computer Science, says

"The opportunity for AI is to help humans model and manage complex interacting systems".

And we're starting to see this come into discussions of public policy. A recent article from Microsoft and Open AI proposed automating US tech export controls. They're literally making the case that heavy handed rules that basically specify one thing are not good enough, we need to be using AI techniques to more dexterously, identify and restrict problematic and users or uses by continually improving to incorporate government policy changes or observations from unauthorized users or use attempts. This is a whole new approach. But we're starting to talk about it, we're starting to consider it.

A wonderful work by Carla Gomez is at the Institute for Computational Sustainability. They've done a lot of work actually in Brazil, looking at the interaction of economic forces of population displacement, sensitive species in the placement of dams on the tributaries of the Amazon. It's amazing work where you can actually use the tools of big data of AI to start to model and manage these complex interacting systems that are increasingly the face of policy.

So, I just want to get you to this point where the great opportunity of the 21st century is to use these newfound cognitive tools to build sustainable businesses and economies. It's not just to keep doing what we're doing. I think we have an enormous opportunity going forward.

I think the main point I would leave you with is that, this again, Mariana Mazzucato at UCLA. They have something called the Institute for Innovation and Public Purpose, and I think this idea of what a mission-driven government does for us. And I think it would deal with climate change, it would prepare for future pandemics, rebuild our infrastructure, feed the world, end disease and provide health care for all, resettle refugees, educate the next generation, help us care for each other. So, I guess all I'm saying is when you think about the government as a platform, this is what you should be thinking about.

LUÍS: This sounds very challenging so to speak. For us here in Brazil we've been following the government as a platform concept for many years. Since you quote the term a decade ago. You told us that we should work as operating systems. That we should follow what the private sector leaders are doing and we would become providers of technological infrastructure to society. Here in Brazil, we established the gov.br platform, which now gathers more than 3000 public services. It integrates states and municipalities, more than 60% of all the Internet users in Brazil are now users of the gov.br, and this means 82 million users monthly. Now we have 63% of our public services online and fully digital. And we saved more than 150 million hours of bureaucracy for the Brazilian citizens.

So, we think of gov.br as a platform. But on the other hand, we want to know how we could do better or what you suggest to us about how to use this technology in the real-life scenario to work as a platform, not only as a regulator, but also as a service provider. How do you see all over the world governments working with the private sector in civil society to provide better and more efficient services to its citizens?

TIM: Well, I guess I would say first of all, congratulations on the progress in Brazil. I've seen that you're the most highly ranked digital government in South America and one of the most highly ranked in the world. So that's really fantastic. I guess I'm trying to make the case as we go further and further into the 21st century that the stakes are higher for government, and for digital government. I think we really have to start adopting a new approach to managing the systems and, again, I think it starts just like when I started talking about government as a platform.

It was really a call to recognize with a different metaphor how the government actually operates, and that's what I'm still doing. I'm saying if you start to understand that there are analogies between the way that governments regulate the economy with tax policy, with central banks, etcetera, and that these things are analogous to the way that Google or Facebook regulate their platform with their algorithms, and then you start asking yourselves, how do we modernize that stuff? How do we actually improve it? So that it becomes more focused on what outcomes we have as a society. I think it's a very heavy lift, but there's amazing work going on, in academia and the private sector.

I could point you to other examples besides the work that Carla Gomez is doing, where we can start to use data and AI to actually improve the processes by which we manage what we do. And I think you know clearly these areas that get talked a lot like smart cities, but when I look again at the massive changes that we're heading into in the 21st century, I think it's going to be a lot of migrations, understanding where people should go, what kinds of challenges that brings up, how we think about the future is going to shape very much what we do and the choices we make.

LUÍS: Thank you. These new technologies that just arrived every day, like you said, AI like robotics, UT and everything. Most of them were real to us after the first edition of your book, "WTF?: What's the Future and Why It's Up to Us". How do you see the evolution from the 1st edition? If you had a blank piece of paper right now, would you change the approach you took on the 1st edition? How will you write the new versions of your book and how do you see us as a government? To keep the pace of these innovations, how do we avoid becoming obsolete in these highly evolving and speedy technological innovations?

TIM: First of all, I don't know that I will be rewriting that book, but I am working on another book which is about antitrust in this context. As we have these giant global platforms like Google and Amazon, Alibaba and we have to ask, do they have too much power over big segments of the economy? And if they do, how will we regulate them? How will the government come to grips with that? And I think right now much of what the government is doing is the kind of enforcement that it might have done in the 20th century. And I think we can do better. I think the big challenge that we have to come to grips with is first off understanding how to change the incentives for these companies.

And I think some of that requires the government to understand that it is actually controlling, even in the most free market economy, the government plays a far larger role than it admits to. And I think that's why I'm very enamored of the work of Mariana Mazzucato because she keeps coming back to this idea that the government is, in some sense, the proprietor of the platform and unless it takes that role seriously, it is not going to be able to do the kinds of things like regulate properly and prepare for the future.

And I think we have enormous challenges here in the 21st century that are going to require vigorous, effective government. And that's why I keep pointing to these studies that kind of show the response to COVID and how much effective government has played a role in the divergent outcomes across different countries.

LUÍS: We have all these challenges and opportunities regarding new technologies and they are all based on data, citizen data. Right now, we are following the health challenges, how we deal with the COVID-19, and how we deal with the vaccines, and the logistics to make the country more prepared for the COVID next phases. But all of this data is very precise and personal. How do you see privacy in that concern? How should governments work to keep personal data and privacy of its citizens while on the same hand it has to increase data exchanging mechanisms to be able to respond in real time as you said?

