Welcome to the Design Clinic Download. In this podcast, we dig into the experiences of Design Clinic teams and classmates through the years. I'm your host, Susannah Howe, from the Picker Engineering Program at Smith College. This episode features four alums from the class of 2006, Sarah Breen, Sara Green, Sarah Mahon, and Krysten Oates. Their Design Clinic project with Fuss & O'Neill was on the design of a mobile hazardous materials treatment unit.

Hey. It's been a very long time. Time passes so fast these days.

It does. Sarah, I was wondering whether we would ever get a gathering of all the Sarahs again, this is so funny. But I'm delighted to have all of you here today and I'm going to start this question just by asking you to tell us who you are and what you're doing right now. So why don't we start with Sarah Mahon?

I currently work at Pratt & Whitney. I'm an environmental engineer. My current role is managing the air emissions at their plant in East Hartford.

Excellent. Thanks. All right. Sara Green?

I currently work at ExxonMobil. I am a global hydroprocessing catalyst solutions lead here. So my role is to interact with all third party catalyst vendors and qualify them for use in our internal applications.

Great. Krysten?

I currently work for ProPharma Group. I'm located in the Netherlands. I'm working as a consultant in regulatory affairs and quality assurance for medical devices in Europe and elsewhere.

Great. And Sarah Breen?

I currently live in Glasgow or just west of Glasgow in Scotland. I work for a company called Arup and I'm an associate in the infrastructure department, mainly doing project management now for large civils projects: bridges, tunnels, and most recently some pump storage hydro.

Great. So you are all doing really very different things all over the world. So I want to take you back to the time when you were together and thinking about this project that you did in Design Clinic. Can one or several of you describe for me the project, the title, the project description, a bit of the details about what you worked on?

I'll see how much I can remember. So it was a design of a mobile hazardous materials treatment unit, which we affectionately called the MHMTU. Was at a
point in time where there was concern about release of biological agents and having a situation where you would need to do a rapid cleanup of potentially equipment, but I think we were mostly interested in personnel at the time. And so the idea was if there was a release of a substance like anthrax in an area, this would be a unit that would come to the site. So it needed to be worthy of transportation on the road.

Individuals would get treated to remove the contaminant and ensure their health, and then they could continue on their way. So there were mechanical components, there were chemical components. I think there was maybe even some electrical components. I can't quite recall at this point. But it was a project that I really liked because it touched on many different disciplines of engineering. And so you got a little bit of everything all at once.

Krysten Oates: I think Sara summed it up nicely actually. She used more terminology than I could remember, but I recall that it was a pretty complex project whether we made it or whether it began as such. But it was a lot of fun to walk through it and learn along the way.

Sarah Mahon: Yeah, I remember a big part of it was, okay, so you just cleaned anthrax off people, now you need to kill the anthrax that's in the water. So we had a bunch of different treatments to basically make the water dischargeable, but also take care of the contaminant that just got washed off of people.

Susannah Howe: Can someone remind me, where does your team name TAMZAH come from?

Sarah Mahon: It's hazmat backwards. So hazardous materials, hazmat and then we just flipped it, TAMZAH.

Sara Green: Yeah. If I recall, we had in our presentation, something like "TAMZAH, reversing the threat" as our moniker in our last presentation.

Susannah Howe: Great. All right. So you discussed liking the different components of the project and the complexity in it. I'm curious, what were your expectations coming into Design Clinic and how did those expectations match the reality? Yeah, Krysten?

Krysten Oates: I remember coming into it with the understanding that they were going to be assigned a project and we were going to take it from beginning concept all the way through a design that we could present to the client at that point, to our sponsor. And I could not have imagined how many small steps in between there were going to be, but in the overall scheme of things, I think it's what we learned the most from was breaking up such a big, daunting assignment into the small tasks and really taking into consideration aspects that we hadn't thought of at the beginning.

