Sara Hendren:

Welcome to episode two of Sketch Model, an audio series about the engineering classroom and how the humanistic disciplines of the arts, the humanities, the social sciences shape, the why, and should questions about the technologies we build. Last time, we talked with Aaron Sick about the process of depoliticization in engineering education. And in this episode, we want to take a look at the history of engineering education to find some clues about how we got to this familiar pattern. Why do social and political concerns about technology come up regularly for engineers only to be smothered pretty easily, by a sense that technological progress is inevitable and impossible to tame? We're talking to two scholars in this episode, James Malazita of Rensselaer Polytechnic Institute and Matt Wisnioski of Virginia Tech.

Matthew Wisnioski:

If you go back to 1972 and create a laundry list of all of the issues at the core of this technology and society debate, near the top is militarism, you have cooperatism, environmental destruction, sexism, racism, this sense of humans have lost control of our trajectory. All of these probably sound pretty familiar.

Sara Hendren:

Matthew Wisnioski is an interdisciplinary historian in science technology and society at Virginia Tech, where he's also a senior fellow at the Institute for Creativity, the Arts and Technology, and a co-founder of the Human centered design, interdisciplinary graduate education program. He's the author and editor of several books, including the one we'll speak most about today, which is called Engineers for Change: Competing Visions of Technology in 1960s America. I talked with these two thinkers about the way the victories of the post-war era in the United States turned into technological skepticism, the worries about tech ethics in the past, that echo many in our own day. And especially with James Malazita some hints about some conversational themes coming up later in our series, that is, how to build a classroom that keeps the ethics of technology fully intact. I hope you'll stay with us.

So I'm really happy to have Matt Wisnioski here today. Welcome Matt. I just spoke with Aaron Sick in this series. And Professor Sick walked us through this process of depoliticization that she has noted in engineering classrooms right now, but I wanted to talk to you as an historian of engineering education and of the engineering profession to take us back to another time when people were asking big questions about what's happening in the training of engineers and what's happening in the engineering mindset with respect to big social good questions, questions of politics in the world. And so in your book, which is called Engineers for Change, you recount a really lively time in the history of engineers and engineering. And that's roughly between 1964 and 1974. So I'm wondering if you can tell us a little bit about that time. It's not the only time or the earliest time that engineers were looking inward at what they were doing, but tell us a little bit about that time and what was happening for engineers as professionals in their self-concept.

Matthew Wisnioski:

Sure. Well, first of all, it's a pleasure to be here. I would say that that stereotype of the depoliticization of engineering is historical reality that has existed as long as there's been an engineering profession. To a large degree our current engineering profession in the United States really starts at the end of the 19th century with the rise of large corporations that required various forms of technological expertise, and often had associations with a conservatism that comes some out of objectivity related to technology and some out of the milieu in which most engineers are working. But I became really interested in the

politicization of engineers. How did engineers become involved in politics? What were the issues that drove them there and how did they go about addressing what to them were fundamental questions about the role of technology in society.

Sara Hendren:

Yeah. And so take us there into the turn in the 1960s. What are we really talking about? What issues are on engineers minds in a new way, what's providing a seed of doubt about the promise of technology compared to, for example, the big optimism of the post-war era?

Matthew Wisnioski:

Yeah. So by the end of the 1960s, there are a wide range of broad societal critiques that are coming from lots of different places. Some of them include the rise of the environmental movement. Others include the civil rights movement living in the shadow at the atomic bomb and the Cold War. And at the center of all of these issues is this new concept called technology. And technology starts to be identified as the driving force between a lot of these societal problems. And then you have engineers who in World War II and beyond tie their very sense of self to this notion that they are the bringers of progress through technology. And so they're looking at this world in the 1960s and saying to themselves, on the one hand, we're putting people on the moon and this is the height of progress. And now all of a sudden we're being accused of bringing civilization to the brink of collapse. And that sounds a little apocalyptic, but there was a lot of writing at the time and thought at the time that put the stakes that high.

