



Episode 12: Ethics of Invention

Guest: Sheila Jasanoff, Pforzheimer Professor of Science & Technology studies at Harvard Kennedy School and author of “[The Ethics of Invention](#)”, in conversation with Kris Østergaard, on ethics in a technologically accelerating world, how to mitigate unintended consequences of one's innovations and the danger of technological determinism.

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Kris: So we are here on the Corporate Innovation Podcast and I'm here with Sheila Jasanoff. Sheila is a Pforzheimer Professor of Science & Technology Studies at the Harvard Kennedy School. She holds AB, JD and PhD Degrees from Harvard and an honorary doctorate from the Universities of Twente.

Her honours include a Guggenheim fellowship, the University of Ghent Sarton Chair, an Ehrenkreuz from the Government of Austria and membership in the Royal Danish academy. She has authored more than 120 articles and chapters and is author or editor of more than 15 books, including most recently “The Ethics of Invention”, which will be sort of what our conversation will primarily circle around here, where we'll talk about the importance of ethics, not just in the business world, but society as a whole, and explore what sort of the issues are relating to ethics in these domains, as well as specifically talk about the COVID-19 crisis and what the ethical implications are here, and then try to conclude also with what does this mean for organizations out there and how can they move ethically into the future?

But first off, welcome and thank you so much for joining the podcast, Sheila.

Sheila: Thank you, Kris. I'm delighted to be here.

2:09

Kris: And so, before we get started, it would be interesting just to learn a little bit about sort of your academic and professional journey that eventually led you to write a book like “The Ethics of Invention” and also being able to have this discussion here today. So please share whatever you feel is relevant and interesting.

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Sheila: Thanks again, Kris. It's been a complicated journey because actually I never expected to find myself writing about ethics as my relevant training was in law. I studied law originally as a, not exactly an escape from, but an alternative to a career in the humanities, where it seemed increasingly unlikely that my husband and I would be finding jobs in the same arcane field of historical linguistics.

But once I went to law school, this was in the mid 1970s, and environmental law was just coming into its own. In fact, it's a historically interesting point that in the years that I was in law school, environmental law was not yet a topic. It was not even taught.

But after I got my law degree, I joined a very small environmental law firm. And so, from the beginning fell into the examination of the connection between science, what we know about nature and law and what we are supposed to do with it. So that turned out to be a stepping stone into thinking more broadly about science, technology and society. And that's become my academic field of study.

Within that, the question that preoccupied me from the start was why is it that confronted with a certain background set of understandings about the way nature works, societies go such different directions that they do not always respond in the same way to the same set of facts. So, an early research project of mine was looking at cancer-causing chemicals and asking what kind of regulations have been made in Europe and the US.

Most of my social science friends thought that this would be an uninteresting topic because after all, if you know the things cause cancer, you are going to respond in the same ways. But the finding was radically different for the countries we were looking at - Britain, Germany, France and the United States came to different policy outcomes and recommendations and that suggested that something else was in play.

Very broadly speaking, the answer to the what question, the what else was at play is the values. So, what are the societal values that lead people to interpret the same information in different ways? So, you can say that that first foray into looking at societal responses to risk automatically let me into the domain of values, because there was an unexpected result. And that's not the case. That singular knowledge produces singular responses. And so, there must be a mediating domain of values. And then it's in exploring what that mediating domain looks like, what do we mean by values, how do societies aggregate and express them? That is what led me to my thinking about ethics in a much broader gauged sense.

Kris: And if we sort of start just, you know, really trying to understand the terminology here, ethics is a word that most of us are familiar with. But most of us also have a really hard time defining what exactly does it mean. So please share your viewpoint on this. What is ethics exactly? And how do you know if something is ethical?



Sheila: That's a very difficult question. There are undoubtedly as many definitions of ethics as there are philosophers trying to define it. And as I mentioned already, I myself am not a philosopher as my training is in law, but increasingly for actually more than a decade, now people see the work that I do as highly relevant to ethics, which suggests that ethics ought to be very broadly defined.

