Craig Layman: One of the good things that's come of this it's that, when we do look at our multi-generational leadership structure at most of the businesses across the US, now whether you still have baby boomers in leadership jobs, or gen X-ers or millennials, or whatever generation that we're talking about now, when you look at this now, I think the desire to authorize and to continue to support some semblance of working from home or remote learning, will continue. I think that will continue for several years after we officially declare that the pandemic is over. That's going to be in part a really good thing that we allow this to continue.

Speaker 2: This is the ORISE Featurecast, a special edition of Further Together, the ORAU Podcast. Join your host, Michael and Jenna for conversations with ORISE Research Program participants and their mentors, as they talk about their experiences and how they are helping shape the future of science. Welcome to the ORISE Featurecast.

Michael: Happy Wednesday, happy 2021. Jenna, can you believe?

Jenna: No.

Michael: It's 2021.

Jenna: It's time now I'm ready for it.

Michael: We made it. Hopefully it will not be the same burning dumpster fire that 2020 was.

Jenna: Yes. Here's to wishing. Anything has got to be better, right? Anything.

Michael: Exactly. It's early, so we're still hopeful. Speaking of hopeful, 2020 was a challenge for the workforce, not just our workforce here at ORISE and ORAU, but workforces across the country. One of the things that we've been talking about is workforce resiliency, particularly with the scientific workforce. We have some amazing experts on this episode. So, we're going to introduce them and get to work, because we've got a lot to cover.

Jenna: We do.

Michael: So, I would like to introduce Craig Layman, Leigh Ann Pennington, and Jennifer Tyrell, to the ORISE Featurecast. Craig, Leigh Ann, and Jennifer, welcome.

Craig Layman: Thank you. Glad to be here.

Leigh Ann Penni...: Thank you, Michael.

Michael: Glad to have you. If you all will, one at a time, tell us who you are and what you do for the organization. Craig, we will start with you.

Craig Layman: Hi. Thank, you Michael. My name is Craig Layman. If you want official title, I'm not sure that you do or if that matters at all, but my title is Director of STEM Workforce Development. So, I oversee what we call our Research Participation Program business line. That includes our research fellowships and internships for of course the Department Of Energy, but also for 20 plus other federal agencies across the United States.

Michael: There is a lot going on in your world, sir.

Craig Layman: You're absolutely correct. It's always busy and it's never boring. So, that makes for a really excellent workplace environment.

Michael: I'm sure it does. Leigh Ann Pennington, tell us about you.

Leigh Ann Penni...: Thanks Michael and Jenna. I have been at ORAU for a long time, and had several roles. I came here, and so claim to be a labor economist, and like to look at the labor market for the STEM workforce. I have also managed programs as a group manager here for several federal sponsors, research participation programs for about 10 years, and I've done quite a bit of program evaluation and assessment. Currently, I am most interested in looking at our data and our trend, and what our research participation programs look like in the past and moving forward, which should be particularly interesting, given that they may look a little different moving forward. So, I'm right now thinking of myself as a data analyst person for the organization.

Michael: Awesome. Thank you. I'm looking forward to the looking forward part of our conversation in a little bit. Jennifer Tyrell.

Jennifer Tyrell: Thank you so much. I work with the K-12 STEM outreach group here at ORAU, and we do outreach programs for K-12 students and K-12 teachers all across the country.

Michael: Excellent. You all stay extremely busy. There's always so much stuff going on in workplace development world, and we love talking about it. I can't even count the number of stories, podcasts, all the stuff we've done to talk about everything that your group does. I'm really excited to dig in and talk about the idea of scientific workforce resilience in, well we're calling it a post pandemic world, but again, it's January, so hopefully tail end of the pandemic world by the time we get there.

So, here's where I'd like to start, I think. For everyone's benefit, we had a planning conversation about this conversation. It was a meeting before the meeting, to think about what we might talk about related to workforce, to STEM workforce development at ORISE. One of the topics that came up was the idea of never wasting a crisis. So our workforce, our customers' workforce had to make some transitions and pivots to remote work, to virtual learning, all of those things. So, I guess I'd like to start with, and Craig, I think this is a question for you, what have we learned as a result of all of the pivots and changes and transitions that took place, I guess mostly in the summer, but I suspect also in the fall to some extent?