And so you might imagine that that prompted a lot of defensiveness on the part of engineers who looked out and said, you say that we're the root of all evil, but we are the people who brought you, your refrigerators and your air conditioners and your cars and your stereo and this kind of material wealth that keeps society going. And yet at the same time, engineers are really close to the inner workings of the military industrial complex, which is a concept that emerges at that time.

And so they see what's going on behind the scenes and they look at these claims of progress that are being made and that are often being made by the same companies that they work for, that they can look and say, well, that's actually not what happened on the inside. And they also start to question, okay, maybe it was a good idea to get trained up to work on military and technology during the WWII, but we seem to have never demilitarized. And we seem to be constantly seeking a military conflict and a buildup of weapons systems and the amount of investment between the state and a few large companies just keeps growing. And is this what I signed up for?

Sara Hendren:

And so what happened? You write that it wasn't as simple as like, well, there was some utopian dreamers opting out or throwing rocks at the profession versus reactionaries who were preserving the status quo. I do want to give people the scene of, for example, the 1971 Institute of Electrical and Electronics Engineers International Convention. This was one of those conferences, you open the book with this story. I think the scene evokes it well, there are these keynote speakers. Here's this very professional context and there's literal protests there on the ground. Can you just tell us about what happened?

Matthew Wisnioski:

Sure. I'll start with maybe some context for this is that we often don't associate engineers with protests. Engineers are, I think, taught and are often constitutionally people who don't like to make a scene, who

don't like to disagree in public, who like to address their problems in a rational way. And if there's one thing to say about the late 1960s is that it was just like an explosion of revolt and people acting irrationally towards each other and conflict as a means of really drawing out what was important. And so you find these pockets of engineers taking on their main professional organizations. And in 1971, the Institute for Electrical and Electronics Engineers, the IEEE, one of the biggest professional societies of engineers in the world had its annual convention. And outside of the convention, you have groups of engineers with leaflets saying that technology was invented to serve man. And yet everywhere his needs are in crisis.

They are holding up cartoon pictures of the H-bomb over David Packard, one of the founders of Hewlett Packard, and also a very political actor involved in federal science and technology policy, who is also the convention's main a speaker. And they're trying to talk about the necrophiliac challenges of technology and how we can turn these weapons systems into humane solutions. They say things like we believe that the current misuse of our technology can be turned around, but not if we put people like David Packard and others as the example. So you had this really intense conflict and disagreement within the engineering profession itself. Now these folks are marginalized and working outside of the context of these professional societies, but even within these big professional societies, there become a lot of conversations around what does it mean to be socially responsible? How can we introduce means of providing engineers with the tools and techniques to figure out how to use their best judgment and to make moral decisions when they're doing their work?

Sara Hendren:

Tell us a little bit about some of the alternative kind of affinity groups, or societies that grow up that people may be familiar with, but not really know their history. So I'm thinking, for example, the appropriate technology movement. This is all part of that time, part of that same unrest.

Matthew Wisnioski:

So one of the hardest things about writing this book is every time I looked there was another group of engineers who were clearly motivated by this broader set of concerns about technology and society in the largest sense, but who went about it in the ways that were most familiar to them, or what they thought were the greatest outlet for their particular set of skills, or their particular concerns. And that included groups like volunteers for international technical assistance, working on things like what we now know of as appropriate technology, where they saw the power of technology in "developed countries" and were trying to figure out how on the ground to support people in countries without the same kinds of infrastructures. There's all kinds of complicated political challenges to doing this. But often they went into this very bright eyed and said, okay, well, let's figure out how we can help this one person on the ground. They'll contact me. I'll help them give them a solution.

And over time, those developed into these organizational movements. So that was one area, how do we use technology to address problems of poverty or address problems of sanitation when it seems like the solution to that might be really easy. Now, if you've seen the emergence and development of groups like engineers without borders, I think we know now that it's not that easy and that it's tied up in all kinds of questions about colonial legacies and what is the just decision to make under one circumstance or another. So, that's one kind of group. Within the professional societies, a lot of the attention is around notions of professional responsibility and codes of ethics, the kinds of identification of engineering as an independent profession that should stand apart from one's employer, which is really complicated problem in a world where some companies are employing as many as 10,000 engineers.