So, one of the key things is that an ethical idea has to have some kind of collective foundation. That is, people don't decide their individual ethics. It's because they're raised in a society or a set of communities that have a shared set of values. And therefore, you know, one of the dimensions of ethics, I'd prefer not to think of this as a definitional thing, I prefer to think about aspects of ethical thought.

One of the key aspects is that there has to be something communal about it, that we collectively have an ethical set of ethical sensibilities. A second thing, though, comes back to what you said. How do we know that something is ethical or not? And it suggests that there is also a subjective dimension, that while there is a collective dimension, that's also something that gets internalized in ourselves so that we are trained in a sense to recognize that conduct is ethical or not.

And that, in turn, suggests that the kinds of organizational settings that we operate in, that those are very important to ethical sensibilities as people may become accustomed to thinking about certain kinds of behaviors as ethical or not ethical because of the circumstances they find themselves in.

And they could be drifting apart between some kinds of institutionalized ethical prescriptions and some kinds of societal ethical prescriptions and those areas of drifting apart are the ones that have been of concern to me.

So, one example that might clarify this point is that when Mark Zuckerberg initially founded Facebook, one of the prescriptions, almost a guiding mantra was "Move Fast and Break Things". And it's become a kind of slogan that has its own Wikipedia page and so on and so forth - ultimate recognition of having arrived in the digital world. But it turned out that "Move Fast and Break Things" was not seen by many people as an ethical prescription because the break things often referred to institutional ties and attachments, including very important livelihood ties and attachments that people considered important. So, in order to innovate, if you break somebody else's lifestyle, if you break the infrastructures that they rely upon.

For instance, you introduce Uber and you drive taxi drivers out of work. It may be that you're breaking apart foundational understandings of how people depend upon each other and you might be attacking the resilience of a society. So, there was a place where a mantra that was ethically okay for the entrepreneurial world turned out not to be ethically OK for the rest of the world.



It's those sorts of frictions between one form of institutionalized ethics and another that has led me to think about the particular things that I think about. The title "Ethics of Invention" in a way came out of exactly that kind of thought, that inventors in our societies were often trying to suggest that ethics can be made up on the spur of the moment, that it can be individualized. And my own perception was that it's actually risky, as it's risky to suggest that new ethics can accompany new inventions.

Sometimes we have to be aware of the possible friction between novelty, which is part of the essence of human creativity, but also the kinds of deep commitments that we have already made to what is a civilized form of life or what is a civil society. Those are the kinds of areas that interest me.

And, you know, I don't have a formulaic answer to the question, how do we know what is ethical? One thing I'm suggesting is that we might actually have contradictory views about what is ethical, depending on whether we are looking. Which parts of society we're looking out at when we choose to conduct ourselves in one way or another.

11:09

Kris: Yeah. And you're already touching upon the core issues of ethics in invention and innovation when we look at it from a macro point or societal point of view here. I think you have some really interesting discussions in the book that is, by the way, highly recommended by me. I've read it a couple of times and I still feel I need to read it a third time as well because there's so much substance in there.

One other thing that struck me in the book is that you talk about the three tech myths and how they are defining how we go about invention and innovation as well and why they may not, in fact, hold up. So please share with us what those myths and what you're thinking is around them.

Sheila: I would say the first myth that I tackle and possibly the most important one is this idea of technological determinism. Technological determinism, very basically defined, is as technology progresses, it moves forward almost unstopably, that's a feature of humankind, the human species.

It's continually inventing and its social consequences. The way society orders itself is determined by technological progress. So particularly when we're in the middle of what many people consider to be a new industrial revolution, the buzzword fourth industrial revolution is abroad in the world. People think that there are certain consequences. The fact that we have a coming together of the digital era information and communication technologies with all of the other inventions that have gone on in the past and the other industrial revolutions, that has created a universe in which certain things must happen because technology is driving them in that direction.

