Episode 31: Science and Society at the White House, ChatGPT, and the Paradox of Data-Driven Agriculture

Intro

Shobita   00:00:36   Hi Jack. Happy New Year.

Jack   00:00:37   Good afternoon, Shobita. How are you?

Shobita   00:00:40   Good. We haven't had much of a winter here, so I am losing kind of a sense of time, but that's okay. I'm not complaining too much.

Jack   00:00:47   I want to know about American politics. I want to know about the State of the Union, of which I have seen sort of 12 second clips of people shouting. And I also want to know about Alondra Nelson, who's announced that she's stepped down as Deputy Director of the Office of Science Technology Policy. Regular podcast listeners will know that before she went into that role, she was one of our first podcast guests. We're not taking credit for her rise.

Shobita   00:01:18   Maybe you are not taking credit, but

Jack   00:01:20   Okay. It's fine if you do <laugh>. That's, that's totally fine. What do we make of all of this? Is it all just sound and fury and what happens with Alondra Nelson's departure?

Shobita   00:01:30   We just had President Biden's State of the Union address. Many people are saying it's him essentially announcing that he's running for election again. And I think, not surprisingly, for many keen watchers of science and technology policy, it was interesting from that perspective for the primary reason that it, it's not at the level of entitlement programs like Social Security and, and Medicare, which is what led to the kerfuffle between him and the Republicans. He talked about it a few times, but it's not one of his big agenda items. It came up a couple times first talking about the CHIPS and Science Act that was passed last year,

Jack   00:02:09   Which is still a terrible name for an act. A terrible, meaningless, stupid name for an act of Congress.

Shobita   00:02:15   I think it represents the fact that it's a kind of Frankenstein piece of legislation, right? It is cobbling together a massive increase in funding for the National Science Foundation with trying to create a stronger semiconductor industry. And, and those two things are not necessarily tied to each other, but somehow they got yolked together. And in the speech Biden was talking about how it's gonna make America more competitive. Great. Wonderful. He also talked a bit about the data privacy legislation that Congress has been unable to pass, but maybe it's a possibility that it might be a piece of bipartisan legislation. And then at a couple points he talked about the Cancer Moonshot, which is, you know, his son died of cancer. He's been always a strong proponent of cancer research. So he had put more funding into that. He

also talked about drug prices, but of course in that discussion they were at separate points in the speech,

Jack   00:03:11   Just completely different political battles

Shobita   00:03:13   And that maybe the US could do with some industrial policy in order to actually produce research that helps people and leads to low drug prices that might require some sort of infrastructure or ability to negotiate, et cetera, et cetera. That was absent. So that link was absent. And on the industrial policy point, I wanna hear about this apparently new department in the UK about science, technology and innovation. I'll tell you a little bit about Alondra first. So she was, for the last couple of years, the deputy Director for Science and Society at the White House Office of Science and Technology Policy. She was the first person to hold such a post. She's gonna be going back to Princeton where she's a professor. And I'm really sad to see her go. I think in her time she did some amazing things. You know, the blueprint for the AI Bill of Rights came out.

Shobita   00:04:08   She also did some important work on open access and open data that we talked about last time. She, for a significant period of time, became the interim director and was the first black woman to hold that post. And the fact that she is an STS scholar, a sociologist of science, technology and medicine, is absolutely huge. And you saw the impacts in the kinds of explicit guidelines that OSTP issued in that period and in some of the implicit behind the scenes kinds of conversations that she was trying to facilitate. I mean, OSTP is not a government department, it's a office within the White House. And so its primary purpose is really convening people. And so as part of that, that's also about defining new forms of expertise as relevant, asking different kinds of questions of science and technology, questions around equity and justice, questions about the social implications of all sorts of things.

Shobita   00:05:08   And you could see that real change in OSTP over the last couple of years. That's not to say it wasn't doing that before, but it really took center stage. And I think that's so important when you want to make sure that science serves society to have those kinds of conversations happening at OSTP. And so the question that I have going forward, we now have a new director for O S T P who is a woman of color, Arati Prabhakar. She's a physicist by training. My question going forward is, is there gonna be another Deputy Director for Science and Society? I think there absolutely should be. I think that Alondra has demonstrated really clearly why that's so important.

Jack   00:05:48   So it's one thing to have the person, but it's another thing to have the job title. And sometimes job titles outlive the office holder, but sometimes they disappear when the, when the person goes.

Shobita   00:05:58   Yeah. I mean, as I said, she was the first person in that role and she helped give it some structure. Right. And I do think that we are seeing all over the place now. I mean we're not where I think Europe and the UK are in terms of seeing STS or science and society expertise as crucial to conversations about science and technology. But we have been taking steps. This was a really important one.

Shobita   00:06:22   And as far as we know, I mean she didn't make any enemies or piece people off or give anybody any reason to not think that it was an important part of the conversation.

Shobita   00:06:31   Not to my knowledge <laugh>. Yeah. So that's the state of the union in the US. Jack, how are things in the UK? I heard about this science, technology, and innovation department. What's all that about?

Jack   00:06:44   Yeah, some policy wonk get excited when there are changes to the machinery of government movement of government departments. For those of us that have seen a few administrations change and have seen this happen and seen the excitement come and go, it looks a little bit like, you know, moving around the deck chairs on the Titanic, I have to say. So what's happened is that the old Department of Business, Energy, and Industrial Strategy it was called, has been split up so that you get three times as many secretaries of state. There's now a Department of Business, Department of Energy, which also has responsibilities for net zero. And there's a separate Department of Science and Technology, which, you know, maybe in the right hands a Secretary of State for that department could take it on and do something interesting and maybe, you know, do what you were saying of ask some new questions, add some new questions to the science and technology policy discussion. But that's not going to happen. I mean it's just not going to happen. We have a government that is flailing about, that's way down in the polls that's recovering from its own self-inflicted catastrophes. And they will probably double down on the idea that science and technology are a route out of Britain's current crisis and this sort of moment of national decline. But that means probably less attention to the new questions rather than more.