Craig Layman: Thanks Michael and Jenna. That this is somewhat of a loaded question. I think we need at least an hour-

Michael: Just for that question.

Craig Layman: ... To create the outline of that question. It really has been drinking from the fire hose, fire drill, how many other sayings can we come up with? Let's go back, which was nearly 12 months now. Here we are January, it was nearly 12 months when we really began to hear about this novel Coronavirus. We didn't really understand what was happening. I think most of us were in disbelief in January, February timeframe of 2020. But, by the time March came, we were no longer in disbelief about the virus, I think we were in disbelief about what was getting ready to happen to us with quarantining, and how we were going to navigate these learning opportunities that we have here at ORAU and ORISE, and what that's really going to mean for the hosting facilities of these young scientists and engineers, and how are we going to continue to ensure that that final step of the learning process happens?

So, that final step is that experiential learning process, the hands-on learning activity, again, that we call research participation programs, that manipulates in the form this internship or this fellowship. We know, and I don't want to overstep my bounds here, especially that the Leigh Ann's on the call, and she is our expert labor economist, she knows much more about this than me. But, in order to ensure a competitive economy and a competitive United States, we've got to make sure that we train our scientists and engineers, all of our STEM professionals, all of our professionals really, properly. That they get the training they need in order to be able to impact profoundly the innovation structure that they're going to need in the future.

So, I say all that to say, I'll tell you the first thing that we learned real quickly. When we talk about all the hosting facilities, the national laboratories, the other federal laboratories, we learned that we weren't really set up to conduct large scale efforts at training these training programs remotely. So, we knew that the first couple of weeks. I think you've titled this section Never Waste A Crisis, and that's exactly what we did. We did not waste the crisis because, we knew we could not. We could not afford to waste the crisis.

You look at our workforce, you look at the workforce of the hosting facilities, and our workforce, Michael, as you know is comprised of PhD researchers and educators, and non PhD researchers and educators, and business professionals, veterans, teachers like Jennifer, that are smart and creative, and incredibly up to the challenge when it comes to these things. So we very quickly, working with some of our sister laboratories and some of our partners, put together plans on how we were going to be able to host remote internships and virtual internships. Because, we knew that what we couldn't do Michael is, we couldn't really delay this learning process. So, we had to make sure that this learning process happened to the best of our ability and the hosting facility ability. So, we drafted documents-

Michael: Right. You couldn't say-

Craig Layman: Go ahead.

Michael: No, I was just going to say, and you couldn't say, "Well, let's hang on for a couple of months or wait till this thing blows over." We didn't know what we were facing, so you just had to jump in, right?

Craig Layman: Yeah, yeah, yeah. Quarantine didn't mean stop doing everything. It meant use the technology that you had at hand, and determine out new and innovative ways to implement said technology in this new learning environment, which is exactly what we did. But, recall the multi-generations that are in the workforce, that are principal investigators, that are learning, that are the student interns and the post-docs, we've got all these different thinkers and creative thinkers. So, we had to figure out a way to communicate effectively, and we had to figure out a way in order to conduct research and conduct their technical projects off site. So, we moved very swiftly in order to do that. We produced multiple documents, training materials. We just worked with our partners and we really just made it happen.

So, the first things we learned was, we knew it was going to be incredibly challenging, and then we learned it's going to be okay. We knew it was going to be okay because, we had the wherewithal in order to think past, and solve the challenge that we were facing.

Michael: Craig, are there examples of, and I'm certain there are, again, to the extent that you can share them, of hosting facilities and/or specific programs where things went successfully? I know there are. We came through the height of a pandemic with, it feels like from my perspective anyway, with flying colors. So, what are some of the examples of success stories?

