

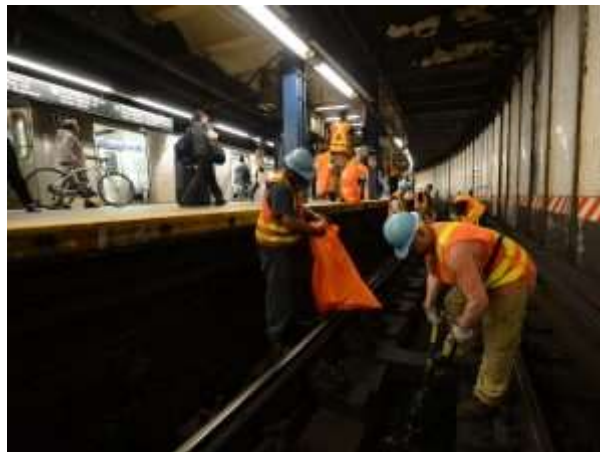


# In Praise of Maintenance (Ep. 263)

October 19, 2016 @ 11:00pm  
by **Stephen J. Dubner**  
Produced by: **Arwa Gunja**



LISTEN NOW:



Is adequate maintenance more important for a growing society than exciting innovation? (Photo: Marc A. Hermann/MTA New York City Transit)

*Our latest Freakonomics Radio episode is called “In Praise of Maintenance.” (You can subscribe to the podcast at [iTunes](#) or [elsewhere](#), get the [RSS feed](#), or listen via the media player above.)*

*Has our culture’s obsession with innovation led us to neglect the fact that things also need to be taken care of?*

*Below is a transcript of the episode, modified for your reading pleasure. For more information on the people and ideas in the episode, see the links at the bottom of this post, as well as credits for the music in the episode.*

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A while back, I got obsessed with the notion of maintenance – or, really, the notion of how much time maintenance takes. You go to the gym to maintain your body so it can do what you need it to do; maybe you go to a doctor and a dentist and a therapist too. You spend a third of your life sleeping so your brain can do what it needs to do. And think about all the time and resources that go into maintaining your work life — the meetings, the memos, the productivity apps. Of course there's also your personal life to maintain. I got so obsessed with the burden of all this maintenance that I decided to precisely track how many minutes I was spending of each day on different forms of maintenance versus all the other things you try to accomplish. But after just a couple days, I quit this ridiculous exercise – because it had become just another maintenance task that kept me from doing the stuff I really wanted to be doing. I decided that maintenance was simply a curse that had to be accommodated. That the less I thought about it, the happier I'd be. And then I read something that changed my mind completely.

*Lee VINSEL: Our thesis is basically that our culture's obsession with innovation and hype has lead us to neglect maintenance and maintainers.*

Today on *Freakonomics Radio*: "In Praise of Maintenance." Because there's not only a need but a certain nobility in taking care of what you've already created. And maybe we shouldn't look at maintenance as the enemy of innovation.

*Larry SUMMERS: I think a great nation can walk and chew gum at the same time.*

Or can we?

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There's a digital magazine called *Aeon* that publishes essays about ideas and culture. Just as I was having my personal crisis about the burden of maintenance, I came across a fascinating piece in *Aeon* called "**Hail the Maintainers.**" The subtitle: "Capitalism excels at innovation but is failing at maintenance, and for most lives it is maintenance that matters more."

*VINSEL: Okay, I'm **Lee Vinsel.***

*Andy RUSSELL: And my name is **Andy Russell.***

They are the co-authors of the *Aeon* essay. Vinsel first:

*VINSEL: I'm an assistant professor of science and technology studies at Stevens Institute of Technology.*

*RUSSELL: I'm also at Stevens Institute of Technology.*

*VINSEL: I am trained as a historian, and most of my work looks at the relationship between government policy and science and technology.*

*RUSSELL: I'm an associate professor of history and director of our program in science and technology studies.*

Vinsel and Russell had already come to believe that the American embrace of innovation had led to – here, I'll quote them — “a mountain of dubious scholarship and magical thinking.” And then Walter Isaacson published a book called *The Innovators: How a Group of Hackers, Geniuses, and Geeks Created the Digital Revolution*.