So, for instance, there will be job losses because AI will come in and drive people out of work. Well, I mean, you mentioned early on that we should be thinking about COVID-19 and how some

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of my work bears on that. It's difficult right at this moment. In April of 2020, not just the thinking through the COVID-19 lens, but the country that you're sitting in and the country that I'm sitting at, in Denmark and the United States, have adopted very different collective ethical responses to the COVID-19 challenge. One question is, OK. People are going to be thrown out of work.

And how do we think about that phenomenon of people who are being thrown out of work? The technological determinist would say that, well, a public health risk has arisen out of a conjunction of natural forces, there is this virus, we do not have a cure and therefore it is unavoidable that people are going to be put out of work.

But it turns out that if you compare just Denmark and the United States, the responses have been quite different because the challenge has been framed differently. Is the problem that we want to protect the jobs a set of relationships between employer and employee? Or is the problem that we want to protect an income stream to individuals through unemployment?

In Denmark, I believe the position was that we protect the jobs, the relational fabric of society, the fact that people are tied to each other in these relationships, including employer-employee. In the United States, the position has been rather that we tried to protect an income stream through unemployment, but that is a very different position because at the end of the day, it means that the jobs can be gone and the people who are on unemployment may come back and find that they have to start completely all over again and looking for jobs.

This may be OK for the young, but it may not be so OK for the person in their mid 50s who do not find the same jobs that they were tossed out of when the crisis hit. So, this COVID-19 movement is a very good case study in how it is not a separate phenomenon, the natural world or the technological world that will drive us to behave in different ways.

It's preexisting assumptions about the way a good society ought to operate, fundamental ethical understandings of what we owe to each other as human beings and human collectives, and whether we think of each other as being in a relationship of family or nation or each one out for herself or himself in a competitive world. These are sort of very basic ethical ideas and technological determinist fallacy, as I call it, makes us neglect these kinds of commitments.

So, when we're thinking ethically, I think we have to put that sort of phenomenon back on the table and become more aware of the ties that bind us. So, a second kind of mis thinking, if you will, faulty thinking is the idea that experts know best.

Now it follows in a way almost as a corollary from the technological determinist idea. After all, if you believe that technological innovation is going to drive us in this direction, then the idea that experts know best and we should be listening to them is a seductive idea. They will tell us the answers. They are, after all, the ones who understand the potential of technology. They understand the risks best. Now, here we have a lot of empirical information backed from the world that suggests why this is a dangerous idea.



Yes, of course, experts know a lot of things and they have specialized skills and we should respect them. But we also know that in modernity, expertise has come at the expense of narrowness that we learn, you know, there's a sort of joke about what a PhD, that you know more and more about less and less until you know practically everything about nothing.

So, we need to keep in mind that experts are experts, partly because they understand the insides of a field extremely well. But how that field then interacts with other fields, how a piece of the system interacts with broader pieces of a system. This is something that experts may lose sight of. And this is why the idea of a technocracy is extremely dangerous.

And even with that, we have a set of case studies that are ongoing at the moment. Who are the right experts to be advising us in the moment of the COVID-19 crisis? Of course, the public health people have a lot to say. They have a lot to say about how you test for this phenomenon. They have a lot to say about maybe how you guide the development of vaccination and so forth.

They have maybe less to say about the social dimensions of transmission, where sociology may have a lot more to offer than public health. So, for instance, we're talking at this very moment about social distancing fatigue or quarantine fatigue. So public health people who are experts in the field may have a very good idea that we should not be associating within two meters of each other because however this disease is transmitted, that is the right kind of distance.

That will tell us nothing about, for instance, what a 19-year-old feels like after having been kept in social isolation for six weeks, let alone six months? So, we need to always ask the question about technocracy. Which technocrats are we listening to in a given moment? Are we listening to the lawyers or the public health experts or the nuclear engineers who understand the insides of a reactor? That is not a straightforward question.