Craig Layman: Well yeah, we have many examples of success stories, and certainly my colleagues can jump in here as well. But, just to illustrate to the listeners of what we're talking about, in a normal year, Michael, we will host anywhere between 8,000 to 9,000 research participants in these programs. Then, Jennifer Tyrell's group, they may host another 1,000 K-12 teachers and students throughout all the event programs that they host. I'd like for Jennifer to talk about one of her successes, the Appalachian Regional Commission Program that she hosted back in July, which is wow, Jennifer, I guess seven months ago now, to illustrate where we were. Again, Leigh Ann's our data person, she can talk about this a little more.

But at one point, 80% of all of our program participants were participating remotely. 80%. We had successfully moved all of these participants offsite, out of the hosting facility. That was quite the challenge working with our partners, in order to do that. Michael, if you allow me, I'm going to turn it over to Jennifer and let her talk about her successes with the ARC Program.

Michael: Yeah, yeah, absolutely.

Jennifer Tyrell: Thank you, Craig. I'm sitting on the edge of my seat antsy to talk about ARC, as soon as Michael mentions successes during the pandemic. ARC was one of the very clear successes that we had in the K-12 group. Michael, I know that we've talked about this on the podcast before, so hopefully some of the listeners heard that story and have some background information on it. We host a program for the Appalachian Regional Commission, where in a usual year, we bring students to Oak Ridge and they do research onsite at ORNL, and the middle school students do work on the ORAU campus. But, that was impossible this year.

So, the incredible team of people that I work with, in cooperation with our amazing mentors from ORNL, were able to completely reimagine the program and take it from a residential research experience, to a completely online research experience. The way that we were able to do that was by sending students and teachers a great big box of research supplies ahead of the program.

Michael: Everything they needed, right?

Jennifer Tyrell: Exactly. We had them create a learning environment in their home, which worked out really well because, then they were able to meet with their mentors using video conferencing, and walk through learning how to use the equipment that they were sent, and still complete a research project in the course of two weeks.

Michael: Wow.

Jennifer Tyrell: The students and teachers who participated were overwhelmingly pleased with the experience that they were able to get, still made personal connections with one another, they were still exposed to career scientists and all kinds of different potential career opportunities, ranging from those that require a high school education to those who require a PhD. That was exactly the goal of the program.

Michael: I remember talking about this before. You had to make this pivot on the fly basically.

Jennifer Tyrell: Yeah.

Michael: You had a very short amount of time to make the transition.

Jennifer Tyrell: Yeah. If you'll recall, in the spring, so many people were waiting for this pandemic to end. Everybody was waiting for it to be over. "If we waited a couple more weeks, maybe it will be safe to travel again." So, at the direction of our sponsors, we were waiting to see if we could still host the program in-person. So, we did this complete re-imagining of the program in six weeks.

Michael: Wow.

Jennifer Tyrell: Which was-

Jenna: What do you think the hardest, hardest part about that was for you guys? You guys are so good at what you do, but you're used to the program being a certain way every year. So, having to just totally flip a switch, what do you think that the hardest part of this was?

Jennifer Tyrell: Well, anytime that you are changing a program from something that you've been doing for years and years, to something new, there are a number of challenges. Luckily, the members of the team that I work on are educators, and educators are really great at changing course right in the middle of something, because you never know what's going to happen in your classroom, and you just pivot and you just deal with what you're given. So, that's what we did in this situation.

The largest challenge that we faced was technology. We had a gap in technology knowledge. We had a lot of students who didn't have technology knowledge, but also didn't have access. We were dealing with students in rural areas of Appalachia. So, we had to provide them not only with laptops and other hardware to be able to access the internet, we also had to provide them with a way to get on the internet with a hotspot. But, the people that we were working with were absolutely incredible because, these participants found ways to access the internet. We had one teacher who was going to his local library every day, because his at home internet was not working. So, he was on Zoom calls from the library, so that he could participate.

Jenna: Wow.

Michael: Wow.

Jennifer Tyrell: It speaks volumes about the type of participants that we have in these programs, and their desire to participate in something like this that can improve their knowledge.

Michael: That's just amazing. We've talked to endlessly it feels like, about not just ARC, but the other K-12 programs, just how quickly you all had to pivot from in-person to online. How you all are able to do that just blows my mind. It just does.