*VINSEL: Basically, Andy wrote me and a friend a kind of joke email saying, “We should answer with a book called The Maintainers: How Bureaucrats, Standards Engineers, And Introverts Create Technologies That Kind of Work Most of the Time.” Yeah, then we just decided to lay it out really clearly in an essay – so, examining where innovation rhetoric came from, what we call “innovation-speak,” then laying out a more grounded vision of human life with technology.*

*DUBNER: I'll ask you an impossibly broad question to start with: how much are we, I guess, hurting ourselves or missing out on, society-wise, globally — it gets more impossible to answer by the moment — by failing to appreciate the value of maintenance at the expense of innovation?*

*RUSSELL: It's a good question; it's a broad question. One thing that we insist that's important isn't that we need to do only maintenance and get rid of innovation. We both appreciate innovation and creativity in new stuff. So there's no argument there. I think in paying more attention to maintenance and maintainers, it's really signaling a shift in values away from glittery new things, consumer culture and those sorts of things, and toward work, towards labor, towards maybe even sacrifice in the form of taxes or effort to sustain society, and to pay a little bit more respect to the people whose jobs do that. They're not superstars, they're just grinding it out from day to day.*

*DUBNER: But I guess one of my counters to that argument — and maybe I've just been brainwashed by the innovation crowd — is that, Well, one of the promises of technology is that it would eliminate the need for much, or in some cases, all of that kind of handmade maintenance. So if you're talking about something literally like a cleaning person, a janitor, someone who comes along to a public restroom in an airport 8, 12, 15 times a day to clean it up, I think, "Well, don't I want the much-vaunted, self-cleaning bathroom that was supposed to be here by now? Wouldn't that technology, if it worked well, be better? Because it would a) do a good job, and b) not require people to do that kind of work." So, why are you making the argument that that kind of work is so important? Is it really a moral argument?*

*VINSEL: It is a moral argument, that's true, but I think we also need to just take stock of where we're at. We live in a moment where lots of people are writing and talking about robots and artificial intelligence. And all these machines and technologies, they're going to come along and replace drudgery, right? We're not going to have to worry about that stuff anymore. But you know, I can show you movies put out by General Motors from 1955 that show you the kitchen of the future that's not going to involve any labor for women, right? And that didn't come true. And we have to be sober and say, "Yes, these things might come." And that wouldn't be bad, that would be great. But, we can't pretend that we can just forget about all the labor that's going on right now, and probably continue going on for the foreseeable future.*

*Larry SUMMERS: People always think about what's new. People always think about what can be named.*

That's the Harvard economist **Larry Summers**, who has served as the president of Harvard, as the U.S. Treasury Secretary, chief economist of the World Bank, and as President Obama's top economic adviser.

*SUMMERS: People always think more about how new ground can be broken than they think about how existing institutions can be sustained or existing facilities can be maintained. It leads to a constant trap where we underinvest in old things, then old things disappoint, us then we feel a need for new things, then to satisfy that need for new things we under-invest more in old things and the cycle goes on. You see it in the fact that we pay the equivalent of 40 cents a gallon in gasoline taxes for extra repairs due to the fact that we are not maintaining our highways right. You see it in an air-traffic control systems in the United States that still uses obsolete technologies and doesn't use GPS. And*

*as a consequence, we all spend more time with air-traffic delays, we burn huge amounts more energy, we take greater safety risks than we need to. You see it in developing countries where they're always building new facilities, but then a few years later those facilities sit in a sense of disrepair. I think the fetish of novelty and the lack of glamor of maintaining and sustaining things is a besetting problem. You know, one very important area where you see this is the area of philanthropy where everybody always wants to start a new institution, do something new. And then be a catalyst and then have others fund their institution. Well, not everybody can be the one who levers other money. Some have to be levered. So I think it does lead to a fragmentation. It does lead to returns that are lower than they need to be. And in cases like the U.S. public sector, it can lead to tragic underinvestment.*

Okay, so let's do a brief history of maintenance. We'll talk about our cities, our homes, our infrastructure, and even how modern investors think about maintenance versus innovation. Let's start way back ... here:

*Ed GLAESER: Certainly, Rome understood that engineering and infrastructure was a huge part of making its city function. And it not only invested in that in Rome, but exported it elsewhere.*

That's **Ed Glaeser**, another Harvard economist.

*GLAESER: So the sewage starts with the Cloaca Maxima, in the 6th century before the Common Era, and that's associated with the last of the Tarquin Kings, the Etruscans.*

The Cloaca Maxima was the one of the world's first sewage systems.