TIM: Yeah, I have a somewhat, probably controversial, thinking about privacy. I believe that the fundamental question is not who has data and who doesn't. I think that fundamental question is, are companies and governments using our data on our behalf for our benefit, or are they using it against us? Because what I see is that people are very willing to give up their data in return for services.

Mapping is a great example. I'm happy to tell Google where I am at any time so that they can give me directions and you know, I can literally get anywhere I want. And that's like an exchange where we've said, ok, we're gonna give you our data and you're gonna give me back a service. And the question really arises: what happens when Google uses that for other purposes? Sometimes we say, oh yeah, that's actually really ok because even though I didn't anticipate that that service would be there, I'm really happy because they did it, and I really love it, it's really useful to me. In other cases, they're selling it to someone else, and I get no benefit whatsoever.

So, when I think about privacy, I think this idea of who has the data and we have to keep it private it's just the wrong approach. It's like no, we have to make sure that companies that have our data can only use it for our benefit and they can't resell it to other people where we get no benefit. They can't use it against us. A great example of that is you know healthcare privacy. There's plenty of data that shows patients like me, where people who have life changing diseases are very happy to share their data with anyone who can be helpful to them. The reason why it's a privacy issue is because at least here in the US, insurance companies use your data against you. So, if I were to have a magic wand, I'd say the government should get off the privacy thing and instead get on this idea of regulating harmful uses of data against the people who provide it.

LUÍS: Yeah, we see lots of new approaches to privacy. First of all, we started to close everything and to make regulations for everything. But right now, we see how data is important, and that's for sure a quite good usage of data that should be spread all over and I agree with you that we should avoid the bad usage of it. In your presentation, you told us that we have many scenarios where we have to turn on our sensors to catch all the signals that the new technology is coming, the development of a society. But if we have many futures, possible futures, how can we do it? Is there any method? Or clue? Or are there any recipes that you could give us that says how to choose the best future or the possible future among all the futures that these signals will give us as possibilities?

TIM: Well, I think that really the key point of my remarks is this idea of robust strategies. But you know, you can ask yourself: is this strategy one that is good regardless? And I know, think climate change is a great example. There's been a lot of debate, politically, about how bad the problem is gonna be, and some people are in complete denial for decades. Other people say this is a crisis. But if you apply the robust strategies filter and say, well, if the people who are really worried about it are right, we better deal with them. If the people who are saying it's no big deal are right, and we invest in, say, solar energy and electrification. It's gonna be pretty good anyway, right? So that's clearly a robust strategy, whereas if you say "no, let's double down on fossil fuels." You know, it's a terrible strategy.

If the people who are worried are wrong are right, right? And it's only good in one future, whereas you look at what happened with Elon Musk. You guys have one of the richest men in the world because he bet on that robust strategy. Look, let's go to electric cars, and let's work on solar. He's only one of many 21st century climate change billionaires. You look at companies like Beyond Meat. You know this is trying to deal with agriculture. You look at the solar cell billionaires in China, you look at the countries that are investing in dealing with climate change and are having an enormous economic advantage over those who are hitting the sand. So clearly, it's a more robust strategy regardless of which future turns out to be the case.

LUÍS: Yeah, the real lesson is implementation. A good strategy and a good implementation may be more important than the right choice because between all the choices, if you do a good implementation… We will create a better future in the end, right?

TIM: That's absolutely right.

LUÍS: So, Tim you are right now being watched by more than 6.500 Brazilians, most of them are public servants, some of them regular citizens, as much of the Brazilian society. So, the main topic of this Innovation Week is: what do we want to leave behind after the COVID shock, what we learned and want to keep for our future, and what should we do differently from now on. So, could you close your session with main ideas? And by the way, thank you for being with us in this virtual session and I hope you can come physically to Brazil in the near future.

TIM: I hope I can do that too. It's a country I've always wanted to visit and I've never been there. So yes, I will definitely put that on my future calendar. Let me close by saying that there is an opportunity for a reset, that's why I opened with this idea of the way that World War One reset the entire global economy.

COVID and climate change, I think are going to change the economy profoundly. Right now, we have a consumer facing economy that's based on consumption. It's based on increasing corporate profits, and I think we're going to have to invest pretty seriously in dealing with big, hard problems, and you look at the difference that we've had with COVID and having to provide support. It's suddenly making us think about questions like universal basic income, which seemed like fringe ideas for a while. You know climate change is going to accelerate so we're going to say wow, maybe we don't want to be just saying that growth always has to go up to the right. Maybe we need to say we need to focus away from the consumer economy into, for example, mass electrification. Help, dealing with the impact, helping people to relocate.

There's going to be all these redirects of the economy that are going to require, I think, the kind of intervention that is very different from what we've expected in the completely free market economy we've been aspiring to for the last four or five decades. We need to rediscover the sense of public purpose redirected by the government to have forethought, to help push the economy and to unleash the private sector in the way that, for example, Franklin Roosevelt did for the US economy in response to World War Two. It was like "we have to go in this direction, we're not gonna make cars anymore, we have to make airplanes".

And once they did that, it was the genius of the free market that actually rose to the occasion. But it took a government push and I think we're going to have a lot of circumstances in the 21st century that are going to require that kind of strong leadership, mission-driven leadership that then catalyzes the private sector. And that really is the essence, I think in the 21st century version of government as a platform.

LUÍS: Thank you, thank you very much. Ladies and gentlemen, this was Tim O'Reilly, the founder of O'Reilly Media and the inventor of terms like "open-source software", "Web 2.0" and the "government as a platform". Thank you, Tim. It was a pleasure and as I said, I hope we can be together to discuss much more about how governments can move on.

Thank you very much.

TIM: You're very welcome.