Jennifer Tyrell: I think it's worth mentioning that, in addition to the ARC Program, which was very successful, we also were able to increase the number of teacher participants that we had in programs overall, because we were able to put all of our teacher professional development online.

Michael: Right. You had 28 states represented if I remember correctly?

Jennifer Tyrell: Yeah, something like that. It was over half of the states were represented in our ORU teacher professional development.

Michael: Which would normally be within 50 miles of Oak Ridge for the most part.

Jennifer Tyrell: That's exactly right. Normally, that program reaches teachers who are able to drive to Oak Ridge. So, we were very pleased to have people who were calling us from California. They would get on a 9:00 AM call and have their cup of coffee in front of them, and somebody would say, "Oh yeah, I'm from California," and everybody would say, "Wow, you got up at 6:00 AM or 5:00 AM to do these Zoom calls?"

Michael: Talk to Dr. Szari about chemistry.

Jennifer Tyrell: Yeah, that's exactly right. But in addition to that, ORAU teacher professional development, we have some teacher professional development that's sponsored by DTRA, that we've been doing this fall. It's incredibly popular with teachers because, not only are they able to get the knowledge that they need, they need help right now. I think everyone who's listening understands what's going on with teachers right now. This is one of the most challenging school years that they've ever faced, regardless of if you're a first year teacher or if you're a 30 year veteran. This is like nothing that teachers have ever experienced before.

Michael: Right. It's one thing to pivot from a bunch of snow days, it's a whole other thing to-

Jennifer Tyrell: Absolutely. Absolutely.

Michael: ... Pivot to teaching from home or teaching kids who are home and you're in the classroom or whatever the situation looks like.

Jennifer Tyrell: Yeah. So, we've tried to tailor our professional development offerings to be the types of things that teachers are in need of right now. We're teaching them about digital tools that they can use online. We're teaching them techniques for doing lab classes virtually, because we can't have kids just not learn lab techniques anymore. They still need to learn how to do that. At some point, they're going to be back in a lab and expected to be able to do things properly. So, we're trying to make sure that students don't have that gap in knowledge, by filling their teacher's ability to be able to teach those lessons properly, virtually.

Michael: That is incredible. Craig and Leigh Ann, I'm trying to figure out how to word this question, because I don't want it to come across as being a criticism. But, in terms of our government customers, was there a resistance? Were there different, I have to assume, different kinds of challenges from what the K-12 folks faced in terms of making the pivot to remote work. Just institutional structure, and they weren't ready for it, those institutions, and agencies weren't ready for it any more than we were. So, were there barriers that had to be overcome to get to the point where you could have 80% of participants working from home or working remotely?

Craig Layman: Sure. Yeah, I'll take the first stab at it and turn over to Leigh Ann. I can say that, the process of transitioning from onsite research to virtual or remote-based research, was incredibly complex. I'm just going to draw back to a couple of earlier statements that we've made. It's not like we were working with one facility that had one or two laboratories, Michael. I probably didn't explain it well enough. When we say we work with the Department Of Energy, all 17 national labs, and many of the headquarters entities, and we work with 20 plus other federal agencies, that doesn't mean it's one location of those 20 plus federal agencies.

Michael: Right.

Craig Layman: It could be multiple locations. In fact, Leigh Ann, you can correct me here, but there's a few hundred research centers across the US where we have placement. Each of those facilities, they have different issues, different problems that they're trying to solve when it comes to, what we now hope, as you said, the waning days of the COVID 19 pandemic. So, leadership at those hosting facilities approach things differently. We had some that were very eager to transition to a virtual remote environment, and we had others especially as some of the large user facilities, that were just trying to understand how they would do that. You really needed to be onsite at the hosting facility, because that's where the toys are, and that's where materials are.

So, it was an credible challenge for all of us to work together. I think that's really one of the things I'm most proud of with this team, at all levels, and 100 plus staff, that simply rolled their sleeves up, and began that open communication process with all of our points of contact and all these hosting facilities. It was, "How do we help? How do we make sure this is a smooth transition? What do you need to know? What's going to be your pain points?" So, there was a series of questions that we posed, and we created answers and solutions from that. So Leigh Ann, your thoughts?