*GLAESER: It was maintained. There were people like Cato the Elder who was particularly famed for uttering that Carthage must be destroyed, "Delenda Carthago est" at the end of every speech. He was also heavily involved in water and sewage [laughs] [00:12:35] So they, this, you know, single-minded passion for the, the good of the Republic translated into caring about infrastructure, and he made it one of his, his pet themes. It was also an Augustan theme as well, right? Augustus wanted to be remembered for taking a city of brick and leaving it a city of marble. But he was also attentive to the water and sewage maintenance side of things. [00:13:03] And of course, Rome also was*

*interesting in that they had — they weren't rich by modern standards, maybe per capita income in modern dollars, around 1,500, but they had remarkable government capacity.*

Glaeser, we should say, is an expert on cities – and also thinks that cities are the one of the best things that humans have ever come up with. He's the author of a book called ***Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier.***

*GLAESER: In fact, all of these old imperial cities had remarkable government capacity, because that's how you got to be an imperial city. You had to have a government that was able to subdue all your neighbors. So Julius Caesar was actually able to help the roads function by stopping wheeled traffic from entering the city for the first 10 hours of every day, which helps in the maintenance side as well, although it's not a substitute for repaving the roads.*

*DUBNER: So cities are inherently dense, which means that a problem, whether it's trash or crime or bad streets or sidewalks, can affect a lot of people in a hurry. So talk to me about the importance of maintenance, especially physical infrastructure maintenance, especially in a city.*

*GLAESER: Oh, absolutely. It's both the fact that any problem can be magnified, and the fact that just proximity itself creates downsides, right? Proximity means that someone's bacteria are more likely to affect you. Proximity means that we're all sharing the same amount of road space, and consequently trying to gobble up the same real estate, and facing the downside of congestion. And of course, density also makes it easier for one person to steal from one another. And on top, of course, creating congestion, all those drivers on city streets, wear down the infrastructure, which is why we so often think of city streets as being places that are full of potholes or full of other problems. So, cities need infrastructure of a variety of different forms, and that infrastructure needs to be maintained, and making sure that you have the institutions in place that can provide at least a modicum of maintenance is really crucial to making city lives work.*

Glaeser recently spent time in the Philippines, learning how Manila deals with sewage. Short answer: not nearly as well as ancient Rome.

*GLAESER: These are septic tanks that flow right through pipes, right into sort of main corridors that course through the city and often end up, in the bay. And the septic tanks are typically in the house, beneath the kitchen perhaps, outside*

*maybe on the, on the driveway. And the big project that the water companies, which take care of the sewerage and the septic tanks were involved in doing this, trying to get people to clean out their septic tanks. And you know, it wasn't that the water companies weren't willing to provide it; the people often didn't even want it, right? So they'd let it go 30 or 40 years without any form of cleaning of the septic tank, without any desludging. And the people were pushing against having it cleaned up because to get to it, you needed to tear up someone's kitchen, and they didn't see the upside of moving it. And consequently, there's a whole public issue related to the fact that more filth is spewing out through these pipes, into the common areas. So, the problem of maintenance is really huge in this area.*

*DUBNER: So in a case like that, what's a solution, other than building infrastructure like a septic tank in a way, originally, that it doesn't require, you know, disrupting, your life later on?*

*GLAESER: Certainly, designing infrastructure from the beginning, so that it is maintenance-friendly, is surely the right way to go, as the lower the cost can possibly be, both for the large-scale entity that has to do the maintenance but also for the individual that has to put up with the inconvenience. That's clearly important. But on top of that, when you're looking at maintenance that's required to keep a city healthy, I'm a big fan of having some form of regulation and fine in place. Look, I mean, I'm, as you know, I'm a Chicago Ph.D, I think lots of areas of our lives are over-regulated. I think entrepreneurship is overregulated. But there are areas like maintaining public health where I think it's just fine to have regulations and small fines that are put in place if people actually don't do basic tasks like desludging that are required for the public good.*

I asked Glaeser to name a modern city that gets maintenance right.

