



## **Panel 3C: Capstone Paperwork Soup: IP, NDAs, IRBs, SOPs, and Risk Management**

**Facilitator:** Bridget Smyser (Northeastern)

**Panelists:** B. Kris Jaeger-Helton, Rod, Karan Watson

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### **Notes:**

**The facilitator was Bridget Smyser from Northeastern University, who started by letting the panelists introduce themselves.**

I'm **Rod Wetterskog** from UT Dallas. We have relationships with many companies. We work with them so that they can hire our students, so that they can do undergraduate graduate research, so we can work with them in chambers and economic development councils. And of course, what today is all about is our undergraduate sponsored projects, namely for our seniors, which is our UC Design Senior Capstone. We have about 60 different alphabet soup processes, our statement of operating procedures, 60 of them for faculty and staff to follow, but about 50 or 20 of them are really key for our students and our companies. That's what we'll be chatting about today.

I'm **Kris Jaeger-Helton** from Northeastern University. For the past 12 years, I've been the Director of Industrial Engineering Capstone. In addition, I have served as the Industrial Engineering Undergraduate Program Director. We have navigated most of the alphabet processes from HIPAA to addressing rights violations, as well as the IRB process, and IP, NDAs, working with industry, community partners, professional sports teams, and the military. I've also advised across not only industrial engineering, hybrid teams in mechanical and industrial engineering, solely mechanical engineering teams and bioengineering, so I've seen a lot of these processes and advised through each piece.

**Karen Watson:** I started here 43 years ago. I have 45 years experience as a faculty member in electrical and computer engineering and computer science and engineering. But then I went

to the dark side and I became an administrator. I was a program chair. I was a... associate dean, I was a dean of faculties, I was a vice provost, I was a vice president, and I was provost. So I can talk a lot about the alphabet soup, especially for how you're going to get sued.

**Bridget** addressed the audience: So just to make sure we're all on the same page, is there anyone who doesn't know what an IRB is?

Awesome. Is there anyone who does not know what an what an NDA is?

Cool. How about IP?

Okay, SOP.

Who knows what HIPAA stands for?

I admit, I don't know what HIPPA stands for off the top of my head.

You know what exists? It's a thing.

Do any of our panelists know what it stands for? Secret.

Okay.

**Kris, added:** It relates to **Health Insurance Portability and Accountability Act** - Protecting the rights of patients and their information.

**Bridget:** We'll take that as good. Information protection. Okay. And this was the one that I had the question, the CITI training. A couple of folks, have you heard that? This is training you're generally required to take before you start asking the IRB folks to give you an IRB. So we'll talk more about that.

**Kris, added:** CITI: **C**ollaborative **I**nstitutional **T**raining **I**nitiative

**Bridget:** So, let's start off by asking, how does your institution deal with things like NDAs and IP. So we're going to start with those two because they often are related to each other. So what happens if someone is asked to sign a non-disclosure agreement? Sorry, my brain was working through the letters. Or if you have to go to the and try to get intellectual property protected. Who owns it? Is it the students? Is it the sponsor? Is it the advisor or somebody else? So if you could just briefly talk about the programs at whatever institution you like.

**Rod:** So here we have things at the university, the college, and the departmental level that may be required of them to do. But in general, after years and years of experience, we have found umbrella agreements, meaning umbrella in the sense that it's the same format for any of those things for students to use. And if a company is working with us at a high enough level, umbrella agreements for any projects we do with them are things that we have found to be

essential. So we have, I can give more examples, but mostly the same across the College of Engineering, but these are not the same in the College of Science necessarily, and not the same in business schools. So mostly by college, we have different agreements, especially for the undergraduate capstone, to save time. Sometimes those agreements, those NDAs, less for the IRB process, but still some agreements on that thing, and certainly for the IP, that we can mold around so we can kind of tell the industry. Can you do this project in this model? Because then we can get students on board and get it done in a timely way. But when we have to vary from those, it takes longer to get the process through.

**Kris:** The default at Northeastern University is that the students will own the IP. However, there are a variety of circumstances under which there will be exceptions for that. And then they would transfer the ownership or the rights to IP to either a company or an institution.

And for example, I just had a team that I worked with with the Boston Red Sox, and the Red Sox would only agree to work with them if they had a different type of agreement. And so we agreed to that. Otherwise, they wouldn't have the opportunity to work with that team. Sometimes if there is a clause on your grant, then we would reassess that and there might be either shared rights or maybe some transfer of ownership.

**Karan:** So capstone projects at UT Dallas are homework to the students. And so whether you're doing the odd problems at the end of chapter 12, or you're doing your senior capstone preliminary design review, you as the student own that. And so if you choose to do a corporate sponsored project, you know that you're going to be signing an IP agreement with the company, the NDA with the company. And so you are choosing the projects that you sign up for based on your willingness to give away 100% of the IP results to the company. When we first started 17 years ago, we were willing to take company NDAs and company IP agreements, and that lasted about six months when the attorney said, I've had to review 8 redlined NDA and IP agreements, so this has got to stop. So that's when we created the template. And now if a company comes to us and redlines anything more on our agreement, which is a five pager or NDA and IP agreements each are like 5 pages, 6 pages. If they can redline anything more than business issues, like when are we going to pay, how often are we going to pay, those kinds of things, then we just simply say, UT design capsule is not for you. You're looking for more for a very expensive research agreement and I'll happily introduce you to the attorney that would create that opinion for you.

**Bridget:** Excellent, thank you. So now we want to impart this information to the students. So when in the course do you present this information to the students in terms of just IPs and

NDA's for now? What sort of things do you tell them?

**Rod:** So they'll typically get it in the first or second lecture. They'll learn about the business aspect of engineering, the responsibilities that you have for keeping information confidential, the process of documenting and making sure across the first page is in bold print, confidential information. And so they'll go through those processes. Really, it's the entire business, whether it's the IRB, the NDAs, the safety checklist, all of those things are very clearly discussed with students as part of doing business as an engineer, typically again, the first or second picture.

**Kris:** Certainly we'll outline it early, but students aren't really thinking about intellectual property until later. So, if they do have an agreement with their supporting entity, we'll have them following that through from the beginning. But it's usually in the second part of Capstone when we're more likely to be thinking about it for independent teams. They'll have the full lecture on IRB, intellectual property, and what it might be like to go into the provisional patent process, because they're more focused on that. However, they're introduced to it initially, and it does come up early, but the whole concept of putting the focus on the steps comes a little bit later.

