## TIM O'REILLY INTERVIEW PART TWO - INTRO

Hello again, Ars Technica listeners. This is the second installment of a three-part interview with tech publisher and thought-leader Tim O'Reilly - discussing his fascinating career, as well as the rich tapestry of original thinking that fills his recent book WTF.

If you haven't yet heard part one, there's a link on the page where this player's embedded, and I strongly suggest that you go back and listen to it before this one.

And with that - back to my conversation with Tim O'Reilly. To set context, at this point in the conversation, we have started talking about how incredibly early after initial emergence of the World Wide Web, Tim decided to bet his company on it.

## TRANSITION MUSIC

Rob Reid: Unbelievably early. '92?

Tim O'Reilly: Yeah. We actually published a book in '92 called The Whole Internet User's Guide & Catalog.

Rob Reid: And how many websites were there in 1992?

Tim O'Reilly: About 200. When we-

Rob Reid: It was a short book, right?

Tim O'Reilly: Well, no. The book was actually-

Rob Reid: Oh, the internet, yeah.

Tim O'Reilly: It was really about the internet more broadly.

Rob Reid: News groups and-

Tim O'Reilly: [crosstalk 00:25:36] FTP, Telnet, all the tools. Literally we sandwiched in the web at the last minute. It wasn't even ... The author of the book who wrote it was one of our editors.

Rob Reid: But still radically early.

Tim O'Reilly: Yeah. It is a long history of why we were doing it. We were trying to figure out e-books. Dale Dougherty, who is my troublemaker-in-chief, he had been looking at e-books since he did a HyperCard version of our book, Unix in a Nutshell, in 1987. He discovered the World Wide Web through a toolkit called Viola. Long story.

But we ended up creating the first commercial website, and that came, again, in this combinatorial innovation out of a couple of streams. Dale wanted to create an online magazine about the people who were making the World Wide Web, but we also had a catalog in the back of this book, The Whole Internet User's Guide & Catalog. Which, by the way, went on to sell a million copies and was selected by the New York Public Library as one of the Books of the Century, as they said.

Rob Reid: Wow.

Tim O'Reilly: Because it really introduced the internet and the web to the world.

Rob Reid: Yeah. With a million readers back then, it introduced it to a lot of people.

Tim O'Reilly: That's what we did, so we really went out there. I became the prophet of the internet. "The World Wide Web is coming."

Anyway, one of the things that we did for this evangelization was to realize people couldn't drive the internet, really; it was hard. We came up with this idea to do a - It was hard. And, so we came up with this idea to do a kiosk in bookstores, and we actually created one in the store in San Jose called Computer Literacy Bookshop.

Rob Reid: Right.

Tim O'Reilly: And the kiosk was a point and click version of the catalog in the back of the whole internet user's guide and catalog. Click on this link and it will take you to ... Instead of typing in telnet.quit.mit.edu, you could just click on the link and, bang, you get information about the latest earthquakes. So, think of us as yahoo before there was Yahoo.

Rob Reid: Yeah, definitely, yeah.

Tim O'Reilly: And so we created it in early '93. It was the first advertising supported site. I thought, well, that would be the natural model. You know, we invented, not internet advertising a la, you know, what Hotwire did with the banner ad. We invented basically the idea of the commercial website as an ad for a company's products. And of course, in the very beginning the very first ads, there were no ... People didn't have websites, so we created this catalog at GNN, and they got a page in it.

Rob Reid: And GNN was Global Network Navigator.

Tim O'Reilly: Yeah, Global Network Navigator.

Speaker 1: Right, right, yeah.

Tim O'Reilly: Yeah, so we sold it to AOL in 1995.

Rob Reid: So, right around when Yahoo was just getting started, you sold it.

Tim O'Reilly: Actually we almost bought Yahoo at one point.

Rob Reid: Jerry's Guide to the World Wide Web, at the time.