*GLAESER: The meritocracy that is Singapore is quite impressive on the maintenance side. This is no longer a new city, and yet it still feels clean; it still feels well taken care of. And I think, part of it is that they have enough smart people in government for whom this is their job, that they continue to focus on this. I think it's an open question as to whether or not all the shiny things that are being built in China will wear all that well, or will be protected. I think we still have to see on that.*

*DUBNER: So when it happens well, whether in modern Singapore or Ancient Rome, is it a more a function of design that was able to be maintained relatively*

*easily or cost-effectively, or is it a kind of conscious devotion to maintenance that many individuals or nations just fail to factor in or budget?*

*GLAESER: Well, I think in both the Singapore and Rome case, there are leaders who make it their job, and some, in the case of Cato, presumably, thought that there was, you know, popularity to be gained by sticking up for the old Rome and for maintaining Roman virtues, including decent infrastructure. Most of the Roman infrastructure looks pretty simple from a modern perspective, and consequently it would've been easier to maintain than a more complicated infrastructure. But that raises sort of larger, you know, technological changes, which is that as the world becomes more complicated, the infrastructure becomes more complicated, there are more ways that it can potentially go wrong, and maintenance if anything becomes even more important. So in a simpler world, maintenance was either to get at than that it is in a more complex world of today.*

*VINSEL: I think we should be talking about what is the value of engineering?*

Lee Vinsel again, from the Stevens Institute of Technology.

*VINSEL: The value of engineering is much, much more than just innovation and new things. Focusing on taking care of the world rather than just creating the new nifty thing that's going to solve all of our problems. If you look at what engineers do, out in the world, like 70-80 percent of them spend most of their time just keeping things going. And so, this comes down to engineering education too, when we're forcing entrepreneurship and innovation as the message, is that we're just kind of skewing reality for young people and we're not giving them a real picture and we're also not valuing the work that they're probably going to do in their life. That just seems to me to be kind of a bad idea.*

*DUBNER: So all you guys need to do is make maintenance sexy for the American public and for politicians and policy makers. Do you have any plans, how you're going to pull that off?*

*VINSEL: Yeah, we're going to come up with some slogans like "maint-ovation." We're going to have professional wrestlers dance in front of bridges with their shirts off.*



Every four years, the American Society of Civil Engineers puts out a report card on physical infrastructure in the United States. On the most recent report card, our overall grade was a D+. Of the 16 categories that got a letter grade, only solid waste scored higher than a C. It got a B-. Transit got a D. Roads, a D. Drinking water, a D. Bridges, a C+. I went back to Ed Glaeser about this lousy report card.

*DUBNER: This is the United States of America, an economic superpower, so what the what? How has this happened?*

*GLAESER: Well, I think the first thing we should do is we should be a little bit wary about infrastructure groups that issue report cards, whose ultimate bottom line is that trillions must be spent in their industry. That being said, there are obviously real issues around American infrastructure. And what I worry about is that the answer to this would be just big checks cut in Washington. And I cannot imagine that that's the right solution. I can certainly point to a bridge that crosses the Charles River, near me, which has been going on, was initiated in part because of the promise of federal dollars. And it's awfully hard to see the value that we got from four years of disruption, for allegedly maintaining this bridge, and improving it.*

*LARRY SUMMERS: It's a remarkable and not a very happy tale.*

Larry Summers again.

*SUMMERS: The Anderson Bridge connects Harvard Square with the city of Boston. It connects different parts of the Harvard campus. It's 75 yards from my office. The bridge is 232 feet long. It has been under repair now for four-and-a-half years. To put that in some kind of perspective – Julius Caesar built a bridge over a span of the Rhine, that wasn't 232 feet, it was over 1,000 feet, and he did it in 9 days. And that was with the technologies that were available before Christ. Today, we surely should be able to do much better. In fact 100 years ago the bridge we're trying to repair and have been repairing for four-and-a-half years was built in less than one year from nothing with much earlier technologies.*

So what accounts for this delay?

*SUMMERS: The delay was a combination of environmental requirements, historical commission requirements and just plain incompetence.*

There were permitting issues; multiple redesigns and, in addition to the time overrun, there were **big cost overruns** — which, Larry Summers points out, doesn't factor in all the costs.

*SUMMERS: [Look, you do calculations. You add up all the thousands of cars that go across it. You value the time that people suffer in delay because the bridge is in disrepair or because the process of repairing it takes forever. You figure out what people's time is worth. You know, even if you value it at \$15 an hour, I'd certainly pay much more than \$15 an hour to avoid being stuck in traffic jams. Often it ends up that big infrastructure investments will pay for themselves right out just in terms of avoiding the delays that people suffer.*

The **Anderson Bridge** is of course just one of many thousands of American bridges in desperate need of repair. Summers argues that forestalling such maintenance has a larger drag on the economy than you might think.