**Bridget:** Thank you.

**Rod:** Just brought up something. So for us, NDAs are typically executed two or three weeks after the start of the semester. That's when we really want it to be done because you've got to have that information disclosed.

**Kris:** Building on that, if there is a sponsor that we're working with who has either an NDA or IP protection as part of the agreement, that's executed early. But if the students are building something that they think has a potential to be intellectual property that does not have an association with a company or an outside entity, or research grants, then we'll be looking at that in more detail Capstone 2, the second half of Capstone.

**Karan:** So very much the same. I would add that we have a fairly large set of students that get engaged before their capstone experience in these kinds of vertically integrated projects and stuff like that. So they will have exposure to it before they come. But the real challenge for us is most of our engineering capstones are two semesters. And then getting this done in the first few lectures and getting on assignment and realizing it in week three to four is okay. But when they have a one semester capstone, it creates a lot more problems.

**Bridget:** So I'm going to pause here. Does anyone have any questions about processes and such? Yes.

**Jim Hart** from UNC Charlotte: So you said at UT Dallas, every student who comes in knows that the IP is assigned to the sponsor. If they take the corporate sponsor project. If it's an industry project. So for Kris, is that the same for yours or is it case by case? Or how do you, what are the students who pick industry projects? Do they know about IP before they pick it or when did they find out about it?

**Kris:** If we have an industry project, then we will be working with the corporate sponsor to find out if they have an IT clause or anything that's also involving NDA. And if that is raised up front as part of the criteria of being a sponsor, then we'll be working with our office of general counsel to see which of the paperwork is going to prevail if we can come to an agreement with that. So it is a case-by-case basis. Yes, yeah, they would be knowing that. That typically comes up when we have what's called the project screening expo.

**Karan:** I just want, I want to add, Monica was just saying, I think our general counsel now won't even review exceptions, unless we're getting over 100K from the company.

So you have to fit, so companies can sponsor it if they'll fit in this model, students can participate if they'll fit in these models. But if the company is given 50K, we can't make the same sort of exceptions to the standard processes just because of the number that we have to do. As you said, you know, general counsel said I had to do 8. Well, here they might be having to do 800. They're not going to do that anymore, especially for one college. And so they tell us we kind of have to fit in the model. And so we can tell the company, you're not fitting in the capstone. Otto, why don't we go over here for you to work, and we have to tell the students.

you're going to have to do this project and this model for the capstone. So in that model, who owns IP? So in many, so there's a difference for graduate students and for undergraduate capstones. In general, our model is that the student will own it. Okay. But if the company has worked with us a lot and does not want that model, we have the second option, which is the company model. We have no middle options right now, which is a shared kind of ownership.

**Audience member:** So I think we were talking about that earlier. Is there a way to do that?

**Rod:** As a standard model, but right now. First and foremost, this is students, and then it, but it can be the companies, but we tell the students before they sign up for it, which it is.

What it said is always in the class, if there are projects, always the instructor has to make certain that there are projects that do not require an IP in the classroom. So we cannot force the students to give up the IP, basically, because it's a required course. They have to have an option where they can say, I want to work for the class, but I'm not going to give my intellectual purpose. And the other thing that... We stressed with instructors that the students have to know day one, Samsung project requires people to sign an IP. So we cannot go back in three weeks and tell them, oh, by the way, we think this has IP, so we will try and sign. Which we already said.

**Bridget:** I got lots of questions here.

**Alex DV:** That was actually, I don't know if this is too far in the direction that will be a can of worms, but I just keep kind of formulating this question of where are the, like, I don't know if it's ethical constraints to, like, if students are paying tuition for a required course and the university is making money off an industry, project, where, where the, are there ethical considerations that you have to think about with IP that like do the students like, I don't know if it legally necessarily, but ethically deserve to profit from their labor when they're also paying for the opportunity to do labor for profit? You know, like is there a, is there an ethical consideration there?

**Bridget:** Excellent question.

**Karan:** Let's see. I can talk a lot about ethics. I think none. No. So, the challenge here is... Universities don't win money off cash on private. The funding that comes in generally doesn't even cover the expense of what we're putting into it, with the faculty, labor, and various other things. So one, your question is framed as if This is a way for schools to make money, and it's not. And there are much better ways, by the way, if your school wants to make money than trying to make it off capstone. But we do recover some costs through capstone that we don't do through other instructions. But your question is kind of like the same ethics of why have a flipped class? where the students have to do their work to teach themselves and can complain that, well, ethically, I was paying for this class and we all taught ourselves. And that is a common complaint. Okay, so what I'm saying to you is these questions are all framed wrong. Nobody learned anything because you talked at them. A lecture is not what touches the student. And when we frame it, and which we do as faculty, where I'm only really teaching when I'm talking at you, we are falling into our own hole. If I tell you, get in shape, join the gym. You pay for a membership, but never go. Does the gym owe you money? If I tell you, get in shape, join the gym, you pay your money, join the gym, you say, what's the purpose of going

to the gym? Lifting weights, you take a forklift, you lift weights with the forklift, and you don't physically get any better. Does the gym owe you a refund? So education is not a product. It is an engagement with the learner. And the more we teach them to commit to their learning and stuff like that, the better it is. So now I've preached, and I'll stop preaching. Maybe not. But the idea that somehow we are making a profit by doing all this work to get these companies to come in and do these things with us and having to convert with them and stuff like that. That is a big investment that we don't have to do as education.

So the challenge is, I can be a crappy teacher and still get your tuition. But wouldn't it be better if I do a good job of teaching? One of the best things about Capstone and interfacing with the industry is the preparation it does for the students. And that takes a lot of work, you know. So I would say to you, I don't think we've crossed any ethical bounds there any more than when we teach in a crappy manner. And if I got to fire every crappy teacher...

**Kris:** Likewise, if we didn't have Capstone, would a team of students get to work with the Boston Red Sox, get to go to the US Open, get to work with Desktop Metal or the Army Air Drop personnel ... so they wouldn't be in front of them otherwise? So these are opportunities that Capstone affords them. And the students have that experience that they wouldn't otherwise get, and so we're providing them that as well.