Tim O'Reilly: That's right. But, they decided to take Venture Capital instead. I didn't want to take venture capital, and the reason I didn't want to take venture capital was, that I had in my consulting days I'd been around so many startups and had watched them go from being really interesting places that I liked, to being really boring companies just like everybody else. I went, Man, I don't want to do that.

Rob Reid: Upon taking Venture Capital.

Tim O'Reilly: That's right.

Rob Reid: That sort of took the edge.

Tim O'Reilly: I want to keep doing interesting work. You know, my original business model was interesting work for interesting people.

Rob Reid: And, you convened what was for all intents and purposes the first world wide web summit, right?

Tim O'Reilly: It as in our offices, and it was really just, Dale brought together a bunch of the early pioneers of the web to kind of start thinking together about how the web could really be this big thing, yes.

Rob Reid: The whole Mosaic team was there, right?

Tim O'Reilly: Yeah, exactly, yeah.

Rob Reid: Marc Andreessen, and his merry band from [crosstalk 00:29:20].

Tim O'Reilly: That's right, and Tim Berners-Lee and people like Rob McCool, who invented the idea of the dynamic website with CGI.

Rob Reid: Right.

Tim O'Reilly: We had kind of done that activism about the web. My next big wave of activism was in 1998, a few years later, when I realized that many of my best selling books were about free software. It was this long tradition of academic information sharing. And, that was what I really responded to. And, I saw that there was this ... And, this is really a story I retell in the book, because it's a great illustration of when you have the wrong map.

Rob Reid: Yeah.

Tim O'Reilly: You actually don't see reality clearly enough. Because, what was happening was that all of the people who were talking about free software were focused on this political narrative of toppling Microsoft.

Rob Reid: Yeah.

Tim O'Reilly: You know, I was saying, "Why aren't you talking about the internet?" Here's the internet is this huge work of free software that, Tim Berners-Lee put the web into the public domain. The fundamental protocols of the internet were originally developed under government contract, but all of the TCP/IP stuff was, even in Microsoft stack, came out of UC Berkeley. And, all the utilities. And, it was also this continuation of this Usenet and UUCP net culture that I had been part of, and had documented in some of my early books.

So, I said, "This is really ... We gotta bring all these people together." When we did bring them together, I said, "I want to find out what we all have in common." And, it was that meeting that Eric Raymond said, "Hey, we came up with this new term a couple weeks ago. Christine Peterson made it up, called Open Source", as opposed to free software. And, it was this big debate, would we use free software or open source.

Rob Reid: This was a summit you had convened, right?

Tim O'Reilly: Yes. I convened a summit of about 30 leaders of free software projects.

Rob Reid: So, the term Open Source was born at that event or, rather, shortly before it. But then, you guys voted and basically knighted it.

Tim O'Reilly: It was knighted, and we agreed to use it. Part of the event was, these guys showed up, and I said, "We're having a press conference at the end of the day, so we have something to tell them." And, we'd invited in all of the top media, who I knew from works and promoting the internet.

Rob Reid: Yeah.

Tim O'Reilly: That's really when it just sort of clicked. Within a few weeks, it was with Forbes or Fortune. You had Linus Torvalds on the cover and a big spread inside about all these free software leaders. I still remember, and this is a great example of the power of ideas.

Rob Reid: Yeah.

Tim O'Reilly: This is something that's fairly central to my book, WTF. What's the Future and Why It's Up to Us. Some people say, "Well, who's us? And, why is it up to us?

What can we do? Aren't we helpless in the face of these vast technology platforms?"

Rob Reid: Yeah.

Tim O'Reilly: And, the answer to me is that, what we as humans believe, shapes what this vast assemblage of things does. In fact, we can go back to that whole discussion of AI as a collective being.

Rob Reid: Yeah.

Tim O'Reilly: We're actually seeing that today. You know, right now, there's these vast mindstorms that are going through the internet, you know, where people ... And, not just sort of cute memes.

Rob Reid: Right.