*SUMMERS: I think infrastructure is the right thing in the short run for the United States because it puts people to work in a substantial scale. It's the right thing in a medium term because it expands the capacity of our economy. And it's the right thing in the long run because it takes the burden off of our children. We will eventually as a country fix Kennedy Airport. It'll just be much more expensive if we delay. And the cost of fixing Kennedy Airport will compound at a far greater rate than the 1.5 percent in bonds we print ourselves that represents the yield today on long-term U.S. government bonds.*

*GLAESER: The New York airports are often used as being the textbook examples of declining American infrastructure.*

That's Ed Glaeser again:

*GLAESER: You know, everyone has an awful experience at one of them that they can recount, about the chaos that JFK can often be. These airports are complicated. They sit on city land. They're run by the Port Authority of New*

York and New Jersey, which answers to two different governors, and is responsible for a lot of other things. It is a very big and sprawling agency. And it has structural problems that almost surely need reform. Probably the airports actually should be split up, and made into separate — completely separate agencies. None of that reform will occur if the Authority simply gets more cash infusions from Washington. That, that is a recipe for non-reform, not for reform, and there's absolutely no reason why the well-heeled travelers who come in and out of JFK airport, can't pay for that infrastructure themselves. There's absolutely no reason why that infrastructure needs to be subsidized by ordinary taxpayers, in any way. So you know, I'm 100 percent on board, the need for a mass infrastructure overhaul in the U.S. I think though, that if we go down the route of saying that just means big items in the budget, we go completely in the wrong direction. We need to take a hard look at institutional reform. We need to figure out how federal nudges and federal money can be used in a way that's productive, rather than simply a recipe for maintaining the status quo.

DUBNER: Talk about that a little more. You wrote a piece for Bloomberg View a few years ago called **"Spending Won't Fix What Ails U.S. Infrastructure."** You argued that American infrastructure needs, quote, "intelligent reform, not floods of extra financing or quixotic dreams of new moon adventures or high-speed railways to nowhere." So what is intelligent reform, in your view, and feel free to be both general and specific.

GLAESER: So my favorite way of paying for infrastructure other than user fees, is with local property taxes, or with property development even. So Hong Kong's mass transit system funds itself by developing skyscrapers on top of new subway lines. And it manages to keep the fees low, because it can do well enough by extracting the value that commuters are willing to pay to be right there. So linking up, I think in the space of public transit, linking up the payments the developers are willing to pay, let's say to build, very high-res buildings near subway stops with funding for the infrastructure — I mean, I don't actually want the America's transit system to be building skyscrapers on their own, but I'm happy for them to get some flow of tax revenues in exchange for the ability to build higher, buildings next to the subway stops. That would seem like a desirable thing. In the case of, roads, I think the key is you know, embracing things like congestion pricing, whenever it's at all feasible. Anytime you build a new highway, you really want to slap a fee on it from the beginning, because there's just a sort of political endowment effect that seems to be very strong — which is that if I take a road that's free and then slap a charge on it, slap a toll on it, you know, you have riots in the street. People are incredibly angry. It's a political nightmare. If you introduce a new road that has a toll from the beginning, people nod. They might not be pleased about it entirely, but they think that that's — they never saw that road before, that road comes with a toll, they can accept that.

So what role does Glaeser see in this for the federal government?

*GLAESER: I think actually the best role for the federal government in infrastructure is to actually be in the business of inspecting, rating local infrastructure projects, to check whether or not the maintenance is good, to publicize when the roads or the bridges are unsafe, and then, perhaps to have federal money that's targeted not to new projects, but specifically to maintenance, perhaps structured as a matching fund for local monies. So it's a structure in which, we think actually having a bit more local buy-in, at the beginning is probably helpful.*

But you inevitably come up against a fundamental budgeting question: how to balance the cost of maintenance with the cost of making new things, the cost of innovating?

*SUMMERS: I'm all for maintenance; I'm all for infrastructure, but I don't think they should be framed as the enemy of innovation.*

Larry Summers again.