**Rod:** So from the context of students, when we first did this corporate sponsored thing 17 years ago, when we had the eight pilot students, there was this issue. I believe I'm going to pay tuition and you're going to take my results to this. And so we handpicked students and it was extremely successful. The next semester we bumped up to 11. This year we'll be doing 100 corporate sponsored projects. When we did 11, people were showing up at my colleague's office. Why aren't there any more industry sponsored projects? Because they heard what happened this semester before. Because the experience is just... totally different. Even when you get, forgive me faculty for saying this, but when you get industry like corporate sponsored or industry like projects that have been generated by a faculty that hasn't spent too much time in industry, it's a totally different experience than the students have. And they realize it and they really enjoy the research.

**Attendee:** I wanted to ask for the classes similar to Texas A&M's Design Center we have. I'm from Florida Tech, we have a very similar design center where each group has their work benches and they're working right next to each other. How do you guys work with maybe involving your umbrella that because one team might have signed an NDA, the other team did not sign an NDA. And if they are students, they're talking to each other about their design, and we do encourage them to share information and things when there's no idea of course. How,

like, is there a portion of it in your ADA or in your umbrella that says that's okay with you?

**Karan:** Like I said, Texas, we were just downstairs. So one aspect of teaching them about NDAs is teaching them what this seriously means, what you can and can't talk about. And that our standard NDA says we have to talk about it to enough people to grade the class. So an NDA, if I didn't sign it, means they can't tell me what they're doing. How can I give them a grade? Okay. So as part of our NDA, it's understood that there will be some presentations in the class and things like that will happen. And they can talk to the students themselves about how strict they want to be about that. So we have the capability of assigning lockers and things like that and telling students, even though you're assigned this desk, don't leave it out. You know, for people who just walk by and wonder about it and stuff like that. Some don't care, some companies don't care, they just don't want you to talk about it, they don't care if they see it, but some nuke it. You know, they don't want to see it. We also have the possibility of setting it up in a different space, but we don't have that infinite possibility. So we can make exceptions, but we can't do it on an infinite note. So generally they do all NDA or non-NDA or downstairs in that. So each department may have its own labs. So biomedical doesn't work nearly as much in this building as some of the others do. So it varies.

**Kris:** Also, for our sponsors who are requiring NDAs, they'll review presentations and papers to make sure the information is either de-identified or redacted or is approved for them. But as far as the conversations go, similar to you, they know that we're going to be publicly presenting information and we will be presenting to jurors. If required, we'll have our jurors each sign an NDA, and mostly what corporate entities are concerned about is avoiding something that compromises their competitive advantage, so sometimes they will indicate that there are certain aspects students can't discuss. We school our students in that, so they do not compromise information, data, or some part of the design. And we can conduct events like our final showcase. We have an entire menu of how they can handle those issues and still convey their design work.

**Rod:** Yeah, and before you, before students do any public disclosure of information, they always vet it with their company to make sure that the company is happy with what they might be sharing. So, here's our NDA. I felt like a turkey. Here's our NDA side of town too. And so, one of the parts of the NDA is you must fully disclose that you're disclosing. So you must put confidential on top of a piece of paper. And if they use our NDA, then our faculty are also under the NDA. If they use their NDA, then the faculty must be excused. And they must meet four criteria. Was the information in the public domain already per the effective date?

Did the receiving party already know that information before? Was it independently developed without a lot of effort by the receiving party? And was it lawfully disclosed to the receiving party? If the company can prove those four things, then they can put just confidential on top of the piece of paper and write that knowledge, that information was part of it. And I will tell you, in 17 years, we've had maybe 8 companies that literally did this. So it's a lot of it is just part of the confidence that the students know that they will not be sharing things that are developed as well as received part of the project.

**Bridget:** Thank you. Any other questions?

**Attendee:** Hello. This only goes to show my lack of know-how, my question, so the student gets the IP, and then signs the NDA. It seems antithetical, right? It doesn't negate the other. I have my IP, but I can't talk about it. I want to get a startup or I'm ready to be a millionaire. It's really the next step. So I think some of the confusion is there are usually two kind of separate things. The non-disclosure agreement with the company is to protect the company's information. In terms of intellectual property, whatever is generated by the end of the by the students at the end of the process is going to be someone's IP in what folks have said is that it is either going to belong to the company, so whatever the students generate will belong to the company, or it will belong to the students. Is that about correct?

**Rod:** Actually. Yeah, it is about the company, right? And the students, right? So, I, as a student, when I graduate, that starts for that, and get my \$200,000. So, really, start a company. You can't give away someone else's trade secrets again. And the intellectual property agreement with that company does not allow you to do that. Right. Now that's what. If you have an intellectual property agreement with the company, you cannot take the information you learned doing that project and go off and start your own company. Because you have said that you're not going to take their intellectual property and wander off of it. By signing an agreement about intellectual property.

**Bridget:** Alright. And did we have one, Phil, did you have one question?

**Phil:** Yeah. I think I had two. I'll do one at a time. So then I'm not quizzing you. So you have your NDA there. I'm wondering... [transcription missed some information] Did you hear that?

**Rod:** Yes, I talked to our Office of sponsored projects and that they're happy if I share like our NDA and participation agreements. But I was just wondering, like, be really cool if we could collect some and just kind of see what everyone does and see if, because we want to revamp ours. We've identified a few things that are great. So just, I don't know how to make all that.

**Bridget:** There are session notes for each session that anyone can add to. So if you had a link to it, you wanted to drop it in there, they're probably the easiest way. And we will put those on the conference website later.

**Phil/Attendee:** Then the other one is, I'm... I'm curious how everyone structures theirs. So ours, as I understand it, is we have the company sign a participation agreement with our university. And that's kind of like the top level agreement. They're essentially contracting the university to do something. And then we have NDAs. That are between the university and the student, and so we've also had companies that say they want. Our students just do separate NDA straight with the company, and I'm just wondering how everyone else structures it.