You can look at the same issue and formulate it in such a way that it foregrounds philosophy as the right area of expertise, or you can frame it in such a way that it formulates, you know, computer science as the right field of expertise.

I think that a much broader societal engagement is always necessary to ask the background question who is the right expert before we wholesale turn over any complicated set of issues and say, well, of course the experts know best.

20:40

Kris: So, what I was thinking about here is that you also talk about the unintended consequences and the unknown unknowns that also play a significant role here.

Sheila: That's a favorite of mine. At the end of every critical juncture when a technology has failed, it's become commonplace to say that was an unintended consequence. Now, unintended consequence is usually thought of as a sort of technical word. It's a kind of Band-Aid for explaining why something went wrong.

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But I think it's important to think about unintended consequences as also having a profoundly ethical dimension, because as soon as you offer somebody unintended consequence as an explanation, it means that you're excusing them.

You're saying, well, you could not have foreseen what was going to happen. Your intentions were good. And then the bad consequences that happen happened, came out of a different box altogether. Nobody could have intended this. And therefore, the people who put the technology out into the world could not have known that this evil consequence was going to result.

So, you know, mooted vehicles were perfectly fine. It's an unintended consequence that we have climate change. And so, we cannot hold the technological system of the automobile responsible for the state the world is in. And so, we should move on to the technological fix for the next set of technologies that will cure the previous set of technologies in a way I would want to make.

Not coupling obvious that unintended consequences thinking leads us also to keep thinking of technological fixes, because we keep saying, well, that technology, that older technology just didn't think far enough. And now we have to cure it by having the new technology of the moment.

It turns out that in retrospect, most of the evil consequences that we see from a technological system after an accident, after a disaster, there were already warning signs that we could have foreseen many of these things. And so, the question becomes not, was it completely unknown?

Was it an unknown unknown that nobody could have even known what we should have known, but rather, why did we not know things that were available to be known inside of the system? So that translates into questions of power, into questions of institutional governance. How come the right people didn't know what the right times were? And just to give a couple of examples of technological disasters that many people in this audience may be familiar with and show how that fallacy sort of works out in principle.

Let's take the Challenger disaster, the 1986 loss of the space shuttle Challenger that in the US, which self-destructed upon launch, the widely accepted reason why this failed was that there was a small piece of plastic material, an old ring that turned brittle at a very low temperature that accompanied the launch in Florida.

Florida in the United States is known for having warm temperatures. But it turned out that on that particular day, the temperatures were unusually low, close to freezing, and this O-rings froze and therefore, it did not achieve the right kind of seal between the gas chamber and the flaming part of the rocket engine. It caused a conflagration that brought down the vessel and killed all of the people onboard.

But it turns out that in retrospect, it was well known that the O-ring was not flexible at those temperatures. There was even a particular engineer who had been predicting that this was the wrong day to launch that vehicle because he was afraid that there would be problems with the

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launch. The difficulty turns out to have been in the communication of the fact and not the lack of knowledge.

So, if we say that the loss of the spaceship was an unintended consequence, then our attention is not focused on those parts of the social infrastructure where the knowledge got blocked.

A similar sort of example is the very well-known 1984 chemical plant disaster in Bhopal in India, where Union Carbide had built a plant with huge storage tanks of an extremely toxic substance called methyl isocyanate (MIC).

And it was widely known to the chemists that if water mixed with methyl isocyanate (MIC), it would release a gas that was exceedingly toxic and for some reason in Bhopal in that situation, exactly this disaster happened and a huge cloud of methyl isocyanate (MIC) gas was released over a very densely populated part of the city and thousands and thousands of people died.

