

Sara Hendren:

Welcome to episode six 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.

In the series so far, we've talked with theorists and historians about why engineering education struggles to include contextual and ethical concerns. And we've talked with an artist and a computer scientist about what it looks like in concrete practice to mix ideas in the arts and humanities with engineering in the classroom, and indeed beyond the classroom. In the gallery or museum, for example, or at a neighborhood community center for young people.

So now we wanted to ask about the horizon for all this work, if right now, too many engineering students end their four years of education with an abstracted technical practice and less engagement with the difficult questions of the world than when they started, what might a different outcome look like instead? What's the language we'd use to describe what we're hoping for on behalf of young technical makers and how would we recognize it and train for it?

Erhardt Graeff:

Everything within engineering education was telling the students, my job is to just solve the technical problem. My job is to make sure that I designed something, otherwise it's a failure. And instead they put together a presentation that they called Design No Harm in which they emphasize the need for engineers like them to refuse to build certain things when it becomes clear that the opportunity for harm was much greater than what they perceived as the opportunity to benefit.

Sara Hendren:

My colleague Erhardt Graeff is assistant professor of social and computer science at Olin. He works on the design and use of technology for civic, engagement, civic, learning, and empowerment, and the ethical responsibility of technologists as stewards of democracy. We talked about all of those subjects and especially about how civic professionalism might be the future for engineering. And I hope you'll stay with us.

Erhardt Graeff, it's so great to have you here. Can you just tell us a little bit about your own path? What were the kind of formative things that you studied and then how did that path set you up with some of the key questions that are on your mind today?

Erhardt Graeff:

I went to undergrad to study information technology. I was really interested in how could we build things, cool computer networks? What were some of the latest technologies we could use to solve interesting technical problems? And that's what really got me excited, but even in my first semester of undergrad I met some mentors, Elizabeth Wally and later Amit Ray, who were professors at RIT that really kind of opened my eyes to the larger questions about the ways technology and the internet specifically were transforming the world, and transforming the way that society operated. And it sparked in me a set of questions that really needed kind of social theory, social sciences, the humanities, to help me understand, wrap my head around.

I ended up doing a second degree in international studies while I was there and then going to get a master's at the University of Cambridge after I graduated in sociology, because I really felt like I needed the social theory to make sense of the ways that technology was transforming the world. And that's

stuck with me throughout my career. There were various meanderings between then and ending up at Olin College, but it really started there.

I'd say one of the kind of key moments for me was trying to understand social capital. What was it that allowed all of us to come together and understand that democracy was a collaborative project? How do we understand that trust and reciprocity that exists in society? And how is that transformed by the internet? I was hoping for the better, right? What are the ways that can augment our ability to connect across distance, across difference? And I kept that kind of star I perception for many years, even into my PhD program that I eventually did at MIT, where I worked at the Center for Civic Media, with Ethan Zuckerman within the MIT Media Lab. I was really interested in the ways that technology was helping us address these gaps in who could participate civically, whose voice was heard, who could make a difference, who could get power through the ways that social media and other technology applications were disintermediating the status quo of society?

But the more I studied it and the more I thought about it, and the more that I applied, the kind of ways that I had been trained as a sociologist to think about these questions, the more I realized that there was a lot of ways that we need to change how we understood the responsibility of designers, the folks that built these tools, and the limits of what technology can and can't do. And so that's all kind of a background for me and the work that I do and how I approach teaching engineers at Olin.

Sara Hendren:

Yeah. And so, I mean, would you say in that time that your questions sharpened up in part because you were watching the kind of social and civic promises of the internet in particular, and then the ways in which connection as a premise, that more would be more that mirror connection might create democratic relationships. I mean, were you disappointed by some of what actually turned out and did your questions shift in response to that? Or what's it been like to sort watch the last 20 years of internet social platforms?