And see, but there you get a lot of attention on what are the right lines of service. We talked a little bit about the dissenters and full on dissent in engineering is something that's almost incompatible with working within the system. And so you find that in these cases, you have engineers who become whistleblowers, engineers who organize others to organize against particular project or company. And they become radicalized as activists and create all kinds of interesting for a, there's a group called Committee for Social Responsibility in Engineering that produces a magazine called SPARK, which has a fist of solidarity you'd see with the Black Panthers that has a lightning bolt shooting out into a peace sign. That's actually made out of a transistor diagram. So you get these really interesting mixes of engineering and radicalism. And a lot of those engineers have a really hard time because the system shuts them out. But then you have other groups who find art and technology as the space for collaboration. They see this as a means of humanizing engineering, of tapping back into that creative work that drew them to engineering in the first place.

Sara Hendren:

I wanted you to tell us a little bit about a history that I think probably a lot of folks, even if they're familiar with some of the engineering ties to development or environmental or social scene, people don't often think of this group that you chronicle the Experiments in Art and Technology, or EAT effort. And in particular, we talked about IEEE, there was a really splashy cover to that very technical scientific academic journal, this work called Homage to New York, Jean Tinguely's self destroying sculpture. And maybe you can tell us a little bit about that work, and then also about what happened in Experiments in Art and Technology, because it's not the kind of, again, that kind of, I think we have a slightly sanitized version now of ideas about steam. What happens when you add art, beautiful things arise, but this is a quite critical effort too here, right?

Matthew Wisnioski:

Sure. Experiments in Art and Technology is a fascinating organization that increasingly it has its day. So if you were talking to a group of art historians now, they would talk about the art and technology movement. And EAT would be the origin story for a lot of people of where that came from. And in those venues, the interest is why are artists embracing technology? And what's exciting about that, and what's challenging about that, and what is liberating or potentially problematic about that? I came at this from the opposite end. I was like, wait, why are these engineers collaborating with these artists? What are they trying to do? How do they succeed? What has been the legacy and impact of this work?

And so the essence of the story of Experiments in Art and Technology is you had a really interesting and unique engineer named Billy Kluver, who was at Bell Labs, which was really the pinnacle of creative technological labor. So we're not talking about, it was run of the mill engineers here at the core of this project, we're talking about people who are like the artist they choose to work with at the avant-garde of their profession. And Billy Kluver has this deep connection with the artistic community and Bell Labs in New Jersey is not very far away from Manhattan, which is the center of this emerging new art movement. You think about people like Andy Warhol and Robert Rauschenberg and others. And these guys start hanging out and Billy Kluver starts convincing other people at Bell Laboratories to get involved.

And the organization grows into a larger group that tries to do a lot of different things. Now they put on some really unique experiential installations that are designed to bring artists and engineers at this level of the avant-garde together and see what happens and to produce something new that's neither engineering nor art, it's some kind of interesting hybrid. And you also get things though with an artist matching program where you have something like couple hundred engineers writing in and artists

writing in, and this organization trying to figure out how to pair them. And you read why are engineers motivated to do this? And a lot of them, as I mentioned, are after I want to reconnect with that creative spark, I want to take my engineering and demonstrate that it's actually like art or is art, but also a lot of engineers have some artistic training themselves, in particular in music. And so you have a lot of engineers trying to express themselves a lot, just want to aid these creative movements that are going on.

So EAT grows really quickly and it gets a lot of press. As you mentioned, it was on the front cover of IEEE spectrum. And there were a series of articles about art and technology in technological journals. You also have companies putting on their own art shows and then using those for their advertisements. Art is on the one hand, a apolitical way you might look at it of, well, we can get these people doing creative things, but for other people it's very political. This is about redefining the boundaries of what it means to be an engineer and to overcome that kind of organization man culture.

And so this movement is really prominent in the news for a short period of time, in the art world, in the engineering world. And then it seems like it implodes for a variety of reasons that have to do with why bigger projects that they kept taking on, challenges of collaboration between artists and engineers, starting to accuse engineers of being so tainted by the military industrial complex, that these collaborations shouldn't exist. And so it seems like this was a moment that came and went, but over the next decades, you see the further growing and growing of these kind of collaborations and they evolve in some really fascinating ways.