And then there were health consequences that affected more in the range of hundreds of thousands for years and years after reaching down several generations. Well, it was known beforehand that this gas was highly toxic. It was known that it was reactive with water. It was known that chemists were unable to work consistently to study the long-term properties of this particular toxin. And yet this plant was built in an area where there was a strong chance, that if something went wrong, many people would suffer. And yet after the fact, it was treated as an unintended consequence.

How could Union Carbide possibly have known? And, you know, it led into a set of legal and political debates where responsibility never was fully focused on the corporation in an appropriate manner. Ultimately, a settlement was reached that many people thought was inadequate. And I think that this unintended consequence thinking underlies often that kind of social injustice that we see.

And this is why, as I said from the beginning, this matter of saying that a consequence is unintended bears our ethical scrutiny, we need to ask who is being excused when you say a consequence is unintended. We should always be asking, according to who's intent? Who did the planning that caused this to look unintended at the end? And again, that leads us back into questions about responsibility that should be accompanying the accident venture from early on.

28:11

Kris: We are on the corporate innovation podcast here, and so, most people who would be listening to work in enterprises of sorts. And we see with all of this technological development that we're experiencing and, you know, accelerating paces, exponential technology.

All of this stuff that in a convergence of technologies that enables all of these new industries at an increasing pace here, one could then imagine that, you know, and I guess we are already



experiencing that, as you know, what could we dubbed as many unintended consequences and many more to comment, a deterministic viewpoint on.

That's just how it is, really. But so if you are in the enterprise and if you are the CEO or a person of whatever level of power to actually influence what your organization does here, you know how to deal with this stuff or how to not fall into these fallacies here, but in fact, help secure that your organization moves ethically into the future.

Sheila: Thanks again for that very deep set of questions.

So, I should say at the outset that we cannot exist as human societies without innovation and without creativity. These are essential dimensions of the human spirit. And, you know, the collective mobilization of entrepreneurship and of the desire for invention, we will be stuck as societies. We would be living like the ancient Egyptians, dead for thousands of years with glorified figures and people sacrificing to them and building pyramids.

And, you know, we may all, well someday enjoy seeing those pyramids again. But they were quite static geometric constructs and we wouldn't want the world to fall into that sort of loss of dynamism.

So, the key question is how to retain the dynamism, the capacity of children to be created, for instance, without letting loose on the world's extremely destructive tendencies. So, one of the things that I've proposed in my work is that we pay more attention to the path of humanity and not just the future of humanity.

Invention, almost by definition, is a forward-looking thing. It foregrounds novelty. It says new is good, almost like a mantra. And that is all well and good. But one should always be coupling that interest in the new with some sense of what might be lost as well. So, in the desire to put something for good, what are we grounding? Can we keep our attention focused on that? Now, I have called these systematic ways of thinking about what is being lost or what would be jeopardizing. I've called them technologies of humility.

And the reason I use that phrase is that prediction is, in my view, necessarily a somewhat hubristic exercise. So, we predict what we cannot yet see in the year 2020, which is so metaphorically relevant to perfect vision. It's worth thinking about all the things that we have not foreseen six weeks ago. Nobody foresaw saw the consequences of a globally transmissible virus and bringing our societies to a halt, and so many predictions were being made on the basis of, for instance, where the stock market was at two months ago and people were investing their money, people were making all kinds of highly consequential decisions based on a set of predictions that ignored what a little spiky virus molecule can do to the world when it is a pervasively conveyed by our technological systems.



And that is, if we didn't have airplane travel, for instance, then the virus might have been contained in Wuhan but instead, here it is in Cambridge, Massachusetts but equally in very faraway places and even in island communities where one would not have expected to find them.

The other day, a friend of mine in India was telling me that one of the hotspots in India is in a city in central India that receives no international airplanes arriving. So clearly, this kind of transmission has happened in ways that we could not could not have predicted. This is the buzzword.