Susannah Howe: Yeah. Sara Green?
Sara Green: So I think similar to the different comments all of us made on the project in general, as the further we got into it, the more nuances popped up. So like Sarah and Sarah were saying, okay, we've cleaned the water off of the people who were contaminated, but now we have to clean the water and just how far down the rabbit's hole we ended up going with a lot of these different components. We have a trailer, we had to think about what kind of structural components we needed to make sure that that was actually roadworthy and could carry all the equipment we needed. And the other comment I guess I would make was I assumed more of Design Clinic would be just the project. And so, I was impressed over time as to how much we actually covered outside of the project. Each of the classes was its own separate seminar that yeah, we touched on the projects, but there was much more to it than just the project.

Susannah Howe: Yeah, Sarah Breen?

Sarah Breen: I think what I took away from it was how much development of the kind of softer skills I took out of it, as opposed to just the technical bit of actually working your way through the problem. I mean, a lot of it was where do you even go to find information? How do you research something? How do you structure your approach to problem solving? And then beyond that. So much of what I took away was more on the communication side of things, working together with a group, actually formulating your presentations and the things that you were going to put out to the public and gathering all of your thoughts and ideas. And that's a lot of the stuff that I've taken into my work and working life going forward beyond the maybe specific technical elements for that project.

Krysten Oates: But I also gained a broader appreciation for how much of the content was even beyond engineering. So not just the communication, but I now value that there was some regulatory in there, or the fact that we needed to veer off as Sara Green said to other concentrations really.

Susannah Howe: Yeah, that's a great segue. Because I'm curious to know, it's been 16 years since you graduated. You could talk a little bit about what your pathway has been from where you were when you graduated to what you're doing now. So Sarah Mahon, why don't you start us off, because maybe you're probably working the most closely related to actually to this project.

Sarah Mahon: Probably. So our sponsor for the project was Fuss & O'Neill and after we graduated, I contacted the person who we had been working with and told him I was looking for a job. And he was able to help me get my foot in the door basically. So my first job out of college was with Fuss & O'Neill, which is an environmental consulting firm. And that's really kind of where I learned basically everything I'm doing today. So I worked with a variety of clients in industry and healthcare, some schools, some commercial entities to do their air compliance, water compliance, just a whole... Anything environmental compliance wise is what I ended up doing.

From there, I bounced around to two or three other consulting firms and then finally landed at Pratt & Whitney, which we make airplane engines and I'm very far
removed from that. I manage their air emissions. So they have a co-generation unit that burns both oil and gas. They've got a bunch of spray booths around campus. They've got emergency engines, they have tank lines with scrubbers. So I make sure that we're managing all of those in accordance with local and state federal regulations. And then sometimes I get pulled into some of our smaller sites in the U.S. as well.

Sara Green: So I work at ExxonMobil now and I took a long path to get here. After graduating Smith, I worked at the United States Environmental Protection Agency courtesy of a connection from Professor Howe. I was doing wastewater permits for discharges from industrial facilities. So I can't recall if I thought of it at the time, but it actually sort of connects to this project with worrying about treating wastewater before it's discharged. I was there for about three years and really enjoyed what I did, but two aspects that led me to leave and try a different paths.

One being that as a regulatory agency, we were very reactive and not proactive. I wanted to spend time on projects to figure out, for example, how to remove the contaminants myself, rather than just issuing the regulation. And then secondly, I really wanted to be part of the looking for different types of energy for our country and the world, rather than more focused on the environmental aspect. So I went to the University of Massachusetts at Amherst and got a PhD in chemical engineering. Was there for five years looking at taking biomass derived chemicals and trying to make helpful materials out of them. Sometimes on the chemical side, sometimes on the fuel side.