Sara Hendren:

And then what happened? Those evolutions are detailed much more in Matthew Wisnioski's book called Engineers for Change: Competing Visions of Technology in 1960s America. You can read there about the origins of the MIT Media Lab and its ties to this history, more in the relationships that formed at Bell Labs and Experiments in Art and Technology and much more. There's way more history than we could cover here. But I did want to ask, Matt, about that all too familiar pattern, why movements swell up from within and then recede? What happens? Why 1974, you've hinted at just some of the internal barriers that arose or internal unresolvable conflicts between and among domains. But can you tell us in macro terms, what happens after 1974? What is it about that legacy? Given all the ferment and all the lively exchanges and indeed all the clashes that happened. What's been the story after 1974?

Matthew Wisnioski:

From the intellectual level, there's a stabilization that happens. So if you go back in the mid 1960s, there's all of this fervor around this relationship of technology and society. And I didn't mention earlier this competing idea, this notion of an ideology of technological politics, this sense among more radical critics that the roots of our technological milieus are of our own making. They're human at their core. They're related to power. They're related to concentrations of power. They're related to some deterministic features of technology, but we need to uncover those arrangements of power and authority if we want to change the system. And it gets to the point where people say, well, we need to completely blow up the structures and systems we have if we want to do that, because what we have now is centralizing power more and more in the hands of fewer and fewer, we're losing our identities. We're losing our ability to make decisions. We're on bad path here.

And an ideology of technological change is oppositional to this, even though they share some really broad similarities in that, it says, well, we can fix these. It's an imbalance and it's the root of technology is where a lot of this is coming from rather than the root of our power structures. So that ideology of technological change is a very powerful tool for making sense out of the world that is able to assuage a

lot of individuals in engineering, but it's even more effective as a discourse and rhetoric for companies who will put out jobs, advertisements for engineers that say, we're concerned about the environment, come here and we'll fix it. It's really good for creating think tanks that say we shouldn't regulate technology in this way. We should just figure out how to deal with some of these unintended effects.

So the battle of ideas has a lot to do with the resolution. I think a second major, major issue, which is not unique to engineering is that in this moment of the sixties, the level of upheaval is not sustainable over time. People get burned out, the problems change. People get so radicalized that they can't see eye to eye in any way that's going to result in a solution. A lot of it also has to do with the economy. And a lot of this energy is due to a downturn in defense contractors and the rise of personal computing and computing more generally in the 1970s and the 1980s creates good job market for engineers. And so there's not that sense of that their own livelihood is at risk. The idea about the relationship of technology and society also becomes an academic endeavor.

A lot of these efforts, especially at colleges to bring together engineers with humanists or social scientists, or artists that proliferate and really flourish in the late 1960s. Some of them fall apart because they're not sustainable within the structures of universities as organized, but also you get the creation of disciplines like my own of science and technology studies, where a lot of that ground level collaborative work becomes academic and professionalized in its own right. So those are some of the really multiple reasons for why these issues die down and seem less relevant and ultimately are forgotten.

Sara Hendren:

So history doesn't exactly repeat itself, but histories do go to sleep, it seems like one generation to another. We could probably do a whole show examining why that kind of historical forgetting is so common, but let's assume that there are lessons from the past and hold that while we zoom back up to the present day. This is where James Malazita comes in. Malazita is assistant professor in science and technology studies at Rensselaer Polytechnic Institute with an appointment in the program in games and simulation arts and sciences. He told me how he thinks about getting at the root of these issues in the technical classroom, at the intellectual foundations that shape engineers. My apologies here, because the audio isn't great for this conversation, which is my fault, but the ideas are terrific.

James Malazita:

What I argue education does, rather than just teaching students what they know. So filling their minds with various facts, various technical expertise, education operates epistemically, in that it shapes how students know and how they imagine different types of knowledges relate to their core expertise. One, whether or not things like social concerns, political concerns, environmental concerns are a part of what it means to be an engineer or what it means to be a computer scientist in the first place, but then second, how they imagine their own expertise and their own capacity to speak to and challenge some of these larger social concerns or political concerns of technology. So it's this really interesting and frankly, quite effective, double bind, where it'll gives permission for folks who aren't particularly interested in social concerns to displace any criticisms of themselves while also trapping stem educators and stem students who are interested in technical concerns into the feeling that they don't have the ability to speak much less act upon those concerns.