Tim O'Reilly: But, vast ideas that are shaping the consciousness of millions of people, shaping our politics. So, the power of an idea that's adopted by millions of people is enormous.

Rob Reid: Yeah.

Tim O'Reilly: And, getting those ideas right, and getting them to spread is a huge part of the way that we shape the future. You know, think back to the American Revolution. A set of people came to believe something different about the way that people could be organized.

Rob Reid: Yeah. And, their internet was pamphleteering, and things like Common Sense, by Thomas Paine, got very widespread. I mean, not widespread like Google. But, a very, very high double digit of American adults read Common Sense. And, they had their own way of spreading these things, and at the time the speed was also very revolutionary.

Tim O'Reilly: That's right. That really is, in some sense, the history of humankind, is the speed and thoroughness with which ideas spread. And, we've been building better and better mechanisms. That is why our society is so incredibly affected by new ideas.

When I started telling that story about, free software is not this rebel movement that's hostile to commercial activity. All of you, and all of you reporters from the New York Times, and the Wall Street Journal, and Time, and all the people who were there. You were all using free software, you depend on it.

Rob Reid: Yeah.

Tim O'Reilly: You know, because the internet was built with free software. And, they were like, "What?" I said, "Yeah. Like, when you have newyorktimes.com, this guy here, Paul Vixie, at the end of the table, he's written and maintained that software for many years. It's just him, and you guys depend on his free software to maintain the domain name system that gives you a name like newyorktimes.com. Oh, and you send an email. this guy, Eric Allman, he wrote that software that routes 75 percent of all the email on the internet. Oh, and over here, if you have a website, it's probably Apache. Brian Behlendorf is one of the leaders of that team."

So, I kind of spread that story. And, it was so amazing, where it was first met with incredulity. I did about two weeks worth of interviews, and it felt like you're pushing on something and it's starting to move. And then, within two weeks, it was just what everybody believed. And, it was probably the most visceral experience I've ever had of changing peoples minds. So, I've been addicted to that ever since.

Rob Reid: And, naming is so important. You need a name that's gonna travel far and wide, and nest in peoples minds, and really convey exactly what the named thing is. In this case, you guys clearly nailed it as a group.

Tim O'Reilly: It's interesting, because if you think of all the names that I'm associated with, like Open Source, and Web 2.0, and the Maker Movement. I didn't come up with any of them. I came up with this deeper infrastructure of ideas, then this name just sort of walked in.

Rob Reid: You convened the people, the exact right people to the room, though. It kind of reminds me of what Kim Polese did with Java. I mean, she's always very clear and very much at pains to say she did not name Java. But, she convened the people who ... In fact, nobody in that conference room, when it was named, remembers who put it up on the whiteboard. But, she pulled the right folks together and led the conversation from which it emerged. I think that's something very, very significant. And, by the way, I didn't know Maker was another term that's associated with you. You guys make, you Make Magazines, so obviously I'm not shocked. But, that's a pretty impressive run, Web 2.0, Maker, Open Source of great names to be associated with.

This brings us to this wonderful book, which actually comes out the very day that this episode is going to be posted. It feels to me like it's a cross between a memoir and a manifesto, plus, maybe a crash course in what's new and truly shaping the tech scene right now. Is that a decent characterization?

Tim O'Reilly: Yes, I would say so. It's basically, it's a memoir from what I've learned from now, plus the 40 years in the technology industry. Mostly about technology platforms.

Rob Reid: Yeah.

Tim O'Reilly: What makes them thrive and how they work. Particularly, how the latest platforms, how they have changed how they work internally.

Rob Reid: Yeah.

Tim O'Reilly: And then, what lessons that has for us as an economy and a society. The first lesson, which I spend some time on, is this idea that they're really marketplaces, they're connecting people. And, a marketplace has buyers and sellers. What I've watched is that platforms begin with this explosion of new capability connecting people, creating opportunity for both sides of a marketplace.