**Karan (?):** The complexity of the universities and how they structured are so different from one to another, I'm not sure, but let me give you a warning. Yeah, because a lot of our faculty suddenly decided the way I can avoid IDC is all these agreements. Because I know with these projects, with these capstone projects, and with graduate student projects, instead of research projects, there's no IVC. IVC equals indirect cost. So, your institution has to negotiate a federally agreed upon IDC rate. And faculty hate it, because the university has that money instead of them. And most universities, it's somewhere between 35 and 65 percent. So whatever your direct cost is, you add this to the billing. And so a lot of the money the company was going to give, is going to cover IBC, which pays things. It's computed because it pays the electric bill and other things, you know. So it's a real cost. Companies, by the way, generally charge 100% IBC and stuff like that when they do something. So indirect cost is a real cost. But faculty don't like to pay it. Okay, and so they thought they would use these kinds of project things to avoid IDC. You cannot do that. OK, so the way the federal government tests it is, were there deliverables or not? So if you have projects with your capstone or other project-based courses, and there are expected deliveries, which can include reports and presentations, as well as an actual item of delivery, then, in general, you're supposed to charge an IVC to that. So you need to be very specific with that highest level agreement you were talking about between the company and you as to why this avoids IDC. I just wanted to say that to a point of IDC, so, yes, we did. But what we have negotiated with our general counsels is very specific on the educational deliverables instead of product deliverables. And because we have gone through that effort to make it very clear that the deliverables here are

the education, We can avoid some of the IDC.

**Kris:** At Northeastern University, you can go directly to our Center for Research Innovation website, and you can search a variety of situations and conditions and get that information. I don't have all of it memorized, but you can research it according to your project agreements and conditions. Check with your university and see how they outline it specifically for you.

**Karan:** Yeah, and so capstone is defined in the master agreement, not master, in the main agreement. This is an educational experience. It's a required course as part of the degree plan. And the outcomes will be an educational full cycle design and build experience. And then it's If there are products that result from this, those will be turned over. So, look at Karen, Karen and I already have some coffee to make sure that I'm not going to prison after this, but we've been doing that. That's past council. It's been also approved by UT Dallas Council and by the UT Regents. So, as long as we're saying that this is an educational experience where we are trying to supplement by a full, real-world experience, then it seems to work well. I was forgetting, I think there was another question. NDA. So in our particular case, we have the templates. And if the company picks our NDA, no red lines except for business issues, then our faculty can stay involved with any kind of meetings where there might be disclosed information. If they choose, there's three options. Our NDA, their NDA, if they choose their NDA, then it's only signed by the students and no employees of the university, because we're not going to go through each individual corporate sponsored NDA to be able to do it. And then the third option is no NDA at all, which is really where most of them should sit in anyway. because typically isn't that kind of a response. And so that's how we handle the NDA. And I think somebody else.

**Rod:** What are there that the faculty are not involved? Faculty would be excused, faculty would be excused whenever the company is going to share confidential information. If they would put it down on a piece of paper with the word confidential on top, and that's usually specific data or design criteria, which so they'll say. You know, Dr. Rod, could you please excuse us for a second? And then the students are, you know, remember, you signed an MDA, and so this is going to be part of that requirement. You can't even share that with your family. Now they share all kinds of design concepts and so on. We just can't feel it.

**Kris:** To help segue for when we get to the IRB, not only can you look up capstone under, in the case of Northeastern, the Center for Research Innovation or the Research Division of your university in IRB or the Division of Research Integrity when it comes to human subject protection, they also have capstone clauses specifically that describe that the process of

capstone different from other types of research projects.

**Bridget:** Time for maybe one more. You too. Oh, wait, we also got one here. Rock, paper, scissors. She's been waiting. You've been waiting? Okay.

**Attendee:** Hi all, I was just curious on the IP topic, what have been the most successful cases of IP produced from a capstone and how rare or common is that that valuable IP goes on to be commercialized from a capstone product?

**Bridget:** Excellent question. I'll start in the middle this time.

**Kris:** Yes, we've had non-commercialized IP that has gone into the provisional patent process, and unfortunately the students just wanted to move on. In another case we had wearable oncology breast cancer treatment, which was moving forward on the IP path. We also had one that was a dental appliance cleaning device that was highly viable; they're kicking themselves because it's now on the market. Unfortunately, they wouldn't listen. ... But we did have an earlier project –a portable nebulizer, and that was in the first-year program; that did go on to gain IP and be commercialized, with the student owning the patent.

**Karan:** So it depends on what you mean by success. A highly useful to society or make a lot of money. So, one of our successful in that the Capstone students got a patent was using fiber optics as a sensor for people who were walking across the desert detecting their presence. Lo and behold, you didn't have to build a wall, could detect whether, but you also had to worry about were you detecting rabbits or deer or stuff like that. So the sensing of the motion was not the hard part, the discernment in the software of discerning.... It was, and these students did an awesome job, and they got the IP, but then getting it into product was something they did on their own outside of the university. And so to say it was successful, it was a great idea, and they had worked on it very hard, but the success of making an actual product was affected by how they followed up on that, going long past it, and then totally destroyed by politics.

**Rod:**... So, an answer, there's internal products. As far as corporate sponsored, there's internal commercialization, and then there's external commercialization. It's a product that's going to be offered. We don't hear too much about the external products. We do hear a lot of qualitative stories about internal. And so, you know, we save \$50,000 a year here, \$100,000 a year here. And frankly, there's a lot of corporate sponsored projects that aren't patented because they don't want the information to be in the patent process. Internally, I mean,

student-wise, we've had two projects that I'm aware of where the youngster's 22-year-old got bought out by the company of California for a mere \$2 million in another company, 52 million, but that was after three capstone projects. And then the real big one was a pharma painting addition. So we'd like to take credit for that, but not really, not fairly. And I actually got an email yesterday from a former student advertising the device that he has finally commercialized from his capstone design like four or five years ago. So it does happen.

**Bridget:** I think we have time to take these two questions real quick, I think.

**Attendee:** Do you exclude the capstone instructor from IP rights?

**Attendee:** If ABET evaluators are going to look at the design reports of the projects sponsored by the companies that they do, do you let them look at those reports?

**Panelist:** I didn't understand that. I didn't understand the second question.

**Bridget:** He was asking if ABET evaluators want to read reports from teams that have NDAs, do you allow them to read those reports?

**Karan:** So all reports are approved by the company to... there's two reports. There's the public report, like when they're presenting or so on, and that's available to anybody. And then there's the, if there is another report that has any, you know, disclosed information, that would be ... additional things. Does that make sense? So you cannot disclose non-disclosed information. And then the question, faculty are there to advise. They do not contribute. They don't contribute to the technical progress of the company, so no, they are not part of the Intellectual property.

**Kris:** I do not have a lot of detail to add, but we have to make it clear to our Capstone advisors when you come on board that you're not expecting that you'll be involved in any IP, that these students are really contributing the technical aspect to it. As the advisor, you're guiding and advising the project, not leading it- and you're not the Project Manager..