Sara Hendren:

Listeners to this series may be thinking of a well known set of ideas that describes this phenomenon pretty well, and from way back. That's writer and thinker CP Snow's lecture from 1959 called The Two

Cultures. And it decry the big gulf between the intellectual culture of the humanities and that of the sciences. James reminded me that the legacy of this two cultures idea is a long one.

James Malazita:

CP Snow's famous, The Two Cultures paper describes the sciences and the humanities as having fundamentally incommensurable or incompatible worldviews, particularly that the sciences, engineering, mathematics value truth claims that are empirically grounded and falsifiable, whereas the humanities and history and literature value truth claims that are more interpretive, more subjective, more qualitative. And the interesting thing about this essay is it's difficult to parse apart how much CP Snow was analyzing or describing a situation that he observed in the academy versus how much this essay is actually weaponized to reproduce that situation. As in stem scholars and humanity scholars will actually invoke CP Snow's, The Two Cultures in order to short circuit any collaboration between the two.

Sara Hendren:

And I've heard you say the remedy is not therefore to have more humanists in the room, and that somehow just the getting together of folks in the classroom would magically resolve this. Sometimes I have found myself saying to young engineers since they are going to become, in my case at all in college, they're all engineering majors, that is what you sign on for when you come. Sometimes I say, well, my vision of the good for them is actually to know where there's a hard stop on the kinds of expertise that they can marshal in a technological issue, and to know at least which domain the expertise they need lies in, and how to call up that person, like the proverbial calling up that person when they're in a bind. So in other words, even if it's outside of a professional context, if you're in a urban planning discussion with your local community and somebody thinks it's a matter of how many automated crosswalk signals you're going to have or whatever, and then you realize, oh, no, this is actually a question for a human centered anthropologist to figure out how we use the street.

I keep thinking, it's not that I expect my young engineer to be able to perform all the duties of an anthropologist in that moment, it's actually precisely the humility that I want them to say, I know what I don't know, which is that this is an anthropological matter, and I'm going to seed my technological expertise that people tend to be so deferential to in these moments, to the anthropologist that we gather in the room. And that, that may be one end to an engineering education, but how does that scenario, how does that land for you?

James Malazita:

Yeah, so it's interesting. On the one hand, I totally agree with this. We cannot train engineers and scientists to believe that they have the God's eye perspective on everything. And in fact, David Noble wrote about some of these very early integrations of philosophy into engineering curriculum, the twenties and thirties, and said, one of the reasons that they failed is because engineers would read Plato's Republic and then say, well, now I'm done. Now I know what the ideal society looks like, and I will just implement that. So that is not the type of education that I would advocate for in terms of a hybridized stem education. And I like the idea or the use of the word humility, acknowledging where expertise begins and ends, who belongs in the room and whose voices need to be represented in various decision making processes. The concern I have with the humility model or, well, all we need is more anthropologists in the room so that we can make sure we're making ethical decisions. One, how easy it is to offset that type of collaborative decision making into essentially a checkbox ethics system.

Sara Hendren:

Yeah, beautifully said. And I think, I often think now too, if when I am a visiting professor dropping in on young people who are getting a more classical liberal arts education, I like that you drew out how important it is that the dynamism run both ways because I find that those young people don't have the same kind of bravery and urgency of the tinkerer and the prototyper that the engineers tend to have. And moreover, they actually feel quite overly deferential in the face of technical expertise. And I'm always thinking that, that's a separate and equally important project that is to say to enfranchise young people who are good at the critical analysis, really good with theory, really good at writing and explicating an argument, but they also need the boldness and the willingness to try to not be afraid of technology on the one hand, but also to be able to get their hands dirty, to really, to enter that fray, maybe not as undergraduates, but to go on.