Shobita   00:08:08   How important slash big are these departments relative to the other government departments.

Jack   00:08:13   So I mean, what it means if you split a department into three, you know, you're not gonna suddenly make each of those departments the same size as as the original one and and and hire thousands of new civil servants. So you've just got some smaller departments. What it means is that you create two new cabinet level posts. So you've got more people around the cabinet table, more people that Rishi Sunak can call friends. Yeah, I mean it doesn't really mean very much in terms of extra policy making capacity. You know, actually most of the policy capacity that's been added to British government has been <laugh> in terms of, you know, dealing with Brexit. That's where most civil servants got their jobs recently and then says some other sort of regulatory agencies that have suddenly become much more important, like you know, the Information Commissioner and Ofcom and these various other very wonkish sort of agencies because they're the ones that have to deal with the whole digital business, which government previously had no way of understanding. Don't, I would say don't watch this space.

Shobita   00:09:10   <laugh>. Oh yeah, yeah. Well there has been a space that everybody it seems has been watching. Uh, and then <laugh> you like my segue and that

Jack   00:09:21   I love that

Shobita   00:09:22   <laugh> and that is ChatGPT. I mean it literally is a space that everyone

Jack 00:09:32   Yes, obviously I played the same games that everybody else did. Got it. To answer my essay questions from the modules I was teaching.

Shobita 00:09:42   Did it do a good job?

Jack   00:09:43   It did fine and you know, if you wanted, I mean it's, it's old news now, but if you wanted to cheat and get away with it, you could, I mean you might not get a very good mark, but you might be able to pass a module or two. It's at a British university, which is sort of

depressing. You know what, the thing I've been trying to resist is seeing this in the terms that AI is so often seen through, which is to ask what does this mean for me? And I've been writing an, an essay recently all about drum machines. Drum machines as a sort of case of where automation meets culture meets political economy. I am, in my spare time, a very bad drummer. So I started off from that, what does this mean for me type thing, right? A sort of technological unemployment-type question and listened to various sort of AI music things and thought what's going on there and try to interpret that.

Jack   00:10:36   But the conclusion that I came to is that that's never really what it's about. And if we ask those questions we, we miss the really important transformative things that technologies do, which is that they reconfigure power. They don't just take away people's livelihoods, they do all sorts of other stuff. And if we think that ChatGPT is just about what does this mean for me a university professor, then we're gonna miss the really important stuff. Yeah, I mean I'm conscious that you were way ahead of the game because you did a report on large language models. Having seen Chat GPT and having done that report on large language models, I mean how many of the issues were you totally ahead of and how many have are new do you think?

Shobita   00:11:15   So one of the things we did try to do in that report was to push beyond that immediate knee-jerk question, you know, questions of authorship and misinformation and push beyond that to say okay, what are the broader impacts? What are the impacts of those things that are likely to happen? And one of the things that I think we were out ahead on, and I haven't seen enough conversation about it, is about how large language models are particular perspectives of cultures frozen in time. And what I mean by that is it's worth noting that large language models, because they are based on texts that are available, they are based on old books and Reddit threads and internet sites and they basically crawl those internet sites until they are at the point that they might violate a copyright rule and then they stop, they go to another site.

Shobita   00:12:14   So what does that mean? As people have famously shown, it means that they say yucky things, they're racist, they're sexist, they're homophobic, and you know, Facebook's galactical that came out in the fall and was quickly taken offline because it was doing those things. Microsoft thinks that it's smarter than everybody else because they have filtered out that horrible language. However, the problem is still the same. When we were doing this research, there are a few things that I think nobody talks about. One is that this is all, almost exclusively based on English language texts. And because it's based on English language texts, it means that what it spits out are American and British perspectives on the world of a certain time. You know, there was someone who wrote a blog post saying, you know, it doesn't have a good understanding of Norwegian culture cuz it's not taking into account Norwegian texts.

Shobita   00:13:13   We are relying on what the Americans and the British think of African countries, South Asian countries, Latin American countries, et cetera, which are not going to be presumably either the way the people in those countries see themselves, nor are they going to reflect changes in the way that we view those countries. You know, we have new new understandings, for example, these days of colonialism, slave legacies, et cetera. LLMs are not gonna reflect that. And so to go back to what you were saying before about reconfiguration power, right? In some ways this is about reinforcing and globalizing again particular views of the

world and that is quite dangerous, but it is also hidden because it is not the kind of thing that you can point out a racist text as easily. It's difficult to root this out, but it's crucial.

Jack   00:14:13   Yeah, absolutely. I mean there's a couple, couple more things that have really, really struck me about the ChatGPT conversation. One is how so many people online fit into the story that this is about a race and that now Google needs to catch up and compete and demonstrate that its large language model is better, more powerful, et cetera, et cetera. I mean it's quite interesting that Google has more to lose, obviously much more to lose than open AI because Google is part of the infrastructure of our lives in a way that open AI just is not. But it's odd that people haven't commented on the, just the breathtaking irresponsibility of releasing this thing and telling the world how powerful it is without considering any of the questions that might come with it or considering those questions in a very narrow way. So the first thing is they don't really give a shit about truth, right?

Jack   00:15:07   And and a few people have done the experiments that said, you know, these things get stuff wrong all the time. And you go, yeah, fair enough. And it's interesting that to the extent that the values are tuned into these machines, the value of truth is way down there as a priority. You know, we just don't care. We're more interested in thinking, oh wow, does this thing do a good impression of a human? The other question that sort of really got me is about responsibility being imagined just as a question of well what the AI people call safety, right? And it's really odd that they call it safety, but they would take your sorts of concerns, right? And say, yeah, we can fix those, right? We can fix bias, we can fix for racism, we can stop it saying nasty things and in the future we can tune it so that it's a bit more culturally diverse, we can feed in different language data sets, we'll do all of that.