Rob Reid: Now, are you talking about platforms and marketplaces in a very literal sense, like eBay and Airbnb? Or, are you talking about it in a broader frame?

Tim O'Reilly: I think, actually, I am talking about it in the broadest possible frame, eventually. But, let's just start with, you know, I started with Microsoft, where they were basically the platform. The software platform for this first wave of, really, the democratization of computing.

Rob Reid: So, the '80s, '90s Microsoft.

Tim O'Reilly: Yeah, the '80s, '90s Microsoft.

Rob Reid: Yeah.

Tim O'Reilly: It was this huge wave of opportunity for small software developers that were, you know ... It was much smaller than the internet. But, there were hundreds, if not thousands of small software companies. And, they all, almost all died. They got, they were consumed. And, Microsoft, which was originally the enabler of this ecosystem, became the consumer of this ecosystem as, one after another, they said, "Well, we have to kill ya."

We had that experience directly with, we had launched, actually, the first PC-based web server as a follow on the GNM, something called Website. Microsoft was like, "This is so great, this is so great. We're gonna make you famous. And then, a few weeks later, yeah, a few months later, it was like, "Sorry, we're gonna have to kill ya, because we need that market."

Rob Reid: So, what they're saying is that, "We're going to build that into operating system, or we're gonna come out with a rival application that will annihilate you. Because it's us, and it's ROS." It's like the marketplace, instead of being eBay, as a literal market place, the market place in this case was this huge base of people who are using Microsoft. And, the buyers were all the software of the users, and the sellers were all the software developers.

But, unlike eBay, which doesn't say, "Hey, we're now going to be the only seller of a whatever very popular category of thing on eBay, you know, like Beanie

Babies, back in the early days. Microsoft was killing off those people who set up shop on their platform, and said, "We're saying, hey, theirs three of us making word processors, and their all different, and we all wanna win." And, Microsoft basically said, "Here comes Word."

Tim O'Reilly: That's right.

Rob Reid: They devoured, in a sense.

Tim O'Reilly: They devoured the ecosystem. And, of course, all the developers went somewhere else. They went to a place where they didn't think they could make any money. And, that's kind of another thread through my career people. Innovation doesn't actually start with entrepreneurs, it starts with people having fun.

Rob Reid: Yes.

Tim O'Reilly: This idea that innovation begins with entrepreneurs and venture capitalists, that's not been my experience. Innovation begins with people who, actually, don't think there's any opportunity to make money. They're just kinda doing shit for the hell of it.

Rob Reid: Oh god. I got onto the internet in 1994, much later than you. But, everybody, even then, was still just in it for the joy of it. And, I agree.

Tim O'Reilly: Yeah. So, all those passionate people, they went over the internet. The internet became this huge opportunity. And then, the venture capitalists came in later. I've watched that repeat as Google is consuming more and more of their ecosystem, as Twitter, and Facebook, and whatever, they kind of compete with the people that they should be enabling.

Rob Reid: Twitter did it very, they devoured some of the people who were-

Tim O'Reilly: Yeah, and way to early too early. They didn't even wait til it was mature enough that they could really profit from it.

Rob Reid: Yeah.

Tim O'Reilly: So, a lot of bad stories there. And, of course, I then really look at that and I say, "Well, that's actually what's happening in our economy." And, that's part of the problem. That's really the central nub of the book. Which is, okay, if we learn that platforms have to be good for all the participants, or the participants go somewhere else.

Rob Reid: Right.

Tim O'Reilly: Then, what are we gonna do about that? What is that, you know, are we doing that in our broader economy. And, of course, we are.

Rob Reid: Yeah.

Tim O'Reilly: So, the narrative, I spent a lot of time on Uber and Lyft, and then on Airbnb, sort of explaining the dynamics of marketplaces, how they're increasingly coming, you know, digital marketplaces are increasingly coming into the real world. Again, talk about the rise of Amazon's thinking of itself as a platform. And, how Amazon organized itself internally.