**Rod:** It's my experience that the cash flow is that there is a lot in getting optimized. Well, then, in some ways, that may be the case, but it's the understanding that even if you are contributing technically. Can you repeat what you just said? So, whatever we can hear? No, ohh, okay. Wait, could you just, just what was the your your second thing that you said right there?

**Attendee:** Faculty contributing.

**Rod:** Yeah. Okay. Essentially the point was the faculty still do contribute. Knowledge, expertise. Yeah. Okay. Got it. Perhaps they would be deserving, but it's the understanding when you come into it, but that's not going to be part of what we get out of it.

**Karan:** This is in part for the ABET answer. So we learned through our graduate students that they have the option to hold their dissertation or their thesis off the shelf, old terms, for up to two years. So they get to choose that option.... And so we have learned with Capstone that we can work with the company sometimes to say how long before we can disclose this. That allows us to show a bit sometimes what we have done because we have, the company has agreed as long as you wait two years, then we don't care.

**Bridget:** And one more.

**Rod:** I just wanted to react to the comment about the ethics of having students pay tuition to work for companies to produce things for them. The alternative is they don't get that experience. So we could say, okay, we'll just do all make up, made up partner projects. How's your education going to be with that compared to having a real world experience? So the cost of us getting those projects from the companies, sometimes they want to help the IP. So that's a trade-off that we're willing to make in order to give this broad experience to most of the students that's much more valuable to them than who they're learning how to do a project with. With when a student does an internship, they're working on a project this big, and they're contributing this much, and they're one of maybe 15 or 20 people on that team, and probably just one of three or four, maybe at the same academic level that they are. When they're in a capstone, they're doing the full project. and they're working very good. We, and I'm sure most of you get the same reports, when students come back after graduation, they usually say the capstone was, if it was a corporate sponsored capstone project, it was the most disruptive thing that they did in order to prepare them.

**Bridget:** Thank you. So we're going to change topics a little bit and start talking about IRBs, human subjects testing, and also data privacy. So if you get data from your subjects, what happens to it when they graduate, where does it go, things like that. So first of all... What difficulties do you see your groups encountering with IRBs and all along with them, where do you introduce it in the capstone season? Okay.

**Kris:** This has changed over time. It used to be once a team thought they might be involving human subjects, we would start to show students what to do. We found that this created a large scramble in Capstone 2, and students came up against tight deadlines with limited background in what they needed. So, now what we have done in Capstone 1 is have a human subjects protection/human subjects in research class. It's a relatively animated lecture, starting with information about the Milgram study and showing how badly it can go wrong, everything from rights violations to putting people at psychological and even physical risk. We review case studies and we have students consider what could be risky. We have them figure this out by giving examples of studies that could go wrong and have students predict how the IRB would respond to the situation. And they realize, 'Well, we don't quite understand all this'. So then we provide more guidance from the Capstone Leadership side. From there, we have student teams each propose a study based on what their project entails, and if it is foreseeable that their project isn't going to involve an IRB study or is it going to involve humans, we have them propose a fictitious study that would need IRB approval, and we help them with the application. They go through the IRB steps by filling out an application. And we have them do most of the full IRB application. Then they know how to do it. We say, 'even if you never use this, this is something in your pocket for when you go out into industry'. And as is the case in most of our courses, you don't use everything in the course that you learn but there's a chance you'll use your understanding when you leave the course. So now when students go into the IRB process for real later in Capstone, maybe 30 to 40% of them might do it, maybe less. They get to that point and they know what they're up against. They know how to protect the human beings, how to protect their information, how to store the data, what the risks might be involved when they're going through the testing. So they are at the point where they know what they are doing and it makes it so much quicker.

**Karan:** So, engineering faculty, as a general rule. Do not know how to comply with that argument. They think if I'm not drawing blood, I don't need an IRB. And they don't understand when you survey your students. and you intend to publicly report on that. you have to go through IRB. If you're never gonna tell anybody else about it, you don't have to go through IRB, but you should. So one of the things we do, for example, this sounds abstract, but this is totally different. We try to get all our students to get a passport in their freshman or sophomore year. Why? Because we have a lot of students who haven't thought about that. We need them to go through that experience. We have the same similar kind of mindset, maybe not for all the students, for IRB. So everybody who has a research experience as an undergraduate, first thing they do is they go through city training. which is the preliminary for us. That's the training you go through to qualify to be on an IRB. So that's the first assignment. Many of the capstone, that's the first assignment for them is to go through the city training for

behavioral studies. There's 2 levels. So the latter level if you will, is behavioral studies. So they understand, even surveying students and stuff like that. There's groups you got to protect, there's questions you got to think about, there's consent you got to think about and stuff like that. So they go through that training. So they're ready to think about their project, will they need to do IRBs? So I developed some software that I think is way better than others. How are you going to know it's way better? I'm going to ask people who use the software if it's way better. That's a survey. You got to have IRB to do that question and stuff like that. So when they go through the training, that helps them. So, for many of our capstones, they just make that first assignment for the student.

**Rod:** Yeah, same, same to that. It's the first, it's like first or second lecture assignment, but I don't, we're not nearly as complete. We don't require everybody to do it once they go through the assignment. If they're not going to be associated with a person, then they don't have to go through the deep experience. I really think that. This is something annoying, yeah. Right then.

**Bridget:** What sort of examples of projects that need IRB have you run into and are there any that were, you know, really kind of out of the park, like you definitely need IRB sort of thing?

**Karan or Rod:** I think, so if we feel like there's going to be any kind of interaction with a person, that would be the one that we would go with, you know, go through the IRB process. And some students won't report it because they don't think it. And then when we hear about it, we'll say, well, that's actually in the gray area. Let's let our university IRB team tell us whether or not that is appropriate. So it's always better to err on the cautious side, but I like really erring on the cautious side and making them develop a fictitious one if they don't think they have one. Traditional ones are, you know, wearing, you know, a sensor that might be detecting perspiration and seeing what kind of things might be thought of. Laying down on a gurney that's going to be flipped to be allowed, you know, allow an ER person to be able to administer CPR and then flipping it back so it's a regular mattress, but those kinds of things. We do about 10 maybe IRBs a semester, so not too much.