Erhardt Graeff:

I think there's a lot of whiplash and it's not one instance of whiplash, but several. Because I think this promise of the internet as a tool of democracy goes back to its earliest moments, predates my time on the internet for sure. But at each moment where we saw kind of cracks in this promise, in the potential of internet and technology more broadly to do that kind of work of fostering democracy, bringing folks together as opposed to pushing them apart, the response was always, well, it needs a different design. If we can just change that user experience a little bit or get more folks connected or more folks connected in a different way, then we can address these gaps or what we see as this promise falling flat when it meets certain contexts in different countries or when posed with certain types of competing values, even in the United States.

And so I've kind of lived through a series of those and each time it kind of helps me change my perspective a little bit in saying, okay, there is something good that's happening here, but I now can qualify that good a little bit more each time. And also start understanding, and this is now my more recent revelation, so think about when should we not be designing at all? When is technology not something that is going to solve this, it's actually all the other infrastructure that's broken underlying our democracy, our ability to connect with one another?

Sara Hendren:

Right. So I think this is what's striking to me, is that the way you spend your time with students and as a researcher bears out this very kind of back and forth way of thinking that you described early in your career. Meaning, you have a kind of literacy for what can be built. You understand the way computing walks and talks. Like you understand what it is that engineers tend to ask and the kind of approaches they take to building things. But you also in the same week will be teaching in seminar style about ideas, about histories, about foundational first principles questions. Is that fair to say that you really have these kind of two active parts of your brain or at least two, more than that maybe?

Erhardt Graeff:

Yeah. So I teach design courses at Olin, as well as computer science courses and I teach a social science course, a kind of political communication and what some folks would call a civic studies course for first years here at Olin. I feel a great privilege to be able to teach at Olin in all of the ways that I like to think, and in what I think are deeply interrelated to my definition of engineering and what being a good engineer looks like, which requires asking these bigger humanistic questions about what is the nature of democracy, what are my responsibilities to other citizens, to the public good. As well as the technical questions of, okay, here's a clear problem that we need to solve with computing in some way, let's figure out how we would do that. How would we gather the necessary data and what would it look like for us to design this with stakeholders that need this tool so that it is defined in their terms.

Sara Hendren:

I mean, I can imagine somebody with your history traveling fully over to right, what's called science and technology studies that you might have taken up that field, which is rich in and of itself and been a theorist about media and democracy and the classes that you do teach at Olin. But do you think it's important, I mean has it stayed, has it been, has it stayed important to you to hang on to that kind of first training that you had in order to be able to do both? I mean, were you determined to be able to do both?

Erhardt Graeff:

When I was finishing my PhD I really didn't think I was going to be a professor because I didn't know of many places that would allow me to use all these different parts of my training and my perspective on what it looked like to do technology. I'd probably end up in an information science department or maybe a communications department and do bits and pieces of these things and be judged upon those bits and pieces as opposed to the whole. Whereas at Olin, I've really had this opportunity to be integrated and holistic about all those dimensions. And I saw a place where I could teach. And for me, going back to my undergrad at a technical university, it was really important to me to be teaching other folks that were on that career path. That were going to be the engineers, that were going to be the folks that were designing and building our future technical infrastructure. Because they're the ones I think that most need that larger perspective, because we already give them an enormous amount of power in contemporary society just by having the STEM skills. And with that power, like the Spider-Man quote, comes great responsibility.

Part of my training that I really took seriously when I was doing my PhD was outside of the field of computer science and design. I was at the MIT Media Lab which specializes in kind of the cutting edge of human computer interaction. But I spent a lot of time thinking about civic education. What does it look like for us to actually be prepared to engage as citizens to support democracy, ensure flourishing as a society, come together, collaborate on this collective project that is governing ourselves? And I wanted to dive into that because I thought and still think that that's the key to understanding the responsibility

of engineers in society. Is that we really need to understand that the humanities and liberal arts, as we understand them in higher education, are part of a larger emphasis on what needs to be civic education. The ways that we learn to have that sense of public responsibility, that responsibility to each other.