I think of students that I know who majored in urbanism, which is, it can be a very reading and writing kind of discipline and they think maybe they've missed the boat on becoming a designer. And I've been able to say, Hey, no, this is also for you, that same maker, impulse that I love so much about engineers, but that can run amok.

James Malazita:

Yeah. And it's easy for, again, certainly not to place any individual blame. It's always a systemic thing, but we've seen that there are ripple effects from this instrumentalism in engineering education, upon both engineering faculty and humanities faculty, where as we begin further splitting these things, engineering faculty and students who care feel that they don't have the ability to speak to social concerns. And humanities and sociology and anthropology faculty and students who deeply care about these technical issues sometimes feel that they're only able to speak as critics, to talk about what's wrong or to reflect upon broader issues. And something that engineering education does really well is equip students with bravery to try to put forward solutions to problems. Even if sometimes those solutions are too narrow for the problem they're actually trying to capture.

And I would like to see a little bit more of that bravery from the humanities and social sciences as well. And, of course, acknowledging that we always represent just a very narrow perspective and we need this kind of collaborative work together, both with community members and with other disciplines, but yeah, getting people to acknowledge and take the risk of trying to posit solutions or trying to posit alternative ways of looking at a thing in order to achieve broader social change.

Sara Hendren:

That brings us, I think, to what I want to hear about, which is about your effort in the laboratory model to do this very thing, to let the building actually proceed from and with the ideas in that tinkerer's mode, but with all the critical wits intact. So you want to talk to us a little bit about alt code?

James Malazita:

Yeah. So through a sponsorship from the National Endowment of Humanities, Rensselaer Polytechnic has started the alt.code program. This program is a minor that is open to all students across campus, and it's offered through the School of Humanities, Arts and Social Sciences, but especially attempts to recruit students from computer science, electrical engineering, mechanical engineering, as well as the arts, science and technology studies and media studies. And what these series of classes are, is a laboratory model of experimenting with sociotechnical integration for critical thought, critical making and social justice. So we have introductory level seminar courses where we ask students to think about what does it mean to be a maker, including the idea of making as this narrowly defined white male Silicon Valley identity as Deborah Chatra as talked about before, and expanding it to things of well,

knitting and gardening and all of these other labor and creative practices that tend to be observed as more feminine are, of course, themselves actually deeply technical and creative practices that we can draw from when thinking about what it means to build better worlds and better sociotechnical worlds.

My personal expertise in alt.code or where most of my efforts have been going to is in the development of a class called critical computer science one. And what this class is, is a special section of computer science one, which is a very standard curriculum taught across the United States. That's essentially a introductory class in computational thinking and early stage programming, usually taught through either C++ or Python. And what we do in critical CS1, with a team of undergraduate computer scientists and undergraduate sociologists who are deeply invested in this type of sociotechnical training is we have redesigned the entire course so that students learn both technical skills, the ability to program, as well as the impacts of programming and information technology upon diverse groups of people. So thinking about how the United States has used algorithmic thinking well before the advent of computers in order to do sorting, in order to do social stratification, but also thinking about the various race and gender dynamics of programming itself and how we can teach those things at the same time.

And so alt.code and critical CS1, for me are operating at both the classroom and the structural level. On the one hand we're literally rewriting educational systems and educational apparatus to try to do this hybrid work that we say we want to get done. But also, and I would think equally as importantly, the fact that I, as a humanity scholar and both computer science undergraduate students and science and technologies and media studies for undergraduate students, are working together in a computer science classroom, I'm hoping is helping computer science students reframe these implicit or taught understandings they have about who belongs in a computer science classroom in the first place. Because one of the results that I don't want to happen is, again, this continued adjunctification of ethics, where computer scientists or engineers, we say, okay, we want you to know that ethics are important. So leave the School of Engineering, leave the School of Sciences and take an ethics and technology class in the School of Humanities, Arts and Social Sciences. You've now checked that off.

