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Mike: From the Center for Occupational Research and Development, welcome to Preparing Technicians for the Future of Work. I'm your host Mike Lesiecki. In each podcast we'll reach out to people who are actually on the front line of the future of work and hear what they have to say. That means interviews with industry, interviews with working technicians, forward thinkers in the field. We'll do some background research, and we'll curate that research to make sure you have the most up to date and relevant information. And in every episode, we'll suggest action that you can take. We want to inspire you to take that action.

This podcast is brought to you by the Center for Occupational Research and Development, known as CORD, with financial support by a grant from the National Science Foundation's Advanced Technological Education program. Opinions expressed in the podcast do not necessarily represent those of the National Science Foundation. You can find out more about our project and our approach at "PreparingTechnicians.org."

Mike: Our guest today is Dr. Linda Molnar. She's a scientist and entrepreneur with more than 20 years of experience in the life sciences and chemical industries. She's integrated her scientific research and engineering background with commercialization for startups and international government, and business environments. Currently, Linda is a Program Director at the National Science Foundation. Welcome, Linda! Would you tell our audience a little bit about what a Program Director at the NSF does?

Linda: Sure, Mike, and thank you for taking the time to speak with me. The National Science Foundation is an extramural funding agency. Which means that, unlike other federal agencies which do some research internally, we fund

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external folks to do the research. And so, what that means for a Program Director is that, because we broadly fund all these different areas of science and engineering, we work both to get the word out about what NSF is interested in funding, and we look at making selections of the awards that we make, and managing those awards.

Mike: All right, excellent. I know one of the programs you're associated with is NSF's Future of Work initiative at the Human Technology Frontier. From your point of view, can you give a sense of how we should look at that future? Maybe three to five years in the future? What's important? What do you see coming?

Linda: NSF has focused on the Future of Work at the Human Technology Frontier as one of its "10 Big Ideas." They made initial investment in fiscal year 2017. And what we're really striving to do there is to look really at these five different areas.

So, one is to figure out how we can have an increased responsibility by firms for training. So, we look at companies, and we feel that they must work to integrate new technology to remain competitive. And will require workers whose skills align with relevant needs. So, we look at it from the employer perspective as well.

We also strive to improve access to education and training. Existing educational institutions must strive to deliver flexible programs with easy access for workers. And so, we fund a lot of areas where we're using technologies to make access to education more equitable.

A third area that we look at are new modes of delivery for education and training. So, where can innovations and disruptions work to provide new educational pathways? And by that, I mean new technology that can be used to train folks differently than we have in the past.

Another aspect of the future of work area is looking at refined matching of workers to skills. There's an increased emphasis on skills and competencies that must align with the needs of the workplace.

We also look at new definitions for credit credentials and qualifications. As technologies are developing more quickly an industry's needs are changing and, therefore, jobs. We need to look at competence-based training and qualifications as a priority.

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Mike: You know, Linda, that last comment really resonates because in a number of our recent podcasts, we've talked about this move towards qualifications, micro-credentials, all that sort of thing. So, it's very interesting to our audience. Linda, could I ask this as a follow up? Where is NSF making its investments?

Linda: So, Mike, NSF recognized when they launched this program that historically, technological development has progressed independent of any consideration of its consequences on workers in society. So, we looked all that was strategic to look at things both integrating convergence research community that integrates future work, future technology, and future workers. We've made investments across a number of different areas, retail sectors, health, wellness, hospitals, office and remote work, training, education, manufacturing, construction. So, really covering broad areas of industry.

Mike: Excellent. Linda, let me ask you this question. In the introduction, I mentioned that you have a background as a businessperson and an entrepreneur. You're also involved with a very new program at the NSF called the Convergence Accelerator. Many of our listeners, Linda, are entrepreneurial. Many of their students are entrepreneurial, as well. What topics are of interest in this Convergence Accelerator program? How does it work?

Linda: Well, Mike, you had mentioned that I was a businessperson and entrepreneur. But first of all, before any of that, I was a scientist. And what intrigued me most was not just the science itself, but rather also the purpose for which it was being developed and being used. And so, the idea that I would be able to develop a product that would be used by researchers or customers all over the world felt like an opportunity to make impact beyond the furthering of the science itself.