I was hired into ExxonMobil in 2014, so about eight years ago, and have been working in lubricants and fuels thus far. A big driver for me for coming to work at this company was I saw an opportunity to very slowly turn a very large ship, so to speak, and try and make a real impact moving towards sustainability. So for example, my last role was working in our licensing organization, where we were looking at how can we make renewable diesel out of various bio-based materials. So I don't get to work on sustainable stuff every day, but I get really excited when I do get to work on it. And I'm excited to see that over the past eight years, more and more of those opportunities have arisen.

Sarah Breen: After leaving Smith, I was like everybody, looking around and applying for jobs and actually randomly through, not actually an engineering colleague, but someone I knew from Smith was chatting to afterwards and they mentioned that one of their family members knew somebody who worked for an engineering firm over in Scotland. And since I'd done my third year abroad, my junior year abroad in Scotland, I thought, why not? I'll take that connection and fire a CV over. So thus began a really interesting series of interviews and basically managed to talk them into giving me a job or a trial and came over for a few years and never left.

So my work role has evolved in that I actually joined the building structures team with Arup originally. So just as it sounds, I was working on beam design and just kind of general buildings work for originally some shopping malls and office buildings and things of that nature. And then I got offered an opportunity to help
out with a very small project management team that was working on a new bridge outside Edinburgh, now known as the Queensferry Crossing. And you can look it up, it's quite a spot. There's three bridges, one each from different centuries all lined up next to each other.

And essentially from there, I was on that project for almost 10 years with my role evolving as I went from being looking after just kind of staffing and the program side of things, going right into being on the employer side, doing all of the construction monitoring management side. And then when that wrapped up, I came back into the office and have been working there ever since. Continuing in the vein of large infrastructure project management. And I've worked on harbors and bridges and tunnels and our more recent focus that we're bidding for is in some pump storage hydro schemes, which is a whole new animal for me.

But yeah, very much for me started in structures, found out that doing day-to-day detailed design on very specific things off on my own wasn't so much my style as it turns out. And when you like people and communicating with people and a lot of those skills developed, it kind of was a natural fit to move into something that was actually a bit of the softer side of engineering. And so now I get to have that kind of umbrella view of things and do more of the problem solving, troubleshooting, as opposed to individual technical design.

Krysten Oates: So after graduating from Smith, I started at a company doing technology commercialization and innovation market analysis thanks to a connection from Professor Howe. And I worked there as a consultant for about six years running, moved into different roles in that company as well. So I started out as an associate consultant learning the ropes. It was a small company so it was pretty intimate in the office in Providence, Rhode Island. And then moved into product management, which was really interesting.

So picking something up from the ground effectively in this case digital infrastructure and building up a system from it, a product that we could help small and mid-size companies with for managing their innovations. So I continued with that digital path. I started a bit of a side hustle of my own with a little bit of web design starting up my own company to go alongside of that. Made a bit too much work for myself and decided that I should probably, after a long time, go back to grad school like I wanted to. So in 2014, after a long pause, a professional pause, I started my master’s program at the Technical University of Delft in the Netherlands in biomedical engineering and specifically biomechatronics.

And I was following a path with prosthetics, orthotics. And after graduating from that international program, I started working with a very small company again, but for the market analysis and sales side of it. And this company was developing body-powered prostheses. So what we were doing is trying to swim upstream against the current and make a name for ourselves in a pretty rigid market, I would say. So that, I learned a lot from. And in that networking, I ended up coming across what was called Xendo at that time, regulatory affairs and quality affairs.
And to be honest, the company was advertised as a pharmaceutical development company and I like my biomedical engineering, but I was specifically avoiding being involved in pharmaceuticals, just personal preference. I wanted more to do with the devices, what I could hold, what I could play with and build and so forth. But I was really fortunate to find this company because they have a small medical devices team and I’m part of a team about eight people. Again, apparently I like working in small, close-knit groups.

And I’ve been there for about four years now and working on a number of projects, some long term, some short term, supporting small to mid-size companies in their pathway from prototype to market, making sure they’re following the regulatory pathways and that they’re doing it in a high quality manner. And it’s interesting to learn how many small companies are very innovation focused, referring back to what I started doing in my career, but they don’t really think about the regulatory aspect of things. So I feel like I’ve kind of gotten a peek into the black box.