That's really where I come into this work at Olin is imagining how I'm helping train the future kind of engineering leaders, STEM leaders, entrepreneurs, to be public leaders in the true sense of public. That they are coming first and foremost into their roles as understanding that you have a lot of responsibility, that you have a public purpose to your work, that you're creating infrastructure on which democracy depends. But also is affecting individuals in traumatic ways. And we've seen that play out in discourse over the past few years over algorithms and social justice. That the ways that we design these tools can have effects on folks that allow or disallow them to receive public services. Can increase the likelihood that someone ends up in prison. That can result in folks falling out with their loved ones over disagreements about values and the ways that misinformation, disinformation kind of hits folks in different ways, depending on how they use online technologies.

Sara Hendren:

So I want to ask you next about two related ideas. One is about the way you've kind of brought together the ethics that you just named and the kind of big purpose of that, which is this idea of civic professionalism. So I want to ask you about that. And then after that, I want to ask you about what it looks like on the ground to be practicing that day in and day out. And that's with your work with public interest technology, which is a kind of larger national effort in higher ed. So what is civic professionalism to you? Where does that come from and why is that a kind of animating force for you?

Erhardt Graeff:

I think of civic professionalism as this intersection of professional identity and professional practices. It's really both, where identity of civic professionals really comes from folks not distinguishing between their civic and their professional responsibilities. That a civic professional is motivated by the common good, tries to produce common goods, but they also practice their work in civic ways. And so if you're a civic engineer, a civic professional in engineering, you're really defining your practices in terms of a commitment to democratic participation. Pushing back against the culture and expectations of technocratic power. That you have some sort of technical expertise that gives you the right to make decisions to design in certain ways.

Rather than consider how anything that you design is actually public infrastructure, is actually things that will benefit or harm people in different ways and actually requires their voice and input in deeper ways than that is traditionally considered. There's been an effort over the past couple of decades, advanced by folks like IDEO and their workshops like the Stanford Design School, to really think about human centered design as a way to through empathy understand folks where they are and be able to then design things that will fit within their lives. I really believe that that's insufficient in order to achieve what I'm calling for with civic professionalism. That it really needs to be a much, much more humble position for the engineer as a facilitator. For the designer as somebody who's saying, I have an idea about how we can build this thing, but I actually need your help in defining what that problem is and I need your kind of, co-ownership really as to the ways that we're going to solve this. I need to give up some of my power and my ability to make this decision about how this should exist and give it over to a larger public process.

So that's what civic professionalism means to me, but it's not my term. I'm borrowing this from a lot of folks who have been thinking about this for a while now. And I'm part of a network from the Kettering Foundation that's been thinking about the civic purposes of higher education and includes scholars like

Harry Boyte, someone who has a background as an organizer, was involved in the Civil Rights Movement in the United States and became a democratic theorist as they began thinking about the ways that their experiences in terms of creating opportunities for grassroots democracy played out within the context of the United States and then around the world, as he began connecting with folks elsewhere. And he puts forward this idea of citizen professionalism, that kind of is one of these sources and inspirations for what civic professionalism really is.

He wrote a whole book called *The Citizen Solution*, where he actually had a chapter where he looked at professionals, including a civil engineer named Laura McGinnis, and tried to make sense of the ways that her work in the intersection of engineering, policy and kind of public voice and that responsibility all came together in the ways that she conceived of her profession. She tells this story about the limitations of her academic training as an engineer. That it didn't actually give her the skillset to think about the political aspects of enhancing a community through engineering projects, or kind of equipping her with the public engagement skills to accomplish such a goal as she says.