Leigh Ann Penni...: Well, one thing that we haven't talked about is the complexity that some of our participants are foreign nationals. So, not only are they dealing with the pandemic, but dealing with the notion of where do they want to experience this. Do they need to get home? Should they not go home? Do they need to get home before a certain time? How does that impact their appointment? Not only those existing ones, but we are continuing to make new appointments and figuring out ways to bring people in either remotely, or in some cases onsite again. What are the considerations that each facility will have to make in terms of bringing on new appointments? Again, obviously foreign national appointments get extra consideration and have extra complexities. So, I think you're absolutely right, Michael. Each facility is different and each program is different, and has different complexities because of eligibility requirements and because of the facility itself. I think the team did an amazing job of keeping things as together as possible.

I wanted to circle back just a minute on something Craig talked about, our data, our numbers, what we're seeing between comparing FY 19 and FY 20. While overall our FY 20 numbers looked pretty strong compared to '19, thanks to a lot of great help from the K-12 group and engaging lots of teachers compared to FY 19, through all kinds of amazing resources, but this is a pipeline we talk about. That word is perhaps overused, but my concern as a labor economist is really the pipeline that we're building. When I look at the data comparing FYI 19 and 20, the thing that makes me a little sad is that, clearly the undergraduates and their experiences were the ones that took a hit. I think we will have to work hard to make up. We're just a small portion of the pipeline for the STEM workforce, but we are certainly a portion of that pipeline.

If we're not able to keep those undergrads engaged in STEM, and keep them with hands-on learning experiences that we know impact their decision to continue on into the STEM workforce, I think there will be a consequence, a blip in the future, that we'll see as a result of this. We're not surprised by that, we know that this is going to affect us for many years. Many aspects of the pandemic will continue on.

I'm looking at right now, I'm looking at some language off the Bureau of Labor Statistics website, that just talks about their occupational projections and what occupations will be strong. They do tenure projections every year. They basically have a statement that says that, these projections are meant to capture structural changes in our economy. So, the first effect that we all will feel and have already felt, is what we call the recession impact of the pandemic. But, that's not really what these tenure occupational projections capture. They capture really structural changes in the economy. We don't even really know what that will be yet. Those will be driven by consumer demand moving forward. Pretty much, our economy is driven by consumers goods that get developed and technologies that get developed because of what consumers want and what they need.

So, even the Bureau of Labor Statistics is saying, "We're going to have to go in and reassess our models, because we think there will be structural changes. We're in the process of doing that. We haven't done that yet. There'll be structural changes from the pandemic." So, we're still really in the unknown, but my comment is really just about the pipeline, and how do we make sure that we keep that pipeline going. I think we're getting back on track, there's light at the end of the tunnel. I think we will get back on track, but I think we'll need to work extra hard, and our federal sponsors may need to work extra hard to make sure that they're training the folks that they need to train to fulfill their needs in the future. I'm hoping that we'll be a part of that as well.

But yeah, now many different scenarios, many different facilities, several hundred different locations that our participants are typically placed at, at any given point. It could be seen as chaos, but we seem to be managing it very well.

Michael: You mentioned Leigh Ann, the Bureau of Labor Statistics and where they are in terms of looking at the infrastructure and the world of work. Realizing it's going to be a while before we know the full impact, are there any ideas at this point, of what the hot careers might look like, as a result of what we've seen? Any form of what demand might look like because of what has happened over the last year?

Leigh Ann Penni...: Well, I think it's interesting. There's obviously the demand side, but there's also the supply side. I think in some ways, that's a little bit something that we control a little bit more, because we interact with these students. I've seen this phenomenon firsthand. I was honored to stand up the first education programs for the Department Of Homeland Security after 9/11, and we were just amazed at the number of young people that felt compelled to work to protect the Homeland after 9/11, a total change of direction path in the best and brightest. We would advertise an opportunity to participate in a Homeland Security scholarship or fellowship, and we would have 100 slots, and we would get thousands of applicants, and they were all amazing. Everyone wanted to give back and do their part in helping to prevent anything like 9/11.