Jack   00:15:59   And they interpret that as a sort of engineering challenge rather than anything with any politics. And it was really interesting I thought, and that this is a, a piece of reporting that I'll make sure is on the show notes, the sort of hidden labor that goes into making those systems in quotes safe, right? And the way that they do this is by basically deciding what they don't want. So they don't want violence, they don't want sexism, racism, what you call yucky, right? All the yucky stuff. But in order to do that, somebody has to go through all of the stuff working out what's yucky. And this takes us to the conversation that we had with with Mary Gray a while back about ghost work 'cause there are people working in the world's poorest places on the worst that the internet has to produce. Going through all of that, deciding what's really, really bad and what needs to be kept out of these systems so that these systems can appear to the outside world, that they are nice and well behaved, when actually the rules for their behavior are being set by people on very, very low wages who have to experience pretty gruesome traumas every day of the week.

Jack   00:17:15   And I think the way that those hidden workers are left outta the conversation is really gross.

Shobita   00:17:21   It's displacing risk and safety in some ways. You know, there's not, I think for in a lot of these cases, I think we talked about this with Mary, that it's not like these companies are providing any kind of support to these workers that would help them manage the kinds of risks and traumas that they go through to do this sort of work.

Jack   00:17:43   Absolutely. They don't want to talk about it at all. So they outsource it in this case to a company called Sama who laughably referred to themselves as an ethical AI

company. And also, and this is really fascinating, they had a strong sort of social justice agenda to lift people out of poverty by giving people in poor countries tech work what they considered to be value added labor. But it means that open AI, you know, when asked how does this work? They go, well I dunno, we got people who make it safe for us, which means that chat g p t is not racist in the way that that old Microsoft chatbot became all racist. But the idea that that sort of solved the problem is just laughable. I mean it's just yet more Wizard of Oz weirdness going on behind the scenes in order to create the impression that this thing is magical. And the really depressing thing is that it appears to work, right? It's that Microsoft come along and say, yes it's magic, let's buy it, let's give you 10 billion or whatever. If you are Open AI, you are just following the incentives that are in front of you, this form of utterly irresponsible action.

Shobita   00:18:51   Absolutely. To go back to what we were saying about Alondra, I think that what I appreciate about having a social scientist of science and technology in a policy position is that they can raise those kinds of questions. Those are policy questions in part, right? We resist the idea that these are just technical issues and you can just tech your way out of it and more and more tech and the, and tech is magical and all, you know, there are always gonna be people and the more tech, the more people engaged in the construction of that tech and they are experiencing the kinds of harms that Mary talked about and Ben Tarnoff talked about before her on our podcast. And the only way to ensure that they are treated properly is through public policy frankly and having experts in the space who can speak to those kinds of issues.

Jack   00:19:45   Yeah, I think we did quite well ranting about ChatGPT without talking about essays, we could have just talked about essays and plagiarism, but we didn't do that.

Shobita   00:19:55   No, we resisted the urge and I'm gonna keep resisting the urge. So shall we talk about who we're talking to this month?

Jack   00:20:02   We totally should. Tell us.

Shobita   00:20:04   So we're talking to Kelly Bronson who is a professor at University of Ottawa. She's the Canada research Chair in Science and Society and she just published a book that brings together two worlds that you might not think about in the same sentence. Data computing, tech and agriculture. The book is called The Immaculate Conception of Data: Agribusiness, Activists, and their Shared Politics of the Future. And we had a really, really interesting conversation about what's called precision agriculture and essentially the way to tech our way into a better food system and the challenges and controversies around that. So hope you all enjoy.

Interview

Shobita   00:20:54   Hi Kelly, welcome to the Received wisdom.

Kelly   00:20:57   Hi, thanks for having me.

Shobita   00:20:58   Sure, it's great to have you here. And I'm so excited about your new book, the Immaculate Conception of Data, which is about precision agriculture. But I know for many years you have worked on food science and technology, genetically modified organisms, various topics related to agriculture and I'm just wondering what brought you to this topic.

Kelly   00:21:21   So my distant background is in biology. I have two degrees in plant biology and a somewhat mathematical biology, evolutionary biology. But I moved from the lab bench

initially to study what the STS scholar Brian Wynne calls the public face of science. I found myself really interested in the early aughts in the public controversy around biotechnology applied to agriculture or GMOs and you know, I had a really supportive lab supervisor. He was actually on the Royal Society report in Canada that weighed into the policy on GMOs in 2001 and he suggested that I was interested in asking bigger questions and so I moved from the lab bench to the social science of technology, so the sociology of biotechnology and then my upper degrees are in the social sciences. And I was really interested at at that time and then for I would say a clean decade in understanding public resistance and understanding, not the technologies per se, but how the legal and social and political infrastructure, including some of the political economy of the science was shaping the way that these technologies were being used or the way they could be used.

Kelly   00:22:43   They've proven really useful for a lot of players in the food system across the globe, certainly in Canada and in the US but there was a lot of farmer resistance and and environmental resistance specifically around the patent regime, um, as you know and have written about Shobita. And so I spent years writing about that and studying that. And then it was actually in following the purchasing habits of one of the largest seed science manufacturers, Monsanto, I started to notice that a lot of their seed patents were coming due and that they seemed to be, the company seemed to be reinvesting or investing a lot of R&Dinto data science. And I thought, isn't this interesting? I don't have the technical chops to understand the data science. I thought to myself, but from a sociological or an STS perspective, I was really interested in how this new kind of technical regime or suite of technologies, you called it precision agriculture, but you know, you can think of that as the collection of data on farm equipment kind of passively data are collected and then aggregated by these agribusinesses and then they're mined by machine learning and et cetera.

Kelly   00:23:56   So that's sort of how I would classify precision agriculture, digital ag. So it was this new technical site, but I was sort of interested in how these tools, I wondered how they were organized, right? Are the data sets going to be proprietary? Are they gonna be shared widely? What, who's going to be using the data and for what purposes? Who's gained? So those kinds of questions about power and the kind of infrastructure around the tools followed really logically from the kinds of lines of inquiry I was following with GMOs. And so that's how I moved from studying GMOs to big data or precision agriculture.

Shobita   00:24:34   So how did you go about studying this? I mean you said you don't have a technical background, which of course many, sometimes I think we do have technical backgrounds, we need to be a little bit more arrogant about that I think, but okay, so how do you go about studying something that's outside the lab but that's highly technical.