So, when I came to NSF, I was initially attracted to the Small Business Innovation Research Program at NSF, where I was the Program Director for two years. However, when I heard about the NSF Convergence Accelerator, I just had to get involved.

The Convergence Accelerator differs from the rest of NSF, which funds primarily basic research, and then has a use-inspired approach to doing convergence research. The premise for "convergence" research is that the big problems

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we're facing in the world today are not going to be solved by one discipline or one sector. We need to get the brightest minds in the world working across disciplines and across sectors to tackle the issues currently facing humanity. The "acceleration" part comes in when we're able to identify an area of convergence research that can result in deliverables for the American people in a three-year timeframe. By approaching big problems this way, we set ourselves up for having real positive impact for society.

So, when the NSF Big Idea, Future of Work at the Human Technology Frontier, I had a couple of years of development. It was time to think about a Future of Work topic for the Convergence Accelerator. And so, I see the research that's being done in Artificial Intelligence and Future of Work in the National Talent Ecosystem track that I'm leading, as an enormous opportunity to have real impact on the future of work. And was delighted to have the opportunity to lead the effort. I'm happy to give some more details on particular investments we've made that are now in their second year of funding.

Mike: Linda, can you give us some examples from that Future of Work track that you think are relevant and impactful?

Linda: Absolutely, Mike. And the first thing you asked me is, what a program director at NSF does. So, one of the things we do is love to talk about our awardees that we are so very proud of.

One example I can give you in the Convergence Accelerator Future of Work funding area, is one that deals with transforming education and training with the use of new virtual environments, and the use of what we call "human augmented technologies." Things like mixed reality. So, one of the Convergence Accelerator Phase Two teams is called LEARNER, which stands for Learning Environments with Augmentation and Robotics for Next-gen Emergency Responders. And their aim, which is really made even more relevant with the pandemic, is to keep our emergency responders safer and help them to be more effective in their jobs.

And, if you can allow me, I have another example: the Convergence Accelerator Team. And that team is called Skill Sync, and it's led by Robbie Robson of EduWorks. And that team looks to have an impact in matching of workers to skills and the movement towards skill- and competence-based

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training and qualifications that we touched upon earlier. Their work is made possible by advances in machine learning and computer understanding of natural language that allow us to represent millions of jobs and courses in terms of their underlying skills and knowledge. And to measure how well portions of college courses align with those industry skill requirements. So essentially, what means that these skills data generated from these jobs and courses can then be openly shared in an environment like the cloud, so that they can be used to build a national pipeline management and other initiatives.

Mike: Linda, I can see why you're proud of those awardees and those programs. I mean, they just sound unique. Many of our listeners at community colleges have a lot first responder-emergency responder programs. And I think they'll be very interested in that, as well as the Skill Sync one. I'll make sure we put links to those in the notes. And thank you!

Linda: Mike, that would be excellent. One thing that's very unique about the Convergence Accelerator is this ability to form new partnerships and act in response to what's happening in the environment. And so, we are actively looking for partners for both of those projects. And our other projects, as well.

Mike: All right, great. We're going to switch gears a little bit. And you know, Linda, the majority of our listeners are STEM educators. So, as you think about STEM education, from your point of view, how can we rethink STEM education? What have you seen from your perspective?

Linda: Mike, this is such an important area. I'm so glad you asked this question. And I think that my recent experience over the last year with the Convergence Accelerator has really emphasized this to me even more.

In the big picture, when you think about the growing number of challenges facing humanity, it is important to make STEM education more focused on use-inspired areas that have the potential for positive societal impact. More close to home, we need to address globalization and the ever-increasing need for STEM talent. We also need to make STEM education therefore more relevant for a broader audience. And more accessible. This gets directly to addressing economic competitiveness for the United States as well.

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Mike: All right. Thanks. Excellent! Interesting! I got a follow-up question for you, Linda. What have you seen that can work—or maybe hasn't worked—when industry and educators get together and talk about these things? Talk about preparing, in our case, technicians. Talk about technology. Talk about STEM education. What works when those two groups get together? Or, what might NOT work?