I think we'll see young people doing the same thing. I think we'll see lots of young people excited about the work they can do to help prevent a pandemic and the impacts of a pandemic moving forward. We'll see people, lots of students that are interested in things they haven't considered. Obviously, many of them will be in the life sciences, but not all, using data and artificial intelligence to model the pandemic will be a huge, epidemiology will be a huge... We'll have a huge new interest of young people who didn't know what that was prior to the pandemic, and probably never considered that as an occupation. So, I think our students and our young people will drive to some degree these occupations moving forward, by joining the supply of some of these occupations that will be in demand, because obviously, the federal government will want to invest money in vaccines and therapeutics and things to fight new Corona viruses as they develop.

So, I think that will be interesting to watch. As far as a specific career, I don't know that I want to be pinned down to that, a particular occupation, a specific occupation. But, I think anything in the data, computer science, life sciences, I see our young people are really flocking to that, in a way similar to I saw them flocking after 9/11, to occupations that would help us, cybersecurity and those kinds of things, that will help us defend our country. I think they'll stand up and take the challenge to do great things, to help prevent another pandemic, so that the impact will never be as this one was. So, I think that'll be interesting to watch happen.

Michael: Yeah, that's a heartening thought, isn't it?

Leigh Ann Penni...: Yeah.

Michael: That because of this experience, there's an opportunity as you saw with 9/11, students being able to do something to give back/pay it forward so they don't end up here again.

Leigh Ann Penni...: I'm sure they will do that.

Michael: This may be a Craig question, but anyone can jump in. One of the things that we talked about briefly in our pre-conversation was, this isn't going to last forever. There will be resulting change, resulting lasting change because of this. Any thoughts on what that looks like? I know Leigh Ann, you've mentioned a little bit of the supply side for students and research participants, but are there other things that are going to change, one for the good or the ill, but also at some point, the world goes back to normal, whatever normal will look like?

Craig Layman: I can start and then I'll turn it over to my colleagues, especially Jennifer, she's probably going to want to answer in a more practical approach. I'm going to tell you something that you're probably not expecting. I think one of the big bonuses to come out of this it's that, it's really changed our mentality about working from home and/or this remote learning or virtual learning process. One of the good things that's come of this is that, when we do look at our multi-generational leadership structure at most of the businesses across the US, now, whether you still have baby boomers in leadership jobs or gen X-ers or millennials or whatever generation that we're talking about now, when you look at this now, I think the desire to authorize and to continue to support some semblance of working from home or remote learning will continue.

I think that will continue for several years after we officially declare that the pandemic is over. That's going to be in part, a really good thing that we allow this to continue. In part, it's going to be a big change from what we're used to, as local economies will continue to be impacted from a workforce that's not commuting in, to let's say a downtown area or a laboratory area, or just an office building somewhere in space, somewhere where you're going. There's going to be a change, but it's going to enable different types of creativity and innovation moving forward.

So, I think one of the big changes of this will be that, we can do it and we can do it successfully. We know that we can do it successfully, and we can trust, and maybe that's a big way to think about this, we can trust that our workforce, especially at ORAU where we just have an outstanding workforce, as you know, we can trust that they're going to do the right thing, even when no one is looking, right?

Michael: Right. Absolutely.

Craig Layman: That's a big thing. I'll turn it over to Jennifer, to answer as well.

Jennifer Tyrell: Well, my answer goes hand in hand with yours, Craig. I absolutely agree that some form of remote learning is going to continue. I don't think that schools are going to find it sustainable to continue in remote learning forever, but I think that one of the big benefits of having to experience remote learning this year is that, it's going to allow teachers and schools in general, to be more inclusive in the future. No longer are we going to have schools who just say, "No, we can't accommodate that. You've got to come into school," and send you a packet of work home if you break your leg. It's going to allow teachers and school districts to say, "Yes, we can work with you. We can accommodate whatever's going on with you."

In the same way, people like our team doing K-12 outreach, are going to be able to be more inclusive. "No, you don't have to travel to be able to attend this. We'll bring it to you." I think that that's a really nice thing for everyone. Not only are we reaching more teachers and students, but also teachers and students are being able to participate in more things.