Kelly   00:24:52   So yeah, I mean I had this technical background but not in computer science or data science, but I think STS really prepares one well for that. You know, you could call it a kind of transactional expertise or a translation, like an ability to kind of, maybe it's a bravado, I don't know, just like you know, confidence and reading the technical documents. But I also just spent lot of time with scientists themselves and it's an empirically driven book and it's almost ethnographic. I spent three years just actually following data scientists around, you know, as they demonstrated their projects and they tried to what they call ground truth, right? We're

gonna bring this machine learning tool into the field and and we're gonna show you how it works. Or in I would say not a small number of cases, how it didn't work. <laugh>.

Kelly   00:25:42   Oh wait a second they'd say we need to perfect this and oh just ignore that beeping, you know, <laugh>. So yeah, I spent a lot of time with the scientists, both scientists in private sector and then also public sector. So government scientists who to be honest were more eager to speak with me or it was easier to speak with the public sector scientists. I think even though I never have taken a normative stand on biotechnology, I often get misread as critical of biotech. So it was a bit more difficult following from that history of scholarship to get the interviews with the data scientists in the private sector. It's also that like big tech, a lot of the, what's going on with precision agriculture is protected by trade secrecy. And so employees weren't really allowed to speak with me. In fact, some of the most interesting interviews I had were with retired scientists who were still kind of working on contract for the big companies, but often I was given a kind of sustainability officer or the public relations person and, and those, those interviews were interesting. But I did spend time some time with private sector scientists. I did gain some access to those labs. And then there was sort of another whole set of field work I did, which was following activist scientists qua farmers and they're kind of one in the same in this community people making do it yourself or following, kind of do it yourself OpenTech methods to develop these kinds of digital tools for, in their case small scale alternative agriculture.

Jack   00:27:13   So I, I'd love to come to that Kelly in a second, the sort of alternatives because well as we all know, a lot of what we do in STS is try to find the alternatives in order to show people that there is another way and alternatives are possible. But just before we come to that, can I just ask you, so your work was looking mostly at the scientists speaking to the scientists and some of the companies trying to sell their wares. What does this sort of stuff do to farmers themselves? So the regular farmer that's trying to make a decision about what to grow and when and how to maximize their profits and fit into established markets, how does the sort of datafication of agriculture change what they do?

Kelly   00:27:56   There is the answer which you can find in the corporate kind of promotional discourse or the advertisements. What is it intended to do or what's the promise of the tools. The promise is often one of a productivity gain, uh, gain in efficiency and economic efficiency in particular, if you're a farmer and you're using a precision tractor, you're collecting data from your farm, but then that data gets aggregated with data from across farm users, right? It gets combined by a company like Farmer's Edge is a Canadian company that plays in this space, competes with Monsanto, they would combine farm level data with say remote sensing data. They have even private weather data through a private constellation of satellites with uh, partnership with Planet Labs. So the companies that amass these big data sets. And as a kind of interesting theoretical sidebar, you know, often people ask me, well what are big data?

Kelly   00:28:51   Like what constitutes bigness? And I feel like that's an extant debate even among data scientists. But I really like I heard Don Mathos, the Intel researcher once say, it really comically big data are just 100 times whatever you had before <laugh>. I really like that. So you know, but the company is AMA data from across farms and they aggregate them into these big data sets and then they have these algorithms that mine those data sets for insights and then they sell those insights back to the farmers. So to answer your question, you know, the

companies say, well listen, if you drive your farm management decisions, when to seed, when to spray which particular chemical seed combinations to use based on these data-driven punitively data-driven insights, you'll be that much more competitive. I mean it's the same promise that has attended seed technologies like GMOs, chemical technologies, and for some farmers that proves true, right?

Kelly   00:29:48   Those tools do offer a competitive advantage. So that's the promise where the data are in terms of productivity gain, it's still, interestingly these tools have, I mean GPS guidance and autosteer and some of the automation and sensing has been around the same timeframe as GMOs, but the adoption is so uneven I think because the return on investment is not totally clear yet and we don't quite have the evidence yet about the efficacy of these tools, but it's still possible these tools to do what the companies say they're going to do. So that's sort of the promise and the potential. One thing from a social science or sociological perspective I see the tools doing is increasingly the farmers who are using these tools or increasingly farmers are being encouraged to use these tools not just by the companies, right, in terms of the pitching of technologies for adoption, but also for example by government insurance schemes which are asking farmers to draw on a data set, right, to validate a claim for crop insurance in a way that historically a farmer didn't need to do that they could provide a kind of different, I would call it kind of testimonial evidence or a spreadsheet.

Kelly   00:31:06   Farmer's Edge, again, that Canadian company that does precision agriculture, they have this great advertisement where they show farming then that's what that says on the image. And then now, so on the left hand side it's a farmer with a spreadsheet and a computer, still a computer-based technology, right? But the now they have is the cell phone in real time, internet of things, data driven machine learning. And increasingly I'm finding that farmers are being encouraged to rely on data to validate claims. It wasn't the case that, you know, from a kind of Marxist alienation perspective, I was seeing farmers say, I don't trust myself anymore or to know my fields. In many cases, farmers told me, actually I knew what the data told me, I knew that that was an underperforming area of my field, but they were sort of empowered by the data driven insights. One farmer even told me to measure by data is to know. They were sort of empowered in a way, you know, they were validated in a way by the data. And then there are again these institutions like insurance that are increasingly encouraging farmers to rely on the data-driven insights and not their own, I would say experiential or farm knowledge.

Jack   00:32:18   And is it the case that the beneficiaries, the winners of this set of innovations, are they just what you'd expect the big farms that are able to invest, take on debt, acquire machinery, and do we see the sort of repeat of what we saw with previous agricultural technologies, that it forces diverse and smaller farmers either outta business or to consolidate or is it more complicated than that? Does it actually allow small farms to have access to things that they otherwise wouldn't have had access to?