So, if we are that bad at predicting, in spite of all our computers, in spite of all our capacity to do data science and aggregate pixels and so on and so forth, maybe we should also be thinking about those things that we are overlooking. And that is my idea of technologies of humility. One of the primary technologies of humility, I say, is thinking about distributive consequences. And that relates obviously to the central element of what we're talking about ethics.

32:27

So, when we're thinking about innovating, do we have a responsibility to think not just who is going to win and how, but also who the losers will be? So, I guess it's kind of axiomatic in my thinking that you don't produce winners without also producing losers. I mean, maybe a rising tide lifts all boats, but I think it doesn't lift all boats to the same extent.

Eons of experience with the world suggests that whereas in the aggregate, the average people may be getting wealthier, that average does not translate out into the rest of the world.

A few years ago, somebody wrote a book called "The Bottom Billion" and that book pointed out that there is an intransigent layer of poverty that is not being addressed by the fact that some people are getting extremely rich lately. Every year, when the Davos meeting happens in January, Oxfam has been publishing a set of results about who actually holds the wealth in the world and the numbers have been fluctuating, but it's something like between five and seven of the richest people in the world are holding a wealth equal to the bottom half of the world's population.

And inequality has become a feature of the policy discourse that inequality is something that we ought to be focusing our attention on. So, technologies of humility would say all the time when an innovator is thinking about wins, there is a responsibility on the part of that innovator or the innovators institution to be also thinking about who loses, translated into some of these gig economy style of inventions that have been so successful in recent years.

Take the Uber case that I already mentioned. Of course, people who have unused capacity in their cars, sort of storage almost of unused capability, they won in the short term because they were able to convert that unused capacity, put it to use and generate wealth for themselves and society.



But of course, they were also knocking other people out of business. And then it turns out that in a highly unregulated environment, where absolutely everybody is suddenly wishing to enter the same tranche of the gig economy, even those drivers were not doing so well because we started hearing stories about how Uber drivers or whatever the imitations are in different other countries, that they were now working 18 hours a day, 20 hours a day.

But again, less income than a more regulated, a more supply demand conscious society might have actually wanted to achieve. So, if there had been a more serious thought to the losers as well as the winners, maybe a better balance would have been created instead of this self-correcting mode where we have these pendulum swings that somebody suddenly wins big, and only then do we start seeing a well, the pendulum has swung too far over on that side and now we need to pull it back.

But in the meantime, a lot of people have been hurt. And, you know, this is something that we do not know. Nobody is left responsible for taking care of the people who've been hurt in these great leaps forward. So, you know, can we be more humane about progress is not an easy question. I mean, you know, whose responsibility is it? You know, what even counts as humane in these contexts?

I do think that looking up to the most underprivileged elements in our societies is something that we would regardless of which cultural and ethical system we're in, we would consider that to be a part of our obligation. But it's complicated.

It's complicated to put it into operation. I'll give you one little example. And then if you stop with this particular line of thinking. We are living, and I am, you know, a tenured faculty member at one of the top universities in the world. This is a very highly privileged position to be in at this moment because we have a guaranteed income. We're not going to be thrown out of our job. Education is an essential industry. People are always going to want education.

And besides, we have jobs that are ours for life, in a way, only the federal judiciary and the United States enjoys the same kind of security that I do as a tenured faculty member. But many people in our institutions don't have that security. And typically, it's the infrastructural workers who do not have that security, the cafeteria workers, it's the cleaners. It's the maintenance workers.

You know, the sort of entire blue-collar enterprise that sustains the white-collar enterprise in a sense. And yet those at the frontline of central workers. So, who's going to pay for them? Someone like me might be perfectly happy to say I will dedicate a portion of my income to making sure that those other workers will be paid for. But it turns out that that's far too easy to do.

It's not too easy to say inside of an institution that people can volunteer their wealth for a particular purpose. It may be okay to say I'm going to donate my money to a charity. I'm going to say I'll pay Greenpeace for their work on the environment. But the mechanisms saying I will do something to sustain the workers and my institution do not exist.