**Kris:** Some of the more benign cases are user interface testing or surveys. One of the things that our students hadn't thought of in industrial engineering is when trying to make a process better, for example they're observing on the job site. And what they need to realize is they need to get the manager's buy-in and the supervisor needs to decide how much to disclose to the personnel - we need to include them appropriately. Because we had somebody from a Capstone client company call our department chair –not our current department chair– and say 'our workers are fearing for their jobs'. So we are now educating our students and our

faculty about workers' rights as well. We discuss how much we disclose versus how much we do not disclose about a study or research project involving people. However, we still need to establish buy-in on the job site by a qualified stakeholder. They think they're merely making observations, and conducting time studies, but if people don't understand that the manager hasn't bought into that, this can create problems, so the study needs to be approved on more than one front. That's something that we talk over with the IRB. By the way, our IRB office has drop-in hours, so you can stop by virtually, talk about your study and get the appropriate counsel. We once had a mechanical engineering team that was creating a Hoyer lift for a client who was not physically independent, so they would be able to assist themselves by pressing buttons, lift themselves into/out of bed or into/out of the bathtub. The team wanted to test this, yet hadn't thought about what would happen if the lift failed or stalled. They had primarily focused on the mechanism's movement path, holding the weight, and keeping the system balanced. So starting to think about the risks: What do we do if the user is simply stuck in the device - if it stalls? Those are some of the issues that the IRB raised. Starting with: What are the risks of the device itself and what are the risks during testing? So they put a stop to the proposal until the team figured out how to ensure each of these elements is sufficiently safe.

**Karan:** And facial recognition and voice recognition are a big deal in this arena, so be careful, because... There are all kinds of aspects going on in that, but one of the very interesting for me was crustacean recognition. So that's most crustaceans are not human. So how much do we have to worry about? But on that particular project, they needed. Why do you have to recognize crustaceans, something the sediment people in construction worry about that I know nothing about? But you need to know, apparently, in some situations, which are predominant crustacean skeletons in the sediment that you are looking at in rivers for some reason. And humans had to decide if it was recognizing the right crustaceans or not. So even though they were recognizing non-humans, The evaluating the tool was done by humans.

**Kris:** I'll give one more example. In virtual environments, driving simulators, for example, or using a simulator for education is fine, but the concept of simulator sickness requires consideration: Once a subject finishes using the simulator in the virtual environment and stands up and feels unwell or unsteady, that's a physical risk. The IRB will take a closer look at that and ask if the team would plan to have somebody sit for a few minutes after the testing? How are they going to feel safe? Are you going to check them before they leave, that they can stand up steadily, that they're feeling well? So there are concerns like that, for which the risk needs to be considered, minimized, and monitored. But rolling it forward with the faculty and the students, we noticed that sometimes before we fully educated them, they would try to make it so that their study could avoid the necessity of an IRB application. We didn't want that.

This isn't something to cut corners on. This isn't something to dial back what you really need to do. Let's do it. Let's do it well. Let's do it thoroughly and properly. Let's do it early.

**Bridget:** And while I'm up here, a question that I have gotten, I know maybe you have, what if the students want to test their prototype on themselves? So they've built their prototype and they're just going to test it in their group. Do they still need an IRB?

**Panelists:** Yep, I agree. OK, that's good to know. I'll have to stop there.

**Attendee:** I'm worried about the timeline for submitting an IRB by the time the students realize they need one and then put it together. Is there a still like us in with your IRB that they'll... Oh, okay. So that's how you do it. No, that's a big problem.

**Karan:** Particularly, that's where the one semester versus 2 semester capstone experience is a big challenge for us, because typically an IRB in a good semester is 6 weeks.

And that's the average, and it takes them six weeks to figure out the equal, right? And so they're done, we know, and stuff like that, so it is a big deal, and that's one of the reasons why we want to train them up front and try to get them. It turns out it's a little bit faster to modify.

an IRB to start from scratch, but it turned out better if they will go ahead and do a reasonable approach to what the IRB should be real early. Because we don't, we've tried and we have a few examples of umbrella IRBs. Can we get an IRB for a course that lasts semesters and semesters, but it's kind of like we were talking about NDAs and IP before. In those umbrella cases, they're very rigid. And so sometimes they can't apply to what the student really needs to do, but some of them can be very rigid. This is how we go to get their consent, this is that, how we will do the survey, and then we can go back to the IRB with specific questions that we may ask in the survey, and it goes much faster than when we didn't have any IRB at all. So she could, in general, you do an umbrella ever faster. But then a faculty member has to be PI, if you will, on the IRB. And no student can be added to that study if they haven't done city training. But that's one of our shortcuts, is that we can do it, but again, it reduces the variability you have in it. So sometimes it's too constrained, but it is a shortcut in time.

**Kris:** In years' past, we found that they would come up against the calendar timeline for getting human testing done. So getting the practice assignment early in Capstone 1 was extremely helpful. And also getting with the IRB and having somebody on the IRB team understand capstone. So each year I would reach out to the IRB Supervisor and say, okay, who on your team needs to understand capstone? And in our case, mechanical and industrial engineering capstone. And once that person is identified, they stay as our capstone consultant

throughout the year, when possible. That was really helpful. So making sure that the IRB personnel understand the capstone calendar and profile, you as the coordinator have an understanding with a representative in the IRB office, that the students are not procrastinating. This is our cycle. This is how it goes. Sometime in February, they're going to try to hit turbo boost on their projects. And it's not because they've been slow to progress. This is the point in time where it's appropriate for them to start testing. Once they understand our cycle and our timeline, we had better understanding and it was an improved process.

**Bridget:** Thank you. So another question that kind of goes along with that is, what are your university's policies about data privacy and how do you deal with the data if it has to get passed to another phase or, you know, you've got this pile of data, who takes charge of it? when the student graduates.

**Karan:** They want to know that the data is secure. They want to know whether it will be destroyed. And that comes in the application process. And once it's approved, then you have to follow through with that. If it's something that they think is going to go forward, then you would be reapplying or modifying with that study. And if it's an Nth generation or a second phase of the project, then you would probably have to do, would typically do a modification of that. But knowing that the data isn't just publicly available, but knowing that it's being secured and it's being kept someplace that it's quite private, and you have to assure the IRB of that.

**Rod:** Yeah. And this is a big problem for students because they think this was my project and I'm graduating and I'm gone. And the company didn't see it that way, you know, and stuff like that. So it is very important, by the way, for most faculty, but also in the industry, they have to have a data management plan that includes chain of ownership and other things like that, that should be in that management plan. So teaching the students to write a data management plan, a continuation of the data and stuff is another very important professional development in my opinion.