*SUMMERS: I think we want to be able to produce in new ways. We want new products. We want businesses to organize themselves in new ways. We want to be the place in the world that has the most cutting-edge science. We want when new uses of software, new uses of artificial intelligence are developed, we want them to happen here. So I do believe in a very strong case for infrastructure investment, but I want to be careful about saying that I am somehow against innovation. I think a great nation can walk and chew gum at the same time.*

Coming up on *Freakonomics Radio*: how innovation and maintenance compete for our money:

*Martin CASADO: Large public companies in mature markets tend to invest primarily on maintenance. And often they don't have the additional capital you need to do large innovation.*

How innovation and maintenance compete for our time:

*Ruth SCHWARTZ COWAN: I started out with the assumption that technological change had reduced women's labor so much that they could enter the workforce. And it took me about three years to discover that I was wrong.*

And: I finally get serious about some personal maintenance:

*Chris LACINAK: It's all about prioritization, one step at a time.*

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**Ruth Schwartz Cowan** is an historian of science, technology, and medicine.

*COWAN: I'm a retired faculty member from the University of Pennsylvania.*

Like Lee Vinsel and Andy Russell, Cowan thinks we put too much emphasis on innovation.

*COWAN: There are basically very few innovators. There are huge number of maintainers. And when you start paying attention to it, you begin to understand how essential it is. My late husband used to say — and I used to think it was a joke, but I think now he was absolutely right — “Plumbers run the world.” And we may kind of resent our dependence on them. In fact, that may be a larger part of why we don't pay attention, because we really would like to think of ourselves as independent of it, but we're not. We are very dependent on a lot of people who don't have Ph.Ds. We are very dependent on a lot of people who don't have high school diplomas.*

Cowan has done a lot of research on one particular form of maintenance: housework.

*COWAN: The name of my book is More Work for Mother: The Ironies of Household Technology From the Open Hearth to the Microwave.*

That's right: she found that home inventions that were supposed to free up women from labor often led to more labor.

*COWAN: I started out with the assumption that technological change in the household, mainly the electrification of the households, had reduced women's labor so much that they could enter the workforce — married women's labor — and entered the workforce. And it took me about three years to discover that I was wrong.*

Wrong how?

*COWAN: There are two components of work and one is time, but the other is what we might call metabolic labor. And most of the new technologies saved metabolic labor. It was much harder to wash clothing when you were doing it by scrubbing the clothing on the scrubbing board and hauling the water from the stove to whatever vessel you were using to wash the laundry, than it was to do it when you had a washing machine and running water. There is no question about that.*

But with more and more machines to help with chores ...

*COWAN: ... housewives began to spend more time doing their chores. In the standard routine for underwear was that you slept in it and you changed it maybe a couple times a year. So in the modern, let's say post-WWII standard household, vastly more wash gets done than in any previous time in history.*

And even for the modern woman — or man — who does work outside the home ...

*COWAN: ... There are women who are — and men too, in some cases — who are doing what sociologists have come to call a double day. They're doing almost as much maintenance work as their grandmothers might have done or grandfathers might have done, if their grandfathers were living on farms. They're doing almost as much unpaid maintenance work as they are paid work, by hours.*

So that's an interesting, and perhaps humbling, lesson from the past – that innovation doesn't necessarily decrease the time we spend on maintenance. Which brings us back to how we're supposed to pay – not only in dollars, but in time – for the maintenance we need to do, even if we don't want to do it.

*CASADO: I think that there can be a false dichotomy when it comes to maintenance, which is maintenance is required, clearly, but in order to effectively do maintenance, I think you need to innovate.*

That's **Martin Casado**. He's a general partner with the venture capital firm Andreessen Horowitz.

*CASADO: As a venture capitalist you're looking for opportunities to invest in that you believe will be large opportunities.*

I wanted to hear from someone like Casado because it struck me that if some startup goes to a venture capitalist with some terrible but innovative idea, it would probably still generate a lot more interest than a startup with an excellent idea that deals with just maintenance. So: with crumbling bridges and outdated airports and all the rest, and a federal government that often can't get out of its own way, are the private equity markets really as skewed toward innovation as I imagined?

*CASADO: Yeah yeah, I think it's a super-interesting question. And in fact I think the public markets have done a really good job of factoring in maintenance into its expectations on values of companies.*

In other words, there's one pool of money – including the stock markets – that values maintenance, whether it's for physical infrastructure or, increasingly, digital infrastructure. And there's another pool of money – including that from venture-capital firms – that seeks out innovation.