And so that really struck me deeply and thinking about, okay, if that's missing for her, but she was able to get there, I'm with Harry Boyte. I think that we should actually be teaching these folks, engineers, to be these citizen professionals. The other person that's part of the network that has thought about some of these questions is Albert Zer. Who's a democratic theorist and Zer describes democratic professionalism is essentially power sharing. That enhances and enables collective action and deliberation of major social issues that are inside and outside of the professional domains that a democratic professional would practice in.

This is in contrast to the technocratic professionalism that would block the democratic will of the people from having a say or it otherwise controls it by flattening the complexity of public problems and the public interests into questions that can be solved by using the methods that professionals are already trained in. The ones that they have greater command over than the lay public. And that does a couple of things. One, it certainly disempowers the public folks that don't have this technocratic training. It also depoliticize these problems. Flattening these hierarchies also means that you're flattening the nature of differences in values that might play out in how we should actually be answering these questions around legal issues or social work or how we understand design and engineering. So I think these two ideas have come together to provide a foundation for how I'm thinking about civic professionalism as we get to engineering.

I've been really called to this in part, not just from my own experiences, but looking at the work of Erin Sec and the ways that she has described the loss of public welfare commitments amongst engineers over their four years at college. And I'm really interested in thinking about how do we change that trend? How do we transform the professional culture of engineering or computing to realize that there actually needs to be a greater humility about the limits of those technologies and the ways that we end up framing problems that are convenient for us to solve and feel good about the solutions that we're offering. And instead embrace that complexity and messiness of what it actually looks like for us to be building things of public relevance, bringing in a lot of different stakeholders, not the folks that are so-called early adopters. The ones that we know have the technology capacities or who think like us in the ways that we frame problems and desire solutions. That's a much harder version of engineering, but it's also the better one.

Sara Hendren:

Maybe you can tell us about the practicalities and the form of capital P-I-T, public interest technology, which is a formalized effort to do just this. So tell us what it is and how it plays out at Olin and then the kinds of conundrums that you and your students wrangle with.

Erhardt Graeff:

So public interest technology is a movement within the United States that comes out of work by Ford Foundation, Hewlett Foundation, New America, bringing together scholars and practitioners who are thinking about the ways that technologies involved in democracy in government and understanding those things to the lens of the public interest. This kind of goes beyond a previously existing kind of movement that some folks still claim membership in and that I was a part of for a long time called civic technology. Which had a bit muddier definition as to what it was about and the role of the public purpose of the technologies that were created in that space. There's a greater prioritization of the common good, rather than competing with private and commercial interests, as well as a necessary integration between technology and policy, with the goal of achieving public benefits, minimizing public harms. That comes into play when we're talking about public interest technology.

And so this is now a university network that is run by New America, and Olin is one of the founding members of that university network. Something that I really pushed for Olin to join, because I think it already fit a lot of how we were describing the types of engineers we were interested in training at Olin and what their careers would look like. And personally, it was really important to me to think about, okay, what is that next chapter within the civic technology space, but also in the union between kind of civic engagement and civic education and technology. As members of the network, we share out the ways that we're kind of teaching these things in our classrooms and learn from other schools that are doing this.

We've also been building specific practical experiential education programs here at Olin in the mold of public interest technology. With some first year students, a few years ago, we created PlnT, what the students named it short for public interest technology, as a clinic that would be run by students in order to create opportunities for community engaged design work. That the students would actually be consulting with these outside groups in the way like a public interest law clinic would be consulting with groups that otherwise might not benefit from that skillset.

The students develop the projects, the relationships, they scope them into projects that they can work on, recruit students onto teams and organize them to do that design work and go through a design cycle that is very dependent on the ways that they build that relationship and think about collaborative design work with those outside stakeholders. And they have faculty who mentor them, we have alumni who are part of mentoring them. But the key for me really is that the students kind of own this. They're responsible for the projects and for running the overall experience for their fellow students. And that means helping train them up on project management skills, also for doing skills shares on the different technologies that they might be using in order to address the design questions that come up in these clinic relationships.

