

Operations Practice

The Fourth Industrial Revolution will be people powered

Companies at the forefront of the technology frontier are empowering their workers with digital technologies—and the skills they need to use them.



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For many members of the world's workforces, change can sometimes be seen as a threat, particularly when it comes to technology. This is often coupled with fears that automation will replace people. But a look beyond the headlines shows that the reverse is proving to be true, with Fourth Industrial Revolution (4IR) technologies driving productivity and growth across manufacturing and production at brownfield and greenfield sites. These technologies are creating more and different jobs that are transforming manufacturing and helping to build fulfilling, rewarding, and sustainable careers. What's more, with 4IR technologies in the hands of a workforce empowered with the skills needed to use them, an organization's digital transformation journey can move from aspiration to reality.

In this special edition of the *McKinsey Talks Operations* podcast, host Daphne Luchtenberg brings you highlights from a panel discussion on the importance of building workforce capabilities and shifting mindsets for successful digital transformation. The discussion took place recently as part of Lighthouses Live, the flagship event of the Global Lighthouse Network—a World Economic Forum initiative in collaboration with McKinsey & Company.

The conversation was led by Francisco Betti, head of advanced manufacturing and value chains and member of the Executive Committee at the World Economic Forum. It also featured Revathi Advaiti, CEO of Flex; Robert Bodor, president and CEO of Protolabs; and David Goeckeler, CEO of Western Digital. The following is an edited version of their conversation.

Daphne Luchtenberg: In this new world of work, the impact of technology means new skills and new roles are emerging as fast as other roles change.

David Goeckeler: You know, change can be opportunity for everybody. So I think we look at it through that lens. Change doesn't have to be a threat; it's just the opposite.

Daphne Luchtenberg: I'm Daphne Luchtenberg, your host for *McKinsey Talks Operations*, and that was David Goeckeler, CEO of Western Digital.

His comments were part of a conversation about the use of digital technologies in manufacturing and production, and how there is a need for training and development programs to teach workers the skills to use [these technologies].

So while there is a common perception that digitization and automation are a threat to the world's workers, companies at the forefront of the technology frontier have actually created jobs—different, new roles that are much more high tech than the roles of the past.

And with the current labor mismatch being felt in many countries, the time is now to further engage workers for a digitally enabled future.

This focus is backed by growing research proving that workforce engagement is key. Over the last several years, research with the World Economic Forum, in collaboration with McKinsey, surveyed thousands of manufacturing sites on their way to digitizing operations and have identified about 90 leaders. These are the lighthouses—sites and supply chains chosen by an independent panel of experts for leadership in creating dramatic improvements with technology. Together they create the Global Lighthouse Network, committed to sharing what they've learned along the way. A common theme among these sites is their worker centricity—they are supporting the frontline workforce, upskilling, and making jobs easier and more interesting.

In this special edition of *McKinsey Talks Operations*, we'll hear from the CEOs of a few of these leading companies about how they are engaging their people and putting technology in the hands of the workforce.

The conversation originally took place during Lighthouses Live, a recent event of the Global Lighthouse Network. The discussion is led by Francisco Betti, at the World Economic Forum.

Let's listen in.

Francisco Betti: I am delighted to be joined by an impressive group of leaders from our Global Lighthouse Network: Revathi Advaiti, chief

executive officer of Flex; Robert Bodor, president and CEO of Protolabs; and David Goeckeler, chief executive officer of Western Digital.

Revathi, Robert, David—a very warm welcome, and thank you for joining us today. We have an exciting conversation ahead of us. We will discuss how you are shaping the future direction of your companies by leveraging Fourth Industrial Revolution technologies and empowering and engaging your people.

Revathi Advaiti: The most important thing is that we're a company of people. We're 165,000 people in 30 countries. And I'm a big believer that culture is at the forefront of everything we do. And great manufacturing comes because you have a great culture.