Then really, I spend, there's a chapter about Google and how they manage their algorithms. And, it's really about this notion ... And again, it's one of these ways, a remapping of the way we think about things. I start my chapter on Google by saying, "If you think with a 20th century mindset, you think that software engineers at Google, or Facebook, or Amazon are kind of like workers in a factory. Except, they're making software instead of making, you know, widgets.

Rob Reid: Yeah.

Tim O'Reilly: But actually, the workers at these companies are software programs, and these are their managers. You know, and everyday they're taking feedback from their customers about how their workers are doing, and then teaching their workers how to do a better job.

Rob Reid: Yeah.

Tim O'Reilly: But, also though, we now have this interesting situation at a company like Uber, where the programs themselves are the managers of a lower level of worker.

Rob Reid: Right.

Tim O'Reilly: So, I really kind-

Rob Reid: Being the drivers, those being the drivers.

Tim O'Reilly: The drivers, yeah.

Rob Reid: Yeah.

Tim O'Reilly: So, I'm kind of looking at all this. But, there's a lot of thinking about, how does a company like Uber or Lyft engage with workers? And, how is technology used in this incredible new compound organism? You know, where you can really see with Uber and Lyft how, you know, this is not just about digital stuff anymore. You now have this, you know, one of these compound beings which is doing stuff in the real world. Of course, it's true of Amazon, just less obviously the

package just shows up at your door, and the human doesn't really seem to be there.

Rob Reid: One of the refreshing things is, this doesn't take you to a place of grim pessimism, of which there's been plenty lately. There was a quote, it's actually not from the book, I think it's from a medium post that you put up to describe the book, which really struck me. You said, "I've had my fill of technological determinism. Technology is the solution to human problems, and we won't run out of work until we run out of problems."

This won't run out of work thing, is refreshing to see that, to me. Because, there's been a lot of doomsaying about how the next wave of technology, the new machine age that we're entering, is gonna obviate the need for an enormous amount of human work. That seems to be, actually, quite contrary to your own thinking.

There's one idea you develop that I quite liked in the book, you called the augmented worker. Would you care to go into that a little bit? Because, I think there's a lot to hope for in that.

Tim O'Reilly: Yeah. Well, first of all, if you think about the fundamental design pattern of technology, it is that it allows us humans to do things that were previously impossible. You know, whether it's an Iron age warrior with an iron sword cutting through the bronze sword of his opponent. You know, he was augmented by that technology, made more powerful. You think about the Industrial Revolution, how much power it gave. We could go faster, we could dig tunnels through mountains. Eventually, we learned to fly through the air. And, all these amazing superpowers.

Rob Reid: And, made the worker more valuable, because the worker could do more stuff.

Tim O'Reilly: We did more. Sort of like, we didn't say, "Ah, guess what. We now only need two percent of the population to produce all the food that the United States needs.

Rob Reid: Yeah. You guys get your gruel.

Tim O'Reilly: Yeah. We started creating all kinds of new elaborations on food. And, you really see this in today's world, as well. This really goes back, this is a really wonderful idea. Whenever one thing becomes a commodity, humans make something else valuable.

Rob Reid: And, something often adjacent to it.

Tim O'Reilly: Yeah, it can be adjacent. I saw that with, that was led me from open source software to big data, for example. When a software is being commoditized, this big data would become valuable.

Rob Reid: One example you gave in a prior conversation of ours, which I found really evocative was, "Okay, we can monetize textiles and cloth, some time ago." But now, we have fashion as a result of that. If you look at the amount of money that's spent on raw textiles, you know, bolts of cloth, versus the amount of money that's spent on fashion, on finished clothing, it's probably 10 X in terms of industry size.

And, certainly the agricultural revolution, to go way back, can monetize the calorie. Which, almost all working humans, prior to that, spent most of their working lives creating enough calories for themselves and their families. Now, we've made cuisine. Though agriculture is, of course, a huge, huge industry, the amount of money that's spent in raw wheat, say, probably pales in comparison to the amount of money that's spent on Ritz crackers, restaurant meals, and all the other things that are made from wheat.