Kelly   00:32:48   The sort of short answer is yes, I see these tools as largely reproducing the same, we could call it political economy or power inequity, farmer to farmer, at least the commercially available tools, those on offer by Monsanto, Farmer's Edge, the tractors that embed the sensors that John Deere offers. For one, they're incredibly expensive pieces of machinery that only a large scale farmer is going to have, you know, farm with a varied topography or a lot of biodiversity. The tools don't even work and they're not designed. And I

have articles on this, right? By the very design of the tools, they're not designed for that type of farmer. When I talked with private sector scientists and I said, what about this small biodiverse farmer and what about, and they said, that's not our bread and butter. It's not controversial really, nor is it surprising that the companies are targeting what they see as their viable market.

Kelly   00:33:44   And so on one level, yes, and it's far more complicated and I deal with this in depth in the book, but I think that we see at least the private led digitalization of agriculture really serving the powerful farmers and the dominant mode you could call it, of agriculture or you know, regime, Harriet Friedman calls it food regime, right? A very capital intensive globally facing, you know, that's a bit of a problem from a technological equity perspective. What about those other farmers? But actually, you know, then again, part of the book is telling the stories of these activist scientists who are trying to use do it yourself digital tools and they kind of really buy into a lot of that promise that we've seen that followed even early internet communication technologies. And to some extent we've seen that, right, cell phones can be liberatory, they can help in the organization of social movements and networking and access to markets in the case of these farmers.

Kelly   00:34:44   And so there's that promise that the activist kind of model for the realization of digital agriculture could lead to an empowerment of a more biodiverse and community based agricultural movement. That's what those farmers hope. in the book I, I don't really take a wholly cynical perspective, but I do try to highlight that there's an incredible asymmetry <laugh> between those two communities in terms of the funding and support that the private led innovation gets. The legitimation, the Association for Agricultural and Biological Engineers, for example, how like what system do they validate? The research, the scholarship, the, you know, and then you have these activists that are doing it off the side of their desk <laugh>, it's like activist coders from Silicon Valley and small scale farmers who are doing do-it-yourself tools and have these communities of tool development and wiki tool lists. And so there's an incredible asymmetry in the potential for the realization of these two models.

Kelly   00:35:47   But interestingly, I thought in the beginning for the book that I would be telling this very simple STS story about these two models of agriculture. I kind of had a simple research design sort of getting at the question that you asked me, are these competing models for the realization of our digital agricultural future? And what are their differences, right? How do these different contexts for the data science lead to different kinds of research questions? But then the book became about something else, which is that <laugh> after three years of spending time with these folks and really only after coding what we say in social science, coding the data, right? Rereading the data and systematically looking at the themes. Did I realize, oh wait a second, sure. These are radically different models for how to build technology like proprietary closed market driven versus open community technology development, open data, open science, radically different models for what good agriculture is. Industrial capital intensive, globally facing export oriented versus community, regenerative agro ecology. And yet shared across all of these groups was a way I found a way of speaking about big data in particular but also artificial intelligence that was shared among everyone. And I actually think it exceeds the ag domain and that's what the book sort of became about. And that's the framework that I develop in the book I call the immaculate conception of data.

Shobita   00:37:23   One of the things that I'm curious about is something that you kind of said to the side a few minutes ago, which is about ignoring the beeping. So I'm wondering how all of the different actors in this domain think about error? Are they thinking about error the same way or risk? How does that affect the way they understand the promise? And does that affect the way they understand the promise in different ways? Or do they both kind of just wave away the error in the name of the promise?

Kelly   00:37:54   Yeah, that's a great question. When I first realized that everyone was really participating in talking about big data in particular as if they're immaculately conceived and it's in simple phraseology that we hear all the time, raw data or data driven. But it was also really in animating data, personifying data in the conversations we had when I realized that I had first thought, oh this is a really false kind of specious way of looking at the data, but then I, you know, it was hard for me to square that kind of intellectual labor they were doing to hang on to talking about data that way. Against all of this time I'd spent with the very same people who were doing so much work <laugh> to bring the data into being, to fiddle with the equipment to then hand the data system off or the platform off to a suite of agronomists who boots on the ground were ground truthing and in lots of cases finding that the language was always, this is not yet perfected.

Kelly   00:38:58   So it was very much future casting. And that's a big part of the book, right? It's the, the immaculate conception of data is very much about the promise of these data systems in the future. Even if they're not perfect now, they're imperfect now, but in the future and that kind of seamless move from data to information to knowledge to wisdom that's even built into computer science pedagogy, I found out right? The DIKW is like the gold standard of computer science pedagogy, which is interesting. But so yeah, it was hard for me to reconcile these people are talking about data as immaculate, all powerful, the future is going to be delivered by data bright shiny future, whether that's an industrial ag future or an alternative ag future. And then here I was with them and things were not really working always as planned.

Kelly   00:39:48   And I would say they weren't really brushing aside the error or the imperfections and probably if I asked them and I ended up asking them, right, they don't hold on to an immaculate conception of data in truth, but they were talking about their data systems using that framework. And so in the end I really, I draw on STS scholarship to argue this isn't really an epistemic distortion, it's not like the data scientists aren't really clever people and and actually think about the data as found and not made. Of course they know they're made and they produce the data sets and they weight the models and they write the algorithms. They wouldn't deny that. But it's that the immaculate conception of data framework they were using, they're using in PowerPoint slides in a bid for major government funding they're using to try to convince the social scientists like me about the power of their activist project. They're using the immaculate conception because it's a framework that works and why it works. I try to use some STS theory in the book to help explain that why it's such a powerful framework.

Jack   00:40:57   Can you say a bit more Kelly about the sort of, depending on how successful these are, the alternatives or the attempt to build alternatives, you know, models of of open source, which looking back to the sort of the early days of the internet, there was a ative talk about open source as a genuine challenger to what were then emerging platforms coming from people like Microsoft. And you see rather less talk of that sort of stuff now as the platforms have

become for almost all of us, just part of our infrastructure, you know, unavoidable, you know, whether they're hackers or activists or alternative farmers. How have they been able to develop alternatives and what does that tell us about challenging the dominance of big tech in areas like agriculture?