We've also created a summer fellowship program thanks to funding from the Public Interest Technology University Network that allows for students to do this work full time over the summer embedded in a organization of their choice. So in the same way that we kind of think about student ownership within the clinic, students that are successful in getting one of the fellowships, they have to find their own placement, develop that relationship with an organization that they want to work with, scope what the work should look like over the summer, the ways that they can bring their technical skills, as well as the broader skills necessary for doing public interest technology into that context, and think about what are the real needs of that organization, as opposed to just coming in and saying, well, we're going to build this.

And then I work with them throughout the summer, along with the students who run the fellowship program, who have designed and run it to do weekly reflective sessions with all of the fellows throughout the summer to put their experiences in context. Share examples from across the different

placements about what it looked like to work in this particular administrative situation. What changes were they having in the ways that they understood what their role was as a designer, as an engineer, as a student within this organization .and helping them think about what it would look like to have success at the end of this, both in terms of their own learning outcomes, but also in terms of the work that they've committed to doing with these organizations. It's really beautiful to see that type of an experiential learning play out because the students really have full ownership over their learning experience.

Sara Hendren:

Erhardt told me that summer fellowships in public interest tech at Olin have immersed students in issues like immigration homelessness, first generation college attendance and international development. In each of those cases, technology might show up in the foreground or just as likely in the background, depending on the work and the timing. And that mix was just right, Erhardt said, a practice of young people witnessing the work in really thorny and long term social issues that we'll all connect to, or be mediated by tech in some form. But the most urgent thing for the students is to see those issues like Erin Sec told us in episode one as always and already social, but Erhardt told me too, that the public interest tech clinic work has also yielded the most surprising outcome of all.

Erhardt Graeff:

In our first year of running the PInT Consulting Clinic. One of the three projects that the students took on was working with an organization that tries to disrupt sex trafficking online. And they asked the students to design a web scraper that would capture details of sex workers, advertising themselves to Johns on different websites. And then that data that was grabbed, including photos of folks would be analyzed by the organization to try and look at patterns and identify which of those kind of fit the description of sex trafficking for follow up or referral to law enforcement agencies.

We started thinking about the data privacy questions, how would we collect all of this stuff that had personal identifying information of the people that were engaging in the sex work? Some of whom were trying to do this as a livelihood and they weren't necessarily being trafficked in that sense. I reached out to a friend of mine that I had known had worked on how technology should be engaged in addressing sex trafficking. And she pointed me to a report by folks who had been studying technology as a tool for kind of investigating and disrupting sex trafficking online. Folks who had signed this included professors at Babson and Wellesley who are really experts on this topic and described in the report are kind of ambivalence about what technology should and shouldn't be doing in this space, especially when it comes to the ways that it's connected to law enforcement and their poor track record in supporting the folks that are involved in sex work.

So the students followed up with these professors and did a lot of introspection and thinking about, okay, at what point are they creating greater potential for harm than benefit through building a tool like this and working with the type of organization that they were working with that really defaulted to handing over data to law enforcement, without any safeguards about what that law enforcement would do around the folks that were being identified.

And so the students made the very hard decision to refuse to build that web scraper. It seems like a simple thing for students to just be like, well, we're not going to do that. But the students, this really weighed on them, because, one, they felt our responsibility to their partner. They had committed to working on this and they understood that there was a lot of value in addressing this issue of sex trafficking, which is awful. They also understood their responsibility to PInT. And this clinic that they had just started up, and this was one of the first projects and they really wanted a success. They wanted to

show that this was a good model, that they could build something that would do this public interest technology work. So with those burdens, they made the decision to say, no, we're not going to build this thing.

What was really beautiful about it is that they wrote a long letter explaining their decision to their partner and asked them to ask some of those same questions of themselves that they were asking. And then they put together a presentation for the Olin community that they called Design No Harm in which they described the decision that they made and emphasized the need for engineers like them to refuse to build certain things when it becomes clear that the opportunity for harm was much greater than what they perceived as the opportunity to benefit. Or, that these canceled these out in ways that are really hard to realize when you're focusing on the technical task, but are the core of the ways that we actually understand how we create policy and politics.