*CASADO: Large public companies in mature markets tend to invest primarily on maintenance. And often they don't have the additional capital you need to do large innovation. So for example between say 2011 and 2015 growth companies, companies that are in fast-growing areas, spent two times more than legacy companies on research and development. So as companies mature, the majority of their investment and their spend is kind of maintaining existing technologies and so forth. And this is largely because of the pressure from the public markets. So then the way these kind of legacy enterprises innovate is through inorganic growth. They buy often startups. So if you look at*

*the same group over the same period they say, "Okay, we have a legacy enterprise and kind of a newer growth enterprise." Over the last, between say 2011 and 2015, legacy enterprises spent something like 10 times more, it's about 9 times more, than the growth enterprises to acquire innovation. So if you tease apart what's happening here. What's happening is that public markets say, "Listen, if you are in a mature company, we know that that will keep the lights on. We know that that's what you need to do to get predictable returns. And public markets like predictable returns, correct? However there is going to be another pool of money and another ecosystem that can take the risks, right? And these are startups. These are like venture capitalists." So we make these very risky investments on these companies that may be wildly successful or on. And then it's up to the growth enterprises whether they want to buy them after this is proven out or not. And so I think the public market has created this bifurcation nicely in an economic fashion, when they're saying, "Yes, we don't want you to innovate. And in fact we're going to keep your margins fixed so you don't innovate." And so they do invest in what they're currently doing versus the more private startup site.*

Casado also points out that behind all those sexy, high-tech firms that attract billions of investment dollars, there's a lot of unsexy infrastructure that makes it all possible.

*CASADO: Think about the brick and mortar of computing — you know, the core IT infrastructure. You know, IT infrastructure is a \$4 trillion market, it's massive. Every time you go to Amazon, you're connecting to this massive building — think like football stadium-size massive building — and inside that building you've got tons of storage arrays that store the data. You've got tons of computing power. You've got tons of networking equipment that connects it all together. You've got a whole bunch of software that just provides kind of the underpinnings for the application itself. You've got databases, you've got security equipment. I mean, all of that is infrastructure.*

Not often, but once in awhile, I take the time to marvel at the fact that so many people do so much work behind the scenes to keep the world humming. Whether it's the internet, the roads, the electricity grid, you name it. Of course it's easy to point out the failures – they're visible, whereas the bulk of maintenance is practically invisible. But, in praise of maintenance, let me just say this: it's necessary work; it's hard work; and for people like me, who are always in a hurry to make the next new thing, it can be really unappealing work. Which means that sometimes you need help. So ... I went out and got some help. I like to think I'm a fairly orderly person. But my office has become increasingly crowded with a small mountain of files and notebooks and photos and audio tape and other byproduct from years of writing, making music, and so on. I didn't want to throw it out; but I



also didn't want it to become increasingly inaccessible in an ever-larger mountain. So I sought professional help.

*LACINAK: Well tell us more about that.*

**Chris Lacinak** runs a company in Brooklyn called **AVPreserve**. They help all sorts of institutions manage their archives. They've worked with Yale University, the Museum of Modern Art, the United Nations. And the New York Public Library:

*LACINAK: Well first we did a big inventory to inventory all of their audio, video and film holding which was over 800,000 items.*

*DUBNER: Which was how big?*

*LACINAK: Over 800,000 items.*

I'm not quite in the same league as the New York Public Library, but my desire is similar: to maintain a history, to make it more organized, more accessible, and hopefully more useful.

*LACINAK: What is the ideal outcome of this project that you envision?*

*DUBNER: I want everything that I've ever documented or created — I kind of want it preserved with differing degrees of accessibility. You know, memory is just so narrow and incomplete and bad, that when I think about the things that I've done, or written about, or reported on in the past, or not written about — I remember them so incompletely and so poorly, that I think it would be really nice to have that preserved for who knows whatever reasons. So I want all of that easily and instantly accessible, but I want that point of accessibility to be so easy that everything going forward from today, I can put in the appropriate basket without acquiring mountains — whether physical or virtual — that have to be sorted later.*

*LACINAK: It's like the ultimate vision of being able to find everything easily and accessible. And if we think about that as the ultimate outcome, we will realize that there is a lot of steps in between there and here. We look at this project as Phase 1 — the first steps. Do you have any thoughts on the outcome of this phase? What defines success for you?*

*DUBNER: It will be that we finish this meeting in 20 minutes and you say, "I'll be back tomorrow and I'll take care of everything." And then next Monday you'll*

*have a hard drive where everything is there.*

*LACINAK: That's my...*

*DUBNER: I mean you asked.*

*LACINAK: I'm trying to get you to be realistic.*

*DUBNER: No, I know. You asked what I want.*

*LACINAK: Right, right.*

Okay, so Chris Lacinak persuaded me it wasn't going to be so easy. But he started helping me draw up a plan.