Kelly   00:41:47   The alternative farmers that I spent time with, the activists, they are developing a platform called Farm OS using open source technologies like GitHub for example. So in that way, very much the kind of suite of tools made available through open source is enabling the realization of that vision for the digitalization of agriculture. But I would say that when I started writing the book, there was a moment where it seemed before maybe Cambridge Analytica and the knowledge of how that work participated in Brexit for example, or the original Trump election. There was a kind of techlash where it seemed to me that there was an awareness about the kind of failed political economy of platforms that even though these seemed like solid things, right, we had not thought about potentially paying a user fee for example to participate on social media. But there was a bit of an opening it seemed after that.

Kelly   00:42:51   And this was just, as I said, as I began the book, but there wasn't that same kind of critical attention to the uses or rather misuses of data and the power, the kind of notion of big tech as capturing a lot of the data and then monetizing that data by selling data to third parties. And there wasn't that same attention to agricultural firms. And so I was curious why aren't people paying attention to environmental data versus personal data collected or harvested online? And I think one thing has to do with this notion of openness that you talk about. I sort of think that environmental data are assumed in many cases to be a priority to be open because it, a lot of public infrastructure has been developed to collect these data. Think about satellite weather data for example. And the data are still thought to be sort of in the public domain. And so this question of like public-private, open or closed, in the agricultural context, I think it's different than say personal data collected online where we've used tools like privacy legislation and the conversation is really about an attack on personal privacy or civil liberties because there's a bit of a presupposition that this is my property or this is mine. I think there's an assumption about openness when it comes to environmental data, even if it's data collected on a farm.

Jack   00:44:26   See that makes me think of when I had conversations with genetic modification scientists here in Britain, some of them would be nostalgic about the way that agricultural research was led by and often held by the public domain for so long. We had things like the Plant Breeding Institute in Cambridge, we had agricultural extension services that were sort of obviously and inevitably going to be government supported. And part of what happened with the move to biotechnology was a privatization of a lot of that. And this feels like a sort of extension of the same thing, which is really hard to resist if you are trying to develop alternative models, right?

Kelly   00:45:03   Yeah. And that the same happened in Canada. I have an article from the Journal of Responsible Innovation on the history of seed science in Canada where it happened, I don't wanna say like sneakily, but it happened over time in a, in a way that caught a lot of seed scientists, public sector scientists by surprise, that the seed industry basically bought up and privatized seed science labs that before hybrid seeds were actually these not even laboratory based, but I would say almost from an STS perspective, like an open system of innovation in

that the innovations were, you know, moved from the laboratory, they were tested by farmers in the field and then the farmers iterated and then you know, the same thing happened with seeds. Absolutely. And what I have trying to show I think in the book and draw some attention to is even though I suspect that the critical data studies attention both popular and scholarly has not really moved from an attention to social media data to agricultural data or other kinds of environmental data, I think it has to do with this assumption about openness.

Kelly   00:46:05   And yet it's a false assumption which we've seen with seed science. And what I try to show with a few different stories in the book is similar things are happening with data. So for example, the companies are collecting data not just from the farms but using the public sector data on weather, but then they're repurposing those data sets in really useful ways and then those are not made open. Those are monetized and made proprietary and it's this really complex, I mean I tell other stories in the book about competitions that industry holds that public sector scientists participate in. It's very much a Silicon Valley model with precision agriculture where the innovations are in a competition are then scooped up and bought right by the larger companies. And it's not just the agribusinesses but IBM for example, the Gates Foundation. A lot of big companies are participating in this space.

Kelly   00:46:55   Now I found too, a lot of the critical conversation is about opening and access and I think that can distract us from some of the more fundamental issues. There's almost an assumption that opening either access to digital farming through, for example, the development of broadband across Canada, the Canadian government right now is spending a lot of money to do this, right? Assuming that increasing access to broadband for farmers will create a kind of equity or justice or opening dataset. So there's a UN organization GODAN that is really pushing to open environmental data sets for food and nutrition. But you know, if you look at actually which data sets are being opened and some of the details that calls into question whether openness is actually a viable solution. But I think again, the more fundamental questions about well what kind of food system do we want? We can get distracted in conversations about access and not ask the broader questions about social justice or environmental justice.

Shobita   00:47:59   It's interesting to think about how access or openness is in part a response to previous controversies. And on the one hand it seems like it's probably a response as you said to some of these social media privacy issues. But then of course Monsanto has a long history of not being known for its openness in various ways. And so that could perhaps shape it too. So I'm interested in thinking about that. I think that the framing in terms of precision agriculture is interesting to me. As you know, I, I know a little bit about precision medicine and I've been thinking a little bit also about, as you've been talking about how a lot of the controversy around machine learning and algorithms is about how it's essentially turning immaculate, rendering immaculate, to put it in your terms, historical inequities. So we have a messed up criminal justice system and if you use the data to inform an algorithm, you're gonna create that in perpetuity. Same with medicine. And I'm wondering whether those kinds of concerns or issues come up at all in the agricultural space where and how. So I'm just wondering if those kinds of issues come up or whether it's more really focused on the access and openness issues.

Kelly   00:49:22   That's a really great question. In part, I think that's some of the work that this framework, the Immaculate Conception does and it far exceeds as you point out the agricultural domain. So I actually don't see this as a book really about precision agriculture. The bedrock is

stories about farming and data and AI. But that point about the immaculate conception, it's just as you say, right, this is used across the board. You know, the promise is that these data sets and this machine learning are a perfection not just of human ingenuity, right? And insight or wisdom <laugh> because of the volume of data that can be drawn on and the speed of the processing machine versus the human brain. But also because we know humans are flawed, right? And biased. And come with politics. And so the promise of the immaculate conception is that, oh the data-driven insights are unbiased, they're objective, neutral.