And something good in itself like unionization, which protects the rights of those people at the lowest ends of the scale, might actually get in the way of creating a volunteer extraneous fund that would go to help workers in a situation of crisis. So when I say that the technologies of humility are not necessarily easy to implement, it's because we do live in these very complicated societies where even the protection that we've created that speak to our ethical thinking in one moment or under one set of circumstances may not be suitable in another set of circumstances.

You know, I guess we need a lot of entrepreneurship in the justice dimensions of the world, but it's not just creating material inventions that make us move forward equally well in thinking about the machinery of social cohesion and justice, which are just as much technologies as a computer is, for instance.

And I think that it would serve our wealthy technocrats of this period well to realize that human thought should be cultivated along multiple dimensions, that we should not lose sight of the entrepreneurial dimensions of humanistic thought and not put all our eggs into the basket of material invention and how do we make the speediest transmission systems to get us from 4G to 5G or whatever?

In the same breath and with the same degree of creative energy, we should also be thinking about social adaptability and who is in a capacity, in the position to adapt, who is not, and develop our humanistic instincts that we are attuned to the plight of those who are less privileged, those who are bound to the old stems simply because they were not given an opportunity to learn a more mobile skill set.

And I think that cultivating that kind of imaginative solidarity is one of those ethical responsibilities, but it's also part of entrepreneurship. We should be teaching our entrepreneurs to understand, you know, the full extent of that triple bottom line of corporate social responsibility, that it's not just benefits back to the shareholders, but it's benefits back to entire communities and back to the environment.

43:33

Kris: You mentioned Uber here, but we could have mentioned many other companies as well, and the maybe unintended consequences, but consequences of them becoming very, very successful and other companies as well riding that trend.

If we go back to when the founders of Uber sat in their metaphorical basement and came up with this model here, does that then mean that they should have sketched out all the potential consequences, that if they become really, really successful, then this might happen and this might happen in society and build in friction in their model to sort of rather than, you know, just go for the scale, which certainly must have been, you know, part of it, which is that the typical Silicon Valley model here.



And do you see that, you know, entrepreneurs need to take that responsibility upon themselves from the very beginning, even when they are, you know, very small and don't even know if they will succeed enough to pay their own salaries and or is there a governmental role here or how do you see them?

Sheila: Well, again, it's a very interesting central set of questions. But first of all, I should take a step back and say we've been talking about Uber, but you correctly point out that there are many other companies that we could be talking about. So just take Uber as a placeholder.

I don't even need to say anything about the specific company but it has just been for the kind of thinking, because it has been so successful and, you know, incorporates some of the ideology of Silicon Valley of rapid growth and a small idea gaining very big dividends for a wide number of people and widely imitated and so forth.

That said, it is so obvious it's too much to expect that everybody sitting in the metaphorical basement or garage suddenly takes on a responsibility for all of humanity when they are generating an idea that may or may not take off at all.

And in fact, as we both know, it's come a bit of a badge of honor in the entrepreneurial community that you started a startup and failed. I mean, even the failure is seen as a kind of marker of success because it suggests you have the right kind of risk-taking persona to be worth investing in in the first place. So not all ideas succeed. We know from way, way back that a very tiny percentage of the patents that are given out into the world actually turn lucrative.

Even universities that are in the business of generating ideas and for the last 30 years in America have been in the business of trying to propagate those ideas by creating businesses. There are only a couple of patents that bring in something like the kind of money that Stanford got from the initial patent and genetic engineering.

And these are exception stories, not the rule stories. So, it's too much to expect that, you know, every single person trying to come up with a bright idea has to think about all of the consequences down the line. And besides, as I was saying, that in itself would be a little hubristic.

That is, how can you expect any creator to understand all of the ramifications, all of society changes, if a ramification is successful and you can't predict it all, you know, sitting in that basement or that garage where your vision is necessarily limited by the tinkering potential of the other material that you have at your disposal.