Now, to get back to get this concept of the augmented worker. Just as augmented farmers made calories so cheap, we were able to create cuisine, your book makes some equally provocative points about digitally augmented workers.

Tim O'Reilly: Just as we augmented our physicality, you know, if you look at an application like Uber and Lyft, you realize that their workers are cognitively augmented. And, it's a really important thing to understand here when you look at these applications. A lot of people think, "Well, it's just an app", right?

Rob Reid: Right.

Tim O'Reilly: But no, it's an app which is an interface to a system with people, machines, algorithms. It's a marketplace of drivers and passengers. The app does this matching in real time. Here's the thing that's really interesting. The reason why Lyft and Uber can have enough drivers, that you can get picked up in three minutes anywhere in the city, most times, is because those workers are augmented by a mapping application. Like, Google Maps and Waze. And, it tells them, not always the app, the Lyft or Uber app that matches them up in real time with the passenger.

Rob Reid: But, the GPS, at some point in time.

Tim O'Reilly: But, the GPS that tells them where to go. This is an example of a cognitive augmentation that makes those workers able to do something they couldn't do before.

Rob Reid: Yeah.

Tim O'Reilly: Now, imagine how might we rethink healthcare in a world where you could summon a community health worker who was cognitively augmented. You know, who has the ability to check with all kinds of new sensors, your health is

able to work with you, is able to summon an AI to look at that. You know, I have this funky little thing on the side of my head that I'm kinda going, "What is that? It's under my hair, I have some little bump. I wanna go to the doctor to get it looked at."

Rob Reid: Yeah.

Tim O'Reilly: You know, somebody could point a camera at it, have an AI look at it. And go, "Oh yeah, this is such and such. I'll take it off right now." Or, "No, no. You should really go in and get it ...", you know. There's all kinds of crazy ways we could totally rethink the workflows of healthcare, of what kind of level of training is required to deliver healthcare.

Rob Reid: To get back to the optimistic notion of the augmented worker, because I think this is, actually, a very evocative notion. Let's imagine this mobile healthcare worker is, maybe, a registered nurse who is able to do things that, formerly, a dermatologist needed to do. But, because of the augmentations of the software of the mobile apps, and so forth, this nurse could do a lot of that initial diagnostic work of a dermatologist.

So, let's say the RN is, I don't know, three times more capable as a mobile health worker than previously. We're not gonna say, "Oh, thank god. Let's lay off two thirds of them." We're gonna say, "Let's hire more of them, because this is a more valuable person."

You use a couple great examples in your book. One, is something that I, personally, remember when automatic teller machines first came out. I remember thinking all these poor folks at the bank are gone, because all we do is come in and withdraw money from them. But then, you point out in the book, with the rise of the ATM, there were actually more tellers than there used to be. Because, they're doing a higher level stuff and, again, they're more valuable. Which is, pretty powerful.

Tim O'Reilly: That's right. Yeah. That's the work of an economist named James Bessen, who, fascinating research. He's done a lot of interesting work about technology transformations. This is a lesson. When you do more, you know, when you do more for the customer, when you actually increase productivity, you do hire more people.

**END INTERVIEW ELEMENT OF PART TWO**

So Ars Technica listeners - here we conclude the second installment of my interview with Tim O'Reilly - and of course, Part three is coming tomorrow.

As mentioned before, if you can't wait to hear the rest of the interview, you can just head on over to my site, at after-on.com. Or, type the words After On into your favorite podcast player, and

scroll through the episodes to find this one, which originally ran on October 10th of last year. There you'll find lots of episodes about life sciences - above all, genomics and synthetic biology. Conversations about robotics, privacy and government hacking, cryptocurrency, astrophysics, drones, and a whole lot more.

Or, you could just join me tomorrow, here on Ars.

**OUTRO MUSIC**