**Kris:** Yes, and outlining the chain of custody of that data and how it's going to remain secure is essential for a project to be approved to go forward. And so for a corporate sponsor, of course, the companies will typically use, well, want the students to use the OIT that's going on at the university, but then it is transferred at the conclusion of the project. So the company is asked for students that are doing, or research faculty through the cloud bases, sort of cloud services.

**Attendee:** Question: Are there provisions so that the students can write about the project on their resumes? Are there provisions in the IP, like the NDAs where students can actually write about their project in some fashion on their resumes or CVs as they apply for jobs?

**Karan:** Typically, companies will allow a student to publish on their resume what they did for their internship, so the capstone project will be the same.

**Kris:** For a few of our projects, which have involved legal counsel, like for the US Open Tennis Championships, we created a statement that the students could use to indicate what they did in Capstone. Same type of thing is happening with the Boston Red Sox because of the proprietary nature of the information that they have, what they learned in their data analysis, and what they developed. So we've created a statement that's acceptable. I can't say that that happens in every case. Likewise, with the Army parachute airdrop personnel project, there's only so much information that can be conveyed. So the sponsors approved of a carefully established description of the project.

**Karan:** So this was an undergraduate experience. One of my favorite things was a PhD. Well, he's a Doctor of Engineering student who did something for the CIA. And they had to approve everything he talked to the committee about before graduation. And what we figured out was they worked with him to craft the statements he was allowed to make that conveyed enough information, but not too much, so they didn't have to shoot us. But we have used that kind of mentality to get companies, if you have concerns about what they claim they did on this, please work with them before y'all finish with the project. A good strategy is like a week before expo, make sure that all the teams do a dress rehearsal with their company so that the company gets to say, oh, would you mind pulling that information out or no, you can. And then of course, they're also reviewing the poster, you know, the posters that are presented at the event this week. I'm sure that most of the companies have looked those over to make sure that they're fine, and then of course, resume's the same company. Just to add a little bit to that, because we've had a few projects that are defense related, whatever, that for whatever reason, where the company wants absolutely nothing to be said. They can't present a poster to the public, even like Jack did. They just don't want anything out there. We ask the sponsors.

**Attendee:** We're trying to avoid projects like that. But sometimes the educational value is really good, and they get to work on some really cool stuff. So what we do is we ask the sponsor to write a letter of recommendation for every student that's on the team that they can share. So they can't put the project on the resume, but they can share this.

**Rod:** And for the expo, for that kind of a thing, we would have them pitch at the company. And so that's great, by the way, that's a great marketing tool as well. You would have, your faculty would go, the student team would go, and you would ask that the company get some senior level folks there to hear the pitch. And because it's an educational experience, we need to have them in front of a good group of people that don't know anything about the project and can be critical in their review. And then of course, what happens as a result of that is they go, man, that was really good. Let's learn a little bit more about that.

**Attendee: Rod,** would you share about the presentation that was made to TI a few years ago at TI that about something the students did to replace a \$200,000 system?

**Rod:** Oh, he signed the NDA. So this was one of those similar things where the student, Texas Instruments was asking that the students not present this particular project. So they presented, we had about maybe 30 or so senior level folks while they're presenting the TI or that was the champion for the project. His boss got up and walked out. And so he thought, oh, goodness, this is, they really said something bad. Well, then the boss came back and you know, you missed half of the presentation. And he said, well, no, I was about to let, we were going to buy commercial products for this. We were going to buy 8 had \$1,000,000 a piece, and I had to get back with my admin to cancel that contract because we can do it for \$200,000 a piece, so...That's always good.

**Unknown:** Some projects were in your showcase.

**Rod:** Yes, so we do 2 in the fall, about 100, in the spring, 345 something. And I wanted to make a comment about, usually 65% of the projects are sponsored experiments. And then there are faculty and there are students. Of all those, only one chose not to participate because the sponsor did not want them to. So even though we have many that signed the IP. We ask them to check with the sponsor before they participate in our program. So I think the students understand the value and the companies understand the value that this is an educational activity. The students work for a year and they are eager to be part of this event where they can share their work and network with companies.

**Attendee:** So did I understand you right that you said 45 companies told their student teams they couldn't present at Expo?

**Rod:** Only one. And we tell the companies that as part of the academic education, again, they have to present. And you have the right to redact things, but you can't say you can't present an

expo. So something that we do, we also have that offer at our showcase that you can redact your poster if it's requested. We have a third option that we provide for sponsors, which just is just a private session. Like they have their own room and there is still.

discussion about that poster, but it is a more contained community, like it's usually instructors and faculty from the university, other students who are doing the Student Choice Award. So we give that as an option from the company and we get maybe for every five, only one of them choose that option, the other four choose the redacted poster option if they do want to like contain confidential information. One of the reasons we don't give that option is because the Art of Expo for the students is you have to be able to take all comers. So anybody who walks in and off the street to challenge you on your design, you have to be able to handle the challenge. So we don't want to shield them from that challenge that they get. And basically, we tell the company, look, if it's that secret and that mission critical to you, your own people probably ought to be working on it, not students. Slightly high, but there we go. I think this goes along the lines of what you just said. For us, the showcase, it's an outreach event. It's a promotional event. I think we all understand why we do the capstone project, because we think the students get a much better experience using their skills and be prepared. So it's a promotional event for us to show the industry. When the Sandia and the Lockheed Martin are coming in, they say, now that I have seen an example of what a mechanical engineer can do, I can go back and carve out and curate the project. So we don't want to have half of our teams do the private session. We would like everybody to participate for that reason to benefit more students a great thing for the junior students to go to and see the showcase of all these hundreds of senior students projects because their brains start churning before they get into the class. So it's a great outreach, not only to the companies, but to the rising students.

**Bridget:** So a question I had is, can you describe a situation where students either didn't do the paperwork or did it wrong or something, and you know, Capstone got blowback because of it? And what did you guys do to sort of mitigate that by next time?