Susannah Howe: So you’ve all had really interesting careers since graduating from Design Clinic. And many of them touched on elements of your project, but in many cases you took pathways that weren’t at all connected with the technical work that you were doing in your Design Clinic project. And I’m curious if you would talk a little bit about what are some of the skills that have transferred from your Design Clinic experience to the work that you’re doing now? What skills have you used that you learned there that you’re now using post-graduation?

Krysten Oates: Well, for me, since I’m working more in the softer skill side, as Sarah Breen referred to it, not necessarily the technical engineering, I find that I took away skills having to do more with planning and taking a big project and breaking it down into bite size chunks. And that for myself in terms of project management as a consultant for my clients, but also following that process for the clients themselves in their design process, how we can fit the pieces together.

Sara Green: I’ll emphasize that PowerPoint skills can never be overrated. We see new engineers start all the time where we have to spend a lot of effort teaching them how to properly put a conclusion on a slide or put a design that’s not distracting. How do you make sure that you’re getting the most value out of what you’re putting in front of people? And I’m very thankful that not only in Design Clinic and in all of our engineering courses at Smith, but certainly topped off by the Design Clinic. There was a real focus on how to present information, how to communicate, how to make sure that the story that you’re telling is correctly interpreted by your audience. I think that’s one that has transcended my working for the government, being in graduate school and being in big industry.

Sarah Breen: I think that exact point you just made, Sara, the ability to adapt your presentation or your communication skills to maximize your impact on an audience, I think is what I’ve noted that I keep drawing back on. But even though I work in the softer side of things in terms of managing more people than technical issues, having a really good fundamental basis understanding of engineering principles has been invaluable. Because when you’re having those discussions with people who may be
saying, "Oh, you're just a project manager, you don't know what I'm doing." To be able to actually convey that you do have enough understanding to know the challenges that they're facing has a lot more impact. Particularly if you are talking to people about delivery time scales and things like that, you really understand what's required. It adds so much more credibility to what you're maybe asking people to do.

Susannah Howe: What advice do you have for future Design Clinic students to make the most of their experience?

Krysten Oates: I would say use the creative freedom that you have because this is a project where you can do anything, and you can think of anything, and you can work with your team to make it into as close to a reality as you can. So use that creative freedom and most of all, enjoy the experience. It is for the most part, a pretty low pressure, low cost experience where you can actually get your hands in every single aspect of the design process for an engineering project that is your own. So enjoy that process.

Sarah Breen: I would say use it to work out and develop what you think your strengths are. You have to function as a team. It isn't just about how good you are at one particular thing. And I think part of what made us work so well is that we all had slightly different strengths and weaknesses that balanced out.

Sara Green: A lot of us have just referenced that where we went with our careers was due to connections at Smith. Really focus on building those connections. The last three years were probably spent doing a lot of classwork and essays and the like. And this course is a real opportunity to think beyond and use your professors, use your classmates, use the alumni network to make other connections for where your future is after this. Because you never know who could end up putting you in touch with somebody else that's going to be a future for you.

Krysten Oates: And to add to that, using your network doesn't necessarily mean you have to stick to what you think you want to do. Make sure that you also keep open-minded because there could be connections that introduce you to your new career path that wasn't even in line with what you thought you were going for.

Susannah Howe: Then I will just close and say it's been such a joy talking with all of you. I know it's been a long time and you guys have gone fast. It's exciting to see where your careers have taken you. So thank you so much for sharing your time and sharing your expertise and your advice. It's been great.

Krysten Oates: Thank you.

Sarah Breen: Thanks for setting this up.

Sara Green: Oh yeah, this was fun.
Krysten Oates: Yeah.

Sarah Breen: We need to do this again soon.

Krysten Oates: Yeah.