Linda: Mike, what I've seen is that, in this growing disconnect between industries, needs for skills, and education, is well known and discussed. So typically, the four-year institutions have a hard time changing curricula to suit the needs and pace of rapid technological change. This is where community colleges can come in and have an opportunity to fill this gap. And if they have the ability to be more nimble, and they respond to changes in industry.

In addition, because community colleges are focused heavily on work-related and vocational training, many have worked to build business-focused infrastructure and ties. So, where four-year colleges have often overlooked these areas and are behind community colleges in building the infrastructure needed to provide support for business needs. So, this discussion between industry and education realm is ongoing. I would focus on this opportunity for community colleges and their unique position in the ecosystem to actually be sort of a "nexus" in that base.

Mike: Alright—excellent, excellent! One last question, Linda. I appreciate all your comments today. If you had to get out your crystal ball, what would you see as an emerging role for technicians and their educational providers in the workplace in using these future technologies? Maybe think about the next three to five years. What would you think is an emerging thing that you see coming?

Linda: So, right now, and again to continue from the last question, I think community colleges are uniquely poised because of their relative nimbleness to four-year institutions to really be a nexus of reskilling and upskilling for current workplace needs. So, for instance, large companies need training to bring folks up to speed in new technical areas. Community colleges could be that nexus.

In addition, because the students are in a two-year institution, we also want to make sure that we can connect them to skills and lifelong learning so they can continue

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to evolve more quickly as technology changes. So, I think this idea of really thinking about learning how students learn is that bringing in new technologies like human augmented technologies to train and educate.

And then how we help progress students to a point where they become lifelong learners. And understand this is a continual evolutionary process. I think that can be a very important piece of the puzzle and making the industry and education divide much smaller.

Mike: Linda, you talked about a need to make STEM education more accessible to a broader community? How do we do that? Tell us more about that.

Linda: Mike, there are a lot of folks who are very interested in this area right now. In fact, through the Convergence Accelerator program, NSF will be convening an industry-led workshop over a series of virtual meetings in late May/early June to discuss exactly how STEM education can be transformed for the better using technology and by collaborating with industry. The results of that discussion might actually be the topic of a future podcast. And in fact, NSF does use the Convergence Accelerator Workshop to have ideation around developing new potential solicitation topics.

Mike: Great, Linda. I'm also going to link that for our listeners in the Show Notes. They appreciate the opportunity to potentially be part of something like that. So, thanks!

Linda: Thank you.

Mike: It's just a great comment, Linda. You know, that really resonates with our project, Preparing Technicians for the Future of Work. We think about these things. I was really interested in hearing your perspective today. You used terms like "use-inspired." I think that's so important to use what's actually happening out there and then to build programs on that basis. And also, your comments about the future of technology, the future of work, and the future of the workplace are just really right on and appreciated. Thank you, Linda! It was just a pleasure talking to you today. I'll put a bunch of links in the Show Notes for our audience to follow up. Thank you, again.

Linda: Thank you.

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Mike: As we wrap up today, listeners, I'd like to ask you a favor. Right by the link to the Show Notes (on the website), you'll see something called a Feedback Survey. It's just a few questions, and most people have been answering those questions in under a few minutes. They'll help us improve the podcast. And thanks very much!

Now today, you heard Linda from the National Science Foundation. She talked about five major things that the NSF sees important moving forward in the future. And that included companies integrating new technologies, access to training; more flexible programs, so that you could get that sort of access; new modes of delivery—things like mixed reality; a refined way of matching skills and workers; and finally, new definitions for credit, including microcredentials.

But importantly, Linda said they're seeking partners. Now, in the Show Notes, I put links to the Accelerator program that she talked about, to the Future of Work at the Human Technology Frontier, and to a series of resources where you can review webinars or look for upcoming workshops. That's your action for today. Get yourself up to speed on these programs at the NSF for your own awareness and potential partnership with others.

This podcast is produced by John Chamberlain at CORD. Thank you, John, for all your excellent work. And the project is led by Principal Investigator Ann-Claire Anderson at CORD. Thank you, Ann-Claire. You can find our podcasts at preparingtechnicians.org (that's all one word), or on Apple podcast, or Google Play. A rating and review is always appreciated. And thank you, our listeners for Preparing Technicians for the Future of Work.

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