Kelly   00:50:19   And that's a very powerful vision as we know, right? It's one that's attached in the history of technologies and you, you see it with agriculture. And so I trace some of those promises and one thing I really wanted to do in the book back to your question about do you see this? Yes, I see that as a promise and, and I see it as a promise being made by the companies, this is how I analyze it in the book in response to heightened criticism around the environmental and social effects of industrial agriculture. So another way I begin the book is talking about the lawsuits against Monsanto, now hundreds of thousands, right? Monsanto just I think settled for billions of dollars out of court with thousands of farmers around glyphosate as a carcinogen, or a potential carcinogen. And so as we've seen, I think this heightened awareness around some of the effects of seeds and seed-chemical combination coming from Monsanto, the companies are really, I think actively trying to reinvent themselves.

Kelly   00:51:24   But cynically, we might say resignify what they do. So you know, I had someone from Monsanto tell me, we don't deal with inputs anymore. We are replacing inputs. And by that they met chemicals with information. There's this kind of farming is, is tending toward abstraction and that's the immaculate conception of data. And it makes a lot of sense if you're getting a lot of negative feedback from farmers even and farm communities, agricultural workers and then the usual suspects like the environmental groups et cetera, around the effects of your products. You know, you're reinvesting in something different, a different approach. One that companies would argue is more targeted and makes more judicious use of those harmful inputs. But there's also a messaging, right? And I really trace that in the book as you say, it's a response. Um, and I was told this explicitly, I met with a sustainability officer at one of the major agribusinesses who said, my job is to tell the sustainability story <laugh> of precision agriculture.

Kelly   00:52:28   And then when I pressed and I said, well does it lead to less chemical use? There was a lot of equivocating, you know, well, um, not necessarily less chemicals but more targeted use of chemicals such that the plants that need it get it. And for sure that would lead to a growth benefit and productivity increase. But the sustainability story, that's a bit of a question mark still. And I have a paper actually I've just submitted to Nature that's a huge meta review of the evidence around sustainability and precision agriculture. And it's a bit of a question mark, I don't deal with that in the book, but

Jack   00:53:04   Kelly, I want to know what you think about an amazing story that you may have had. So John Deere tractors, which you mentioned, which is one of those things where, you know, the normal person who doesn't follow agriculture closely just thinks, oh they make tractors, right? And it turns out that the more you find out about this tractor company, the more you realize that they're a data company, a surveillance company, that they are basically renting their things to people rather than selling their things to people. And there was this amazing story,

I dunno if you, if you saw this about the Russians stealing John Deere tractors from a Ukrainian dealership and they stole dozens of these things, took them back to Russia and, and gave them to some folks in in Chechnya. And then the sort of victorious message afterwards was that John Deere managed to shut down these tractors.

Jack   00:53:52   There were about 30 of them and they shut them down remotely. They disabled the tractors remotely, which was harrah. Isn't this an embarrassment for those daft Russians thinking that they got away with it? But it was one of those moments where those of us that don't follow agriculture go, hang on, you can do that <laugh>, you can just, you can just remotely shut down people's tractors. And that sort of fundamentally made me rethink questions of ownership in agriculture. I mean do farmers worry about whether they actually own the means of production that they used to own? Yeah,

Kelly   00:54:23   It's a bit more complicated. Certainly many farmers worry about that. And there's a whole very well-developed right to repair movement, right, that is working against that. The interpretation of copyright law and the John Deere lock right on these now digital machines, as you say, that can be controlled remotely. And so the interpretation of law currently prevents farmers from doing what farmers have done for a long time, fixing their own machines on the fly as they need to. 'Cause as we all know or probably ought to know, farming is very time sensitive. But these machines are, and the the legal infrastructure surrounding them are such that, yeah, now the farmer has to go through a certified John Deere dealer for the fixing of the machine, right? Because the farmer doesn't have access to the software, they need to fix the machine, nor do they really want to be in many cases the farmers I've spoken to, aren't computer scientists, right?

Kelly   00:55:17   It requires a whole level of digital skill that many of them interested in developing. But for those who are and and there are, you know, there's a whole movement advocating for the right to repair and the dismantling of that digital lock. And one of the things, you know, I recently fact checked the book again cuz it's been two and a half years since I submitted the manuscript to the press. And one of the things I said in the book was, oh, it looks like John Deere's gonna relax the digital lock. And it turns out that's one of the facts that is not true. They, they have not done that. So I would point people toward organizations like i fixit.org, there's a lot going on in that space. But you know, the answer to your question, do farmers care I think is a really interesting one from a social science perspective.

Kelly   00:56:02   I found that the farmers who are really buying into literally, right, the precision agriculture model, the dominant one, the private led innovation model for digital ag. So they're buying the really expensive tractors, they're using what's called variable rate technology, which is the data-driven insights that then almost in real time suggests to the tractor as a nearly autonomous vehicle where to spray, when to spray, et cetera. The farmers buying into those strategies don't seem to care as much. You know, and one of the things I found in reading the license agreements and reading the trade use agreements for these companies around the data sets and also the machinery, is that protecting farmer privacy, the privacy of your personal data and also the messaging is, even in the trade use agreements, they're interesting kind of discursive documents. The messaging is you are a busy farmer and we've got the in-house expertise to protect your privacy but also to do all of the work for you.

Kelly   00:57:00   And we're just gonna then deliver you this insight or rather deliver the machine that you may or not be in while it's driving the field. That messaging really works for, I think the kind of farmer that's buying into these systems. They're not super interested. I would say the, those farmers I spoke to, at least in Canada and the US in accessing the data, in tinkering in right, becoming a data scientist themselves, they're busy and they want, they buy into that narrative of wanting to farm while they're fishing or that kind of, you know, increasing autonomy or liberation from the arduous work of farming. Whereas farmers who are farming at a different scale and who really like farm labor and re like supporting farm laborers, right? Have a community of workers who come and go on their farm, the kind of labor intensive organic farm or agri ecological farm.