My belief is that the recognition of [the Flex factory in Althofen, Austria] as a lighthouse site is because they have a fantastic culture—a culture that's focused on innovation, that is very ready to embrace change, is willing to learn from other companies across the world. So it's such an amazing recognition for that particular site. And it really opens up the avenue for every Flex manufacturing site to really strive to be at the level that Althofen is and to be at the level of the other 90 manufacturing sites that are lighthouse-recognized.

So we are very, very excited about it. We think that this is the start of using the Fourth Industrial Revolution to really build on the capability of our sites, and just build a sustainable manufacturing legacy for Flex.

Francisco Betti: Western Digital has also joined the Global Lighthouse Network with two sites this year—one in Penang, Malaysia, and the other in Prachinburi, Thailand.

In your lighthouses, we have seen success driven by a combination of technology and people. Can you share how Western Digital has been keeping people at the center of its digital transformation journey to realize its full potential?

David Goeckeler: Keeping people at the center is actually pretty straightforward because people

are the number-one priority in our operations. We work in a very dynamic market, and we know that our teams, and the skill of our teams, is really what's going to define our success in the future. So keeping them at the center is critical. And it's not just the operations team; it's everybody in the company. We have over 60,000 employees—from the people in operations all the way to the executive team—and everybody is involved and behind this exciting effort. So keeping our people, reskilling our people, building that future-ready workforce, is what's critical for us, but also for our employees.

Any time in life when you learn new skills, when you educate yourself, I think you have the opportunity to live a better life. It's not just about our company being better and us being prepared for the future; it's about all of our employees being ready for that future—keeping them at the center, having them highly engaged, all of the reskilling, getting them excited about what the future holds.

This isn't some kind of executive mandate; it's the employees leading it, pulling the company to it. Keeping them all deeply engaged keeps them directly at the center of what we're doing. And, as I said, having our employees fully engaged, really building that future-ready workforce, is going to be what defines the success of Western Digital.

Francisco Betti: Thank you very much, David. It's great to hear about the importance of culture and people from both you and Revathi.

Let me ask you a follow-up question. What advice you would give to those companies that are still stuck in pilot purgatory and are trying to scale digital transformations?

David Goeckeler: First of all, what we just talked about is workforce engagement. It's got to be a pull, the workforce has to be fully engaged, you have to take the time to train and explain all the things about what success is going to mean for everybody. And you have to get that alignment from the shop floor all the way to the executive team on what going to a new model is going to deliver. And, as I said, not just for the business, but for all the individuals.

Then I would point people to infrastructure readiness. This is a new world. In manufacturing, there's going to be a lot of fast and big data. Make sure you have a scalable industrial IoT [Internet of Things] stack that's going to be able to handle that and be ready.

So first make sure the workforce is engaged. Make sure the infrastructure is ready so that you don't run into roadblocks. And then really prioritize. Pick use cases that are going to have a big impact. As the team says, "Think big, start small, and then scale fast."

We've had a lot of success doing that—picking use cases that are going to have big business impacts. People see the value. You start to build momentum. And once you get some momentum going, it's easier to keep it going and build faster and more of it. So, again, workforce engagement, infrastructure readiness, and then start with some prioritized use cases. Start small but think big. And then scale as fast as you can.

Francisco Betti: That is great advice, David. Thank you.

Revathi, let me come back to you now. Flex's lighthouse in Austria was facing tough competition from lower-cost regions. However, your teams were able to leverage technology to build a more attractive product lineup. What are the key lessons your company learned from this? How does it inform your future strategy?

Revathi Advaiti: When you walk into our Althofen site, the first thing you notice is the "can do" culture. As the world went through labor arbitrage and manufacturing moving to more competitive regions of the world, Althofen has been a thriving site that has focused on using technology as a competitive advantage.

We have a site that is very well trained in terms of skilling. They're able to skill and reskill, like David talked about, at an amazing pace with really good change. And the second is, tremendous resiliency. They're able to bring up new products at a fast

pace versus any other site that I'm aware of just because they have that spirit of innovation and the focus on technology.