I couldn't be more proud because this is what public interest technology meant to me. This intersection of technology and policy of engaging with the politics of that design work, considering all of the stakeholders, not the obvious ones. Not the ones that you know were working directly with, but the ones that might not have a voice in that design process. And then realizing that through an active humility, reflection, and really putting ethics in application, as opposed to ethics in theory, and saying, this is something we're not going to do and we're going to stand by that decision, and we think other folks would benefit from thinking about that as well as they embark on their careers as engineers.

Sara Hendren:

I just think of the kind of metaphor that you built by calling it a clinic. You can think of an analogy in medicine where, yes, plenty of the time, if doctors have a kind of means of intervention, there's a bias toward using it. And some of the time, in terms of looking at somebody's overall health and wellbeing, that there are choices for non-intervention too, that should be on offer and maybe less taken up because they feel somehow less active, less proactive, less full of expertise. But I love that students also got this inverse of the clinic that intervenes and offer some repair, that the repair could also be in the form of restraint.

Erhardt Graeff:

I'm hopeful that those moments will remind folks that when it came down to it, there was another way of thinking about this work, that they were surrounded by everything within engineering, even undergraduate engineering education that was telling them, well, my job is to just solve the technical problem. My job is to make sure that I design something, otherwise it's a failure. And instead they have another way of realizing that a good outcome can look like not building something, pushing against those expectations that they thought that they had and completely changing their design process.

Sara Hendren:

This conversation with Erhardt Graeff brings us to the end of this audio series. And we wanted to end with Erhardt's use of this term civic professionalism, because it takes us once again to the big picture, wherever you land in that. For Erhardt, that's the key, big idea in how we're preparing our students for the future, and it's a generative idea for how we might plan our classrooms even, just week in and week out. Whatever our role, yours or mine in thinking about the future of technology, education, ethics in the classroom, shoring up the arts and humanities. These big picture questions should always be in our minds every bit, as much as the short term outcomes we're hoping to see.

When we talk about engineering education and the students of the future, we should always be asking, what is the horizon we're hoping for? How should students leave schools and colleges and enter the world of, yes, work, but also civil life, leisure community pursuit of the good. One of the ways universities have talked about this subject of course is saying, well, students come to college, not to learn what to think, but instead to learn how to think. That's kind of the accepted wisdom about a liberal education. But I think that clever phrase could still always use some sharpening up.

One of the thinkers who's inspired us most about this is the philosopher, Danielle Allen, who says that the goal for an education is what she calls participatory readiness. It's an elegant idea and built on an enduring notion of what schools should do, create the readiness among young people to participate in adulthood. Allen succinctly describes this idea in an essay in the Boston Review called, What is Education For? And there, she draws out the distinction between professional readiness, so readiness for the job market and this broader participatory paradigm, that includes the professional piece, but supersedes it. And it's that participatory paradigm that I think we've been talking about here in this audio series. What does it look like to participate in that full dimensional sense?

Certainly for us at Sketch Model, the readiness to participate has been a kind of north star that guides our investment in the arts, humanities, and social sciences, to fortify the technical and moral imagination that's unfolding for our students in engineering. We're wanting to preserve that strong agency and energy of the builder while cultivating the capacity to ask those enduring first principles questions, how should we live? And what's our next move to get there? I don't know about you, but I'm planning to have all my students in all my classes read in our opening weeks, What is Education For?

So if you've come this far with us, thank you. Thank you for listening. Let us know how these ideas are landing for you in your own context by writing to us SketchModel@olin.edu

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, summer 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 Breitbart, Kristin Casasanto, Jonathan Adler, Deb Chachra, and Benjamin Linder. I'm Sara Hendren. Thanks for listening.