However, again, that all said, there are things that we could do. For instance, teaching people to operate with a greater sense of history, the ways in which things have evolved and what we've learned from those historical circumstances, that could be more part of the training of entrepreneurs that we to some extent have sort of all the stock trial understanding of unintended consequences.



It's not to say that every entrepreneur has to understand every consequence once, but if every entrepreneur operates with a set of understandings of what these unintended consequences might be and therefore with a heightened sense of responsibility for what to do if and when the success happens.

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Is there for instance, something like a tithing obligation like the Mormons have in their church, that if you become extremely successful, then you pay back society? Now, at the moment, we rely on the very rich of the world to come up with their own ideas of philanthropy, which is fine as an ethical stance. I mean, it's great that some of the billionaires have signed on to saying that some fraction of their incomes will be dedicated to the public good.

I have misgivings about billionaires deciding what the public good is. At some point, you need democratic involvement and there are ideas that have appeared in the technology and society literature and in thinking that there is serious consideration.

Two of these ideas are responsible innovation and upstream engagement. So, the very idea of responsible innovation suggests that ideas of responsibility should be there from the outset. What that means in practice has yet to be spelled out. It's still one of these unknown unknowns, if you will, but at least the idea is there in the world.

I have some problems with the idea of responsible innovation because it suggests that the responsibility logic is in the innovator. And that again strikes me as both unrealistic and anti-democratic, because why should the individual innovator be responsible for all of society's problems? I'm thinking, for instance, of the oversight board that Facebook has created to decide some of its questions about fake news and hacking of data systems and so forth.

But I think it's risky to even talk in those terms, even to talk about a very successful company like Facebook having its own Supreme Court, because it suggests that these very wealthy corporations have, in effect, taken over the work of nation states and have their own legislatures, their own judiciaries and, of course, their own executives.

We didn't used to think that a CEO of a major company had the right to run a kingdom in which we are its subject just because we happen to be using their product. And I don't want to sacrifice the idea of democracy to the idea that now corporations have become the new nation states.

That would be fine with me if we then chose to have the constitutional conventions that we had in the late 18th century and later to decide how we should govern ourselves in democracies. If we really have corporations governing us, then we should have the equivalent, we should have the constitutional conventions to show how we should govern ourselves.

So upstream engagement is a slightly more positive idea in that regard because it suggests that there should be more transparency and more involvement by publics in those moments of

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invention. Again, these ideas have limitations, where I think at the sort of infancy of really thinking about invention itself as a mode of governance. And I think that is an idea that we have to internalize much more completely.

We have to understand when big breakthroughs happen in technology, we are in fact, what I call institutional moments, where moments when power shifts, who makes the rules by which we live and conduct ourselves, those things shift. So, for instance, ideas of privacy today when some of our identities are there in the digital world and some of our identities are there in the world of DNA, our expectations of what we're entitled to as autonomous human beings has shifted and the technologies have a way of bringing about or being involved in that kind of reframing of who we are as human subjects.

I think we need to take all of this complexity on board and really think through what our democratic entitlements are in an age of innovation and in a sense that may be the most far reaching ethical obligation that we all have towards each other, innovators and beneficiaries of innovation alike.

I think we're going through a set of changes that might be thought of as constitutional in their dimensions in the sense that we have become participants in citizens and of societies in which de facto rulemaking power rests with innovators and with private companies. I think we need to think through the implications and the consequences of all of this and that it's our collective ethical responsibility.

Kris: There are certainly no easy answers here. And it's a fascinating, very deep and complicated set of topics that we've discussed here. Our time unfortunately is limited because we could easily talk for hours, probably even days, weeks and months about this stuff.

But I want to thank you so much Sheila for joining us here on the podcast and looking into these fascinating and very important topics.

Sheila: Thank you again, Chris, for inviting me to this fascinating conversation.