*LACINAK: So this is about maintenance. It's losing the 200 pounds and then staying that weight.*

And he said it wasn't as scary as I thought.

*LACINAK: I'm sure it feels that way. But it's not. It's all about prioritization, one step at a time.*

And so: we've begun. He and his colleagues are doing most of the hard work – enumerating and measuring the amounts of different media; then categorizing by media – paper, audio tape, digital audio, etc.; and then, eventually, I sit down with them, file box by file box, and figure out whether, and how, to preserve a particular thing, and how to make it live in a place where I can visit it whenever I want. The key, for me, is one thing Lacinak said:

*LACINAK: It's all about prioritization, one step at a time.*

One step at a time. Increment by increment. And so, inspired by this advice, we keep the conversation going on the next episode of *Freakonomics Radio*. It's called "In Praise of Incrementalism." We'll talk about the small steps necessary to make big changes, from the evolution of Renaissance art:

*GLAESER: You know, you can really see each innovation in each painting or each step along the way. It's a piecemeal process.*

To the civil-rights movement:

*HIRSHMAN: They followed an incremental pattern more cleanly than any other social movement because the NAACP controlled it.*

And: can incrementalism help you win the Tour de France?

*Dave BRAILSFORD: Probably not, but it can contribute.*

That's next time, on *Freakonomics Radio*. Thanks for listening.

*Freakonomics Radio* is produced by **WNYC** Studios and Dubner Productions. This episode was produced by **Arwa Gunja**. Our staff also includes **Jay Cowit**, **Merritt Jacob**, **Christopher Werth**, **Greg Rosalsky**, **Noah Kernis**, **Alison Hockenberry**, **Emma Morgenstern**, and **Harry Huggins**. You can subscribe to this podcast on **iTunes** or **wherever else** you get your podcasts. If you want more *Freakonomics Radio*, check out **our archive**, where we have every past episode. And you can also find us on **Twitter** and **Facebook**.

\* \* \*

Here's where you can learn more about the people and ideas in this episode:

## SOURCES

- **Lee Vinsel**, Assistant Professor of Science and Technology Studies, Stevens Institute of Technology
- **Andy Russell**, Dean, College of Arts & Sciences, SUNY Polytechnic Institute
- **Larry Summers**, Professor and President Emeritus, Harvard University; former Secretary of the Treasury and former director of the National Economic Council under President Barack Obama.
- **Ed Glaeser**, Professor of Economics, Harvard University
- **Ruth Schwartz Cowan**, Professor Emerita, University of Pennsylvania
- **Martin Casado**, General Partner, Andreessen Horowitz
- **Chris Lacinak**, Founder and President, AVPreserve

## RESOURCES

- **“Hail the Maintainers: Capitalism excels at innovation but is failing at maintenance, and for most lives it is maintenance that matters more,”** by Lee Vinsel and Andy Russell, published in **Aeon**.
- **“A lesson on infrastructure from the Anderson Bridge fiasco,”** by Larry Summers, Boston Globe.
- **“Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier,”** by Ed Glaeser
- **“More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave,”** by Ruth Schwartz Cowan

## Music

Scoring by J. Cowit

Additional Tracks:

- Kero One, “What Am I Supposed to Do” (from **Color Theory**)
- Boat, “You’re Muscular” (from **Setting the Paces**)
- Boat, “Tough Talking the Tulips” (from **Setting the Paces**)
- Dorian Charnis, “Roman Life”
- Boat, “The Name Tossers” (from **Setting the Paces**)
- Boat, “Calcium Commuter” (from **Setting the Paces**)
- Boat, “Friends Since 1989” (from **Setting the Paces**)
- Boat, “100 Calorie Man” (from **Setting the Paces**)
- Boat, “Le Grande Opening” (from **King Kong**)
- Boat, “We Want it We Want It” (from **Setting the Paces**)
- Boat, “Reverie” (from **Setting the Paces**)

**TAGS:** Andy Russell, Chris Lacinak, Ed Glaeser, Freakonomics Radio, infrastructure, Larry Summers, Lee Vinsel, maintenance, Martin Casado, Ruth Schwartz