**Karan:** So, tragic stories, because I've been around them. I could talk to you about when... We blew up a lab that decommissioned the whole floor on a building with the capstone project. Not because everybody was an idiot. Only takes one. Another more tragic one was a case where the capstone was sharing a research lab for certain instrumentation. And the technician had modified the, it was a ChemE project and they had a gas chamber that got pressurized to do certain observations of the chemical processes going on. and it had been modified away from the original. selling of the product. So even though a technician was there in the lab, when the students did this, they didn't understand all the nuances, and this glass chamber blew up and killed the technician and hurt seriously three students, undergraduate

students. And so it's not that we were breaking all the rules, it's that the communication of what seemed to the faculty member like a good idea to let the students get this experience with this instrumentation, but the students were not fully knowledgeable about what the modifications meant. The instrument now could be problematic. So we have to be very careful about making sure the safety precautions are beyond just standard safety. It's not just about wearing glasses and doing things. There's a lot of other things. And so, of course, after an event like that, you become zealous and religious about it. And then, and everybody's going like, oh, we understand why. And then three years later, everybody is like, why are we having to do all this stuff, you know, and stuff like that. So our problem is always the drift of what happens in those operating processes.

**Kris:** With regard to public disclosure of findings, this is more of a lesson for the students. We had industrial engineering students who were going out and looking at wait times at a clinic where most of the patients were below the poverty level, but not all. And they had gone through HIPAA training and had the demographics and all the information about the patients. Again, they were looking at wait times from arrival to be called to the rooms. And what they found was a strong correlation between some demographic elements and how long people were waiting. And so they were about to publish and announce the conclusions that there might have been some bias toward certain populations based on how long certain demographics were waiting to be called in to be seen by the doctor. Fortunately, we as coordinators took note of this situation. Deeper investigation had revealed that some of those people arrived perhaps because they were late and had children, were single parents, had to take public transportation. Thus had to wait until the next opportunity to be called - not made to wait unfairly and in many cases, they were graciously accommodated even though they missed their set appointment. And so they were about to conclude that that clinic was biased and had not considered intermediate explanations. Pretty scary. They did not put that public conclusion out, but it caused us to have them think about intermediate effects and alternative explanations before they drew and publicized conclusions that could have been very damaging for that particular clinic. So that's something we've embedded now into the lessons and into drawing conclusions based on data alone.

**Bridget:** And I know on the ME side of our program, because Kris and I are in the same department, we've had to, my mantra is kind of, don't make me make a rule. And a lot of things that used to be, we used to trust, say the advisor to notice if someone was going to do something dangerous and like, call them on it. And we found that not all advisors necessarily did this. And the classic example was an advisor who allowed their team to prototype as some sort of tree trimming device by duct taping a circular saw to the end of a 10 foot long pole.

and then like just running the wires down to plug it in and letting them try a way to get around the trees in his backyard. And we found out about this during their midterm presentation. And we're like, you did what? So that's when SOP started to get much more formal and much more required by everybody in the MP side because we realized that there were some professors who just were phoning it in. So we had fixed various things because of that, but that was the one that, you know, you could see half the audience gaining gray hairs as listened. So that was a good one. Now, we've got about 8 minutes left, and I have to say that after this, we're going over into the center here to take a picture for the whole conference, so don't disappear. But any other questions while we've got our folks here?

**Attendee:** So I'm from UT Austin and we're considering a capstone for the computer science master's program. And I anticipate one problem we'll have is getting enough data from companies that are sponsoring projects in time for it to be successful. So any tips that you have based on data-heavy capstone projects to get the sponsors ready in time. This goes back to our data privacy and data management and all that.

**Karan:** First of all, exciting. So we're doing some master's capstone as well. And as long as it's a class that they can take, then it's their homework, even for the master's level. And so the same role kinds of applies. We've done it with computer science and we've done it with mechanical engineering so far at the master's level. And we basically say all of the data set must be ready for submission like 2, three weeks before the start of the semester, or we simply delay it until the next semester starts. They need to have that data ready in the format, or it needs to be, you know, cleaned so that it's generic as well. For each of our new corporate sponsors or external sponsors, I have them sign a letter of commitment and it says that they will make data available, that they will have a contact available, and anything else that the students might need, whether it's perhaps desk space at that particular institution or business, or whether it is internet at that institution or business organization or access to the building at certain points in time, whatever we agree, we would have that in the letter of commitment. And then whatever they want for data privacy, they could outline that as well. And for our graduate students, they who are in program like you're describing, I think they don't do thesis or dissertations, they do records of study that get processed by our library the same way. And so, it's to the students' benefit to not call it a capstone, but a record of study has turned out to be a benefit to the graduate students at that.

**Bridget:** Did you have a question in the back?

**Rod:** So it's interesting because, as she said, don't make me make a rule. So your one mistake can make you make a rule that's very rigid for everybody. But one of the things that we have as an advantage here is we have a whole program in safety engineering.

or graduate students, and they will consult with our different departments at times about risk management and safety things, because that can be some of their class projects is to work with a particular lab or something like that to talk about how you get them to manage the risks better. So I don't have any specifics to say, because as we've been saying, standard operating procedures, when we have to make them, are to cover those things that we think the risk is either too high to let it even happen once, or it's too frequent. not to address it. So we kind of have a way of doing risk management where we can say, oh, this is a very significant risk, but it hardly ever happens. This is not that big a risk, but it happens all the time. And then we decide which ones need standard operating processes for or not. So we work with the University Fire and Safety Group to develop a checklist. And so that's one of the many things that definitely happens through the first or second lecture of the class. So every engineering team will go through that and check items on that list that they think might be of risk. And then about two-thirds of the way through the first semester is when they do hazardous materials and hazardous procedures. Once they've done their first preliminary design, they'll go through that. And then they have to go through a pretty laborious effort of like a page for every box that they check.

**Bridget:** What's your risk mitigation for that? Is that all?

**Karan:** In general, with safety, make friends with your university safety office and buy them coffee, whatever you need to get them on your side, because they can really help. I don't know if it's fortunate or unfortunate, but fire and safety at UT Dallas is in our building. So they walk a lot.

**Bridget:** Okay, this has to be quick.

**Attendee:** So, just along the line to safety, what does everybody do, because a lot of students work on their stuff at home?

**Bridget:** Yeah, I know that we have a pretty strict policy about not doing that.

**Rod:** So we have about a 14,000 square foot space for senior capstone students to do their project. They have 24-7 access, and they do it this evening. Now, of course, they're going to do some things outside, but we encourage them to use it. We do. They still mean they have their own community. Of course, yeah. As good as ours.

**Bridget:** All right, alas, we're at time, so let's thank our panelists. And as a reminder, they're trying to get us to gather in the center here to take a picture of us. So don't want her to go straight to the center, get your picture of them.

Di.

**Smyser, Bridget** stopped transcript