Craig Layman: I was just going to make one statement, following upon what Jennifer said, in terms of her break a leg comment. Here we are, it's January as we are recording this. At least in our region, there's the possibility of inclement weather. We have school districts that are saying, "That's okay. Inclement weather doesn't bother us anymore, because we know we have the facility, and we have the means to offer instruction remotely." We've already had one school district locally that had canceled their in-person learning experience in favor of virtual, because we do have the technologies available for them to work from home.

Michael: Right. All the kids who flush those cubes down the toilet and wear their pajamas backwards for a snow day just got disappointed.

Leigh Ann Penni...: I had one comment about the future. I think economists talk about sea changes, and we talk about the industrial revolution when we went from an agricultural economy to an industrial economy. I think probably the internet and the changes of the internet, and this may be seen as just really an extension of the internet, because that's what really allows us all to work remotely and to connect virtually, we've been doing that in a slow, slow snail's pace. In some ways now, we realize it was a snail's pace for a while. But, I do think that this will be seen in time, as the year that we really truly embraced, and it will be seen as a sea change in the way we do business and exchange information and function.

But, I do also want to mention that, there are estimates of how many jobs where it's appropriate to work from home. While we feel like that must be all jobs out there, because we all are working fairly productively from home, really, most estimates are that about 40% of jobs are feasible to work from home. Obviously, the service industry is a significant part of the 60% that don't, but the other significant part of the 60% that don't is the manufacturing sector. I don't see that changing significantly in our lifetimes. Manufacturing is such a critical part. Even if you think that manufacturing will change and will become more advanced, like our advanced manufacturing facilities, those do require people being in a physical location to have access to those kinds of technologies to do that.

So, I think we will have significant people working from home, but I don't think that we will ever be to the point that... Those industries, the service industry, the manufacturing industry, those kinds of sectors, will primarily go back full scale working at a physical location. So, I think that will temper our excitement about all of this virtual working from home as time... We realize that a lot of our peers and friends and family members are not able to work from home really over the long-term.

Craig Layman: Just think about though, even in our industry with research, and this notion of that one needs to be in the wet lab or near the toys, I think what we're going to find, and correct me if I'm wrong here, we're going to find that a lot of the support staff for these laboratories, they continue to work from home for quite some time. Name me a laboratory that doesn't have space issues. Name me a university that doesn't have space issues. So, I just perceive some of the support areas working from home with principal investigators, the research staff on site. Do you see that differently, Leigh Ann?

Leigh Ann Penni...: No, I agree. I think the support staff are part of that 37 to 40%. Even if they're at a laboratory, if they're support staff, there's a reasonable chance they can work from home, so I agree. Those are part of that 40% that can work from home. Sure, even at manufacturing facilities, there'll be some staff that will be able to work from home, but I think that we're still going to be in a majority situation of people whose jobs don't allow them to work from home. But, I do think we're going to all have to beef up our technology and beef up our ability to communicate remotely in a way like we never have before.

Michael: Thank you for that, Leigh Ann. That makes perfect sense as we continue to move forward. One of the discussion points that we had in our pre-conversation, was the notion of someone having to lead us out of this mess, this whatever we want to call it. Are we all leading each other? Are we all taking steps forward together? I'd like to think that we're the leader in terms of helping our customers move along this spectrum of work from home to work from work. But, is there a clear leader? Is there someone who should be leading the charge? Is that us? All those questions.

Craig Layman: Well, I'm not sure I have the right answer, but it's been fun to watch, as it's Leigh Ann has talked about, back in 2002 or whenever, after 9/11, it's been fun to watch people volunteer and step up to fight the pandemic. I would say at multiple levels, there's been leaders across the United States, from those that are in the healthcare industry, to those that are in the research lab trying to find a vaccine or a therapeutic, to fight the virus.