And while there's a lot of great stuff that they can learn in those classes and they should be taking more of those classes, frankly, it still reinforces for them that in order to get this expertise, they have to leave science, they have to leave engineering and go somewhere else. And so that expertise, that knowledge becomes something that is nice for them to have, and maybe even important to them at a personal level, but it's still implicitly become segmented from the technical knowledge that makes up their engineering identity, their stem experiences. So by actually having humanities, faculty and humanity students present in these classrooms and teaching technical lessons, not just providing the critical voice to a technical faculty member, I'm hoping helps them reframe their understanding of what it means to do technical social practice and who the identities are of folks doing that type of work.

Sara Hendren:

So I wanted to get back to Matthew Wisnioski before we closed this episode to revisit this sense of history playing out. It's common in American culture, and perhaps, especially in engineering institutions, to operate with a relentless kind of presentism about the problems in our own day, but how might we take seriously the continuity of these concerns? I asked Matt about this. When you hear the kinds of big tech handwringing and debates that happen now. And, of course, now it's about software and especially social media and big data and surveillance and so on. What is it that you think people are missing? What ideas, what terms, which key thinkers or histories do you most want to make it into more mainstream discussions when we're in our own moment? What is it that you'd like to see people understand better?

Matthew Wisnioski:

So I'm a historian. So the first thing I'm going to say that they're missing is the history of this. There's a lot of sense that we're in a whole new world and we've never seen this before, and we need to change things right away. But if you go back to 1972 and create a laundry list of all of the issues at the core of this technology and society debate, near the top is militarism, you have cooperatism, environmental destruction, sexism, racism. This sense of humans have lost control of their individual environment. That we've collectively lost control of our trajectory. That power is becoming centralized. That we're losing community. That the end of the world is near. That on the flip side, a whole new world is going to emerge out of this. That surveillance is pervasive and we need to be concerned about who has our data. That artificial intelligence is going to replace us. That authoritarianism is taking over. That we need social justice. That big brother has taken over big science. All of these probably sound pretty familiar, and-.

Sara Hendren:

It's like a map it right onto the present.

Matthew Wisnioski:

Yeah. And so you start to say, well, okay, well what's new and what can we learn maybe from our past's engagement and continued engagement? Not everybody forgot about these problems. People have been working on them. I think that they're far, far more attention now on issues of inclusion and bias and justice in the big data conversation. I think that there's interesting difference, but maybe not a real difference is that this notion of the military industrial complex and that term was central to this first big moment of what people now call techlash. And a lot of the conversation around big data is around ideas like surveillance, capitalism and tech bros, and algorithmic bias and things that are not necessarily connected to that kind of military element of the earlier moment. But, of course, we see now that they're pretty similar.

Sara Hendren:

There's a lot more to investigate here in the realm of ideas, even outside of engineering education about the structure of grassroots movements and how they succeed or fail, about the history of globalization, about war time versus peace time, about the cost and structure of higher education and about the prestige and financial rewards for engineering in industrialized cultures. But there's also a lot to investigate at much smaller scale, just like when you're trying to roll up your sleeves and build a classroom with ethics and context woven all the way through it. So in episode three, we'll try to place my own institution Olin College of Engineering in this larger history, as an example of a college forming its response to 21st century challenges by starting an engineering school from scratch as Olin did in the 1990s. For that we'll talk to Lynn Andrea Stein.

Speaker 4:

One of the first things we had to do was articulating why it made sense to create a new school, what it was that existing engineering schools were too entrenched to do. It was clear that separation of the technological from the human was causing more problems than it was solving.

Sara Hendren:

That's coming up next on Sketch Model. Sketch Model is a production of Olin College of Engineering. A four year undergraduate engineering college outside Boston, Massachusetts. Sketch Model is an ongoing investigation into the substantive engagement between the arts and humanistic disciplines in engineering education, and it's been supported by the Mellon Foundation. We spent the last four years

running programs at our institution, bringing more robust arts and humanities to our campus in the form of residencies, some are fellowships for students and collaborations for faculty and staff. You can read all about these programs and ideas on our website, olin.edu/sketchmodel, that's O-L-I-N.edu/sketchmodel. Sketch Model team members are Sharon Brightbart, Kristin Casa Santo, Jonathan Adler, Deb Chatra and Benjamin Linder. I'm Sarah Hendron. Thanks for listening.