Pretty much any complexity of product, they're able to bring into their facility and scale up for a customer, and really respond to any of the market dynamics present. All of this has resulted in a site that's having tremendous rigor—operational rigor—lots of agility, in terms of how they operate.

The results have been incredible for that site. They've had tremendous revenue growth while improving margins. But most importantly, they've made some sustainable change, which I really love. CO₂ emissions have improved significantly for that site. And we have driven reductions, in terms of our travel costs and those things in that site, just by use of technology—whether you're thinking about simulation or any of those other technologies that have been used.

Francisco Betti: Thank you, Revathi. Amazing achievements.

Robert, this seems like the perfect opportunity to bring you in. Firstly, many congratulations for the recognition of your Plymouth site as a lighthouse—Protolabs' first lighthouse in our global network.

As a medium-size enterprise, you embarked on an amazing journey to transition from providing prototypes to becoming an at-scale production supplier—and you did that by incrementally developing new digital capabilities.

What did you do to further accelerate your 4IR journey, considering your company was already a digital native?

Robert Bodor: As you alluded to, Protolabs was founded over two decades ago with a digital mindset from the start. We began as an injection-molding company looking to transform the traditional manufacturing process. Our mission was to automate traditional manufacturing in order to provide molded parts in days at a fraction of the price of traditional molders.

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–David Goeckeler

Over time, we extended this digitalization approach to other services, including CNC [computerized numerical control] machining, sheet metal fabrication, and 3-D printing. So, Revathi, you’re right, we love additive manufacturing at Protolabs.

As our name implies, we targeted engineers, who had needs for prototypes to begin with. But over time, we found that our customers were using us for production-part needs and that they valued us for our quality, our reliability, and our willingness to make parts on demand with no minimum-order quantities, so that they could virtualize their inventory and reduce their supply-chain risks, especially in times when demand was volatile.

So that realization was really key for us. And that launched the 4IR journey that you mentioned, Francisco, from being a prototype provider to, now, also a production provider. To do that, we had to extend our digital thread, which connects our online quoting platform to the shop floor and to the customer.

We already had end-to-end automation in place that allowed us to make a mold from scratch and shoot molded parts in one to 15 days. But now, we needed to extend that for these production applications. So we adopted 4IR technologies to expand that system. And it included things like processed automation, digital-part inspection and validation, and process control, which included implementing an industrial IoT stack that allows to us to conduct real-time monitoring of our mold presses and associated equipment. And then close the loop in all of that.

All of this expanded the digital thread and the digital twin of key elements of our production processes so that we truly had this end-to-end connection from the online quote all the way through the production process and, ultimately, to the customer.

Lastly, we also implemented a scaled agile development framework, because software is at the core of our business and what we do. And this framework allowed several hundred software developers who are serving our injection-molding business to be able to be agile and coordinated at that scale and to respond to the needs of the plant and to the customers as they evolved.

Francisco Betti: Excellent. Thank you for sharing that, Robert. It sounds like an amazing journey. David, coming back to you now, and I’d like to focus once again on the importance of people.

Your lighthouses in Thailand and Malaysia have several thousand workers, and you’ve focused heavily on upskilling and reskilling. In fact, in Thailand, 60 percent of your workforce was reskilled to support and accelerate technology adoption. And that resulted in zero job losses, which is just fantastic.

How are you turning this approach of reskilling at scale into a competitive advantage for your company?

David Goeckeler: Our successes depended on our people. And let me give a little bit of background on what these people are building. Western Digital is a

diversified storage company. An easy way to think about us is, 40 percent of the data that's stored in the world is stored on a device that our team built.

That's kind of an amazing stat: 40 percent of the data in the world that's stored is stored on a device that these teams built. And the demand for that storage is increasing at a 35 percent yearly compounded annual growth rate. So there are plenty of things to do, and the technology allows us to build that.

And it's our responsibility to equip and empower that team for our short-term and our long-term success. This is a very large imperative that we have a workforce that's ready for the future that we're building. We have thousands of engineers who are designing the products of the future that are going to enable the digital economy we all live in. Making sure we have a workforce that's ready to build that technology is critically important to us.