Kelly   00:57:50   They're really interested in tinkering. But you know what, they're buying machines from 1920 and converting them into an electric vehicle. And a whole interesting system of alternative innovation and parts development is developing around that model of digital agriculture. Again, it's not symmetrical, right? There's sort of like a small piece of the puzzle over here. But so I think to some farmers that intervention on the part of John Deere, that oversight on the part of a machinery company, especially because we know that John Deere is trading data with Monsanto, they're a data partner. So the chemical company gets the data from the machinery company. Just like we know Facebook sells data to third parties, right? Who sell us washing machines and jeans. The machinery companies are selling the data sets that's a source of value or profit for the companies. And one can infer that those data sets are gonna be incredibly valuable to say a chemical manufacturer who will be able to know areas that have particular pest pressures or weed pressures and therefore are in need of chemicals. We know that these companies price set, they already do that, right? They're near oligopoly corporations, agribusiness. Were Big Tech before social media companies. They're the earliest Big Tech. And so we know that these, this potential for the misuse of big data or the use of big data to entrench market power and private gain exists. And that concerns some farmers, but I would say say not the farmers really buying hook, line and sinker into this strategy

Shobita   00:59:25   Kind of related to this in a perhaps more mundane way, which is kind of where I like to think about power too, is something that you said a a while ago, Kelly, about how government insurance schemes are now requiring farmers to use this data in some way. And I'm curious, what was the process by which this happened? First of all, it seems like it's a normative position on the part of the government that they're essentially saying, we think this is good, right? We're gonna endorse it. But also that we think this kind of data is valid, that it doesn't need to be authorized, there doesn't need to be accountability, transparency, any of the things that we're now debating about whether and how AI should be subject to it sounds like the government was just like, all right, we, we think you should have that data and it should inform your farming and that effects whether or not you can submit an insurance claim. So I'm wondering whether you know anything about what was the process by which AI essentially, or AI for agriculture essentially gets validated by governments?

Kelly   01:00:32   That's a really good question, and I would say that's the crux of the question that I'm sort of troubling over in the book, or the thing that concerns me is how are decisions about farming and food system and about, you know, which innovations ought to be endorsed by public sector and supported by public sector being made. I mean, I'm concerned about some

of the biases I would call it in that I've talked about in pri, the private led innovation, right? The fact that the technologies are designed for the data sets cater to that are only affordable to the particular scale and type of farmer, but that's private sector. You know, there are some kind of regulatory tools that could be used to kind of maybe shift <laugh> innovation to engender a, a greater diversity of tools and technological equity. But I'm really concerned about public sector decision making because I think that's very perspicacious that you infer that I think at least in Canada, but certainly in the US too, governments are really buying into literally supporting the digitalization of agriculture, assuming that data driven farming will lead to sustainability.

Kelly   01:01:52   A lot of the investments are around the sustainability promise and productivity, almost that twin, right? The environmental economics win-win. And so in Canada, for example, and I and I trace some of the initiatives in the book, a lot of public money has been spent to digitalize farming, whether it's infrastructure development, millions and millions of dollars to develop broadband access because that has been shown to be one of the barriers to adoption around precision agriculture, but also investment that has largely gone via the private sector. So investment in firms who are developing tools for farmers, but again, that's public sector money. That inadvertently then feeds into I would say the narrowing of options around what can be done in the production of food. And there isn't a lot of wide participation. I don't think there's been any in wide sort of deliberative conversations, for example about, okay, do we want this technology?

Kelly   01:02:57   I mean, I think the conversations really need to start at an earlier point. What kind of food system do we want and what techniques, right? <laugh> not just technology necessarily, but what farm techniques might help us get to that food system? And we, right, that's, uh, the million dollar question, but I think certainly a greater diversity of voices of farmers representing different farm strategies and farm sizes, gender diversity, indigenous groups. And that conversation hasn't happened. You know how the government of Canada came to rely on or encourage farmers to rely on data systems to support insurance claims? I have no idea. That's a super non-transparent thing that's happened. I should clarify and say that in the case of insurance, at least in Canada, the government is asking farmers to rely on a public sector tool. It's called the Ag Impact Climate Reporter. So not the John Deere data to validate insurance claims, but it's still asking farmers, again, to rely on the putatively data driven insight as opposed to the kinds of testimonial experiential knowledge that they would have submitted earlier or prior in support of a crop insurance claim.

Speaker 4   01:04:10   And we seem concerned in other domains like social media about these things. And I think we as in, in public discourse now, we're kind of arguing for greater transparency around data uses, trying to call out biases. But if you think about it, a lot of that has been worked out in the court of public opinion watchdog organizations that call out a recidivism app for using racially biased data. I'm thinking of Compass and I think the same thing could happen or is likely to happen with farming. I think it's probably going to be worked out in the court of public opinion, you know, but partly I don't really see the interest, the critical kind of mobilizing that I saw around GMOs or that I see in the critical, you know, social media data study space. And that's really what I try to travel over in the book.

Kelly   01:05:00   Why don't people seem to care as much about environmental data, about farm data? And I kind of think that, you know, it's similar to the climate communication issue that

the impacts are a little bit farther removed. You know, it's not like, okay, look at we're putting, you know, black people in jail at a disproportionate level and it's totally unfair. Look at the like serious harm. It's visible, right? It's immediate. Whereas with the agricultural data, the impacts are okay, maybe over time we're fostering a particular way of producing food that eh, if it dominates is has some real environmental and social consequences, but it's a bit of a slow burn. And so it's a, a difficult thing to raise visibility around.

Shobita   01:05:50   Well, this is an incredibly interesting topic and a really interesting book, Kelly, so thank you for digging deep into this arena and I think it gives both the folks who think a lot about agriculture and GMOs historically and the folks who think critically about data as something to chew on. So thank you so much.

Kelly   01:06:08   Thank you for having me.

Outro

Shobita   01:06:23   The Received Wisdom podcast is edited by Edward Waisanen and produced with help from the Shapiro Design Lab at the University of Michigan. We would love it if you would subscribe and rate us on your favorite podcasting platforms. You can also find all the recordings and transcripts and links to the books, articles and other stuff we discuss in this episode at our website, thereceivedwisdom.org. That's thereceivedwisdom, one word, dot org. Talk to you soon!