I will also say, to those frontline retail workers who very on in the beginning, they didn't waiver from their duty, their jobs. Just think about your local 16 year-old or 15 year-old bagging groceries for you in March and April of 2020, when we had no idea really what the mortality rate or morbidity rate of this virus is going to be. So in my opinion, those were all leaders too. When you look at what we are doing and what we've done in order to transition to this virtual learning environment for federal internships and research experiences, we're certainly a leader in this space. We've developed processes and procedures and training programs, that have allowed our students, our researchers to function very well remotely. We've been able to positively impact the PI staff and in a way to where we've helped them transition as well. So, I know I'm biased here, but certainly we've been a leader in this space as well. Leigh Ann, Jennifer?

Leigh Ann Penni...: I'll just say, I think our federal customers have been leaders as well. I know particularly with the Department Of Energy, the Office Of Science, they have a team that's looking at the impact of COVID on their research initiatives, their PIs, they're collecting data, they're assessing and systematically trying to measure the impact and plan for the future, for the research to get back on track, back on progress, additional budget if needed, if available. So, I'm really impressed with their leadership and their organization, to really pivot and take this on, and try to make the most of what we have now that we're moving on the other side of it, and move forward with limited impact. So, they seem to be very on top of this. Maybe not what the media would have us think, but in my opinion, I'm confident that our federal stakeholders are doing a great job and leading us through this.

Michael: Awesome. That's fabulous. Thank you for that comment. Jennifer?

Jennifer Tyrell: I think that I agree with both Craig and Leigh Ann. ORAU has been leading for our customers and developing our programming. Particularly in the K-12 group, we have been able to help teachers. But, what we're also experiencing is teachers helping one another. I hate to be cliche and say, everyone's a leader, but in what we're experiencing right now, we're seeing all of these heartwarming stories about people who've figured something out, sharing it with other people. Instead of just figuring it out for ourselves and hanging on to something, people are sharing what they've learned, and sharing their solutions to help us to move past the isolation that a lot of people are feeling, and the struggles that people are feeling while they're alone and adjusting to working from home, or learning from home, or hybrid models, or fear from going to school in-person, fear of the virus, fear of transmitting it to your elderly relatives. But, people are coming up with solutions and sharing them with one another, and making a difference. I think that's a really nice thing to see come out of this as a result.

Michael: Just from a practical perspective, Jennifer, going back to the early days of the pandemic, we had Renee Powell who, during the PPE shortage, figured out a way to 3D print PPE on the printers that she won as part of Extreme Classroom Make-over. Even you all, the K-12 team, you all were 3D printing mask extenders for the same purpose, because people needed them and we could do it. So, there have been many levels of leadership across the board, and some of those heartwarming stories that you mentioned.

Jennifer Tyrell: Yeah, that's exactly right. I think that it's important for us as we have pandemic fatigue, to remember the good things that did come out of it, and to realize that people can be better than what we expect of them.

Michael: I love that. People can be better than what we expect them. So last question, I think this is obvious. This has been a test of our resiliency. It's been a test of, from a corporate perspective, from an education perspective, from our customers, hosting facilities perspective, it seems like we're resilient as heck.

Jennifer Tyrell: Absolutely. Speaking for the K-12 team that I get to work with every day, we have been extremely resilient in what we were able to do. The teachers and students that we work with have been resilient. We're not giving up. We're not going to let something keep us from teaching and learning.

Michael: Awesome.

Craig Layman: I will say Michael, that again, we're going to go back to March of 2020, when our President Andy Page, gave us the order to quarantine and to work from home. Within two days, we had successfully taken, not only the overwhelming majority, I think 90% of or ORAU staff home. We did so in a way to where we were almost 100% functional, as soon as our keyboard began to type.

Michael: Right.

Craig Layman: We were resilient. That's a testament to the staff. That's a testament to their hard work, to their dedication, to the mission. So, that's my shameless plug to them, just saying a thank you. They've heard me say it over and over, but thanks once again.

Michael: All right, well, thank you all so much for your time.

Leigh Ann Penni...: Thanks, Michael.

Craig Layman: Thank you Michael, Jenna, for that.

Michael: Thank you all. Have a great rest of your day.

Leigh Ann Penni...: Thanks. Bye.

Michael: Bye.

(Silence)

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