So it's really about making Western Digital the employer of choice in the regions that you saw. And that's about that stronger workforce engagement—training them, letting people know that when you come to Western Digital, you're not just going to do the job you have today, but you're going to learn new skills.

We're able to take our very experienced employees and our workforce that really knows how our business works and bring them into the future, and at the same time attract new people into the business. So I think it's a win for everybody, and it's been a great journey and a tremendous success.

Francisco Betti: Thank you, David. Robert, can I ask you what your thoughts are here?

Robert Bodor: I would agree with David's comments. And furthermore, I would add that the manufacturing industry today, particularly the American manufacturing industry, is experiencing a severe labor shortage. And this has potential long-term implications.

A National Association of Manufacturers study indicated that over two million manufacturing jobs

could go unfilled by 2030. As a digital manufacturer, we've worked to automate a great deal of our manufacturing process, which allows us to be more efficient with our workforce. And that's one of the competitive advantages that's coming to us from our 4IR initiatives.

However, our employees are absolutely critical to our success. So the challenge is real. And at Protolabs, we're dedicated to creating what we hope are long-term career opportunities for our employees on the shop floor. And that requires considerable investment in creating learning opportunities that will help them grow.

We've put a really concerted focus on upskilling our employees to ensure that they're able to grow in their careers and develop the skills that are vital in this Fourth Industrial Revolution. But for us, that includes things like in-house training and certification programs for key roles, like our mold technicians, for example.

Our online learning portal offers hundreds of courses that can help our employees to grow. [We provide] tuition reimbursement for continued learning opportunities at universities and trade schools. Further, we really work to incorporate technology on the job so that we can improve the employee experience on the manufacturing floor and support their on-the-job training through technology.

Ultimately, our goal is to ensure that our employees have the path to become experts in the modern best-practice methods that we're using, such as scientific molding in the case of Plymouth, and also to grow other skills, like A3 problem solving, change management, leadership development.

Francisco Betti: Excellent, Robert. Thank you. Revathi, one final question to you. At Flex, we have seen your incredible efforts to reskill almost the entire IT team and your shop floor operators. They are all smart manufacturing experts by now.

How are you thinking about Fourth Industrial Revolution upskilling programs as part of your future strategy?

‘It’s core for the survival of companies, and, more importantly, its core for our people strategy, because the best way to keep our employees, our colleagues, excited about what they do is to make sure that they are at the forefront of every technology they use.’

—Revathi Advaiti

Revathi Advaiti: Francisco, just like Robert and David talked about this, I think it’s core for the survival of companies, and, more importantly, its core for our people strategy, because the best way to keep our employees, our colleagues, excited about what they do is to make sure that they are at the forefront of every technology they use.

I’ll give you an example. The facility here in Austin typically makes a lot of technology products, whether it is storing security products, things like that. But recently, we had to start moving a lot of medical products into Austin.

One reason for this is because it’s a fantastic location to have. But two is because we also have a great team there. But the team had to really change their entire mindset. They had to learn a fully automated, wholly sophisticated set of equipment and how to run it, and really pick up new skills that they didn’t have before, including FDA [US Food and Drug Administration] compliance for a lot of regulatory issues.

But we were able to train the team based on other sites, learn from them, and really change the competency of this site in the last couple of years. Althofen, the site that is recognized as a lighthouse

today, has done that time and time again, many times over.

We have a system called Pulse that we deploy across the organization. Pulse, truly, is the heartbeat of the organization. Althofen was one of the first sites that deployed Pulse. They know in real time exactly where all the product is—what is coming in, what is leaving, how much inventory is in the system—so they can give real-time updates to the customer to provide them a seamless transition.

The idea of all those sites was “unless we learn first and we get to the table first, it is survival of the fittest and the best team wins,” right? So we are able to have sites that have the culture of “we want to be the best.” And what has been amazing about [the Global Lighthouse Network] is we get the ability to benchmark and learn from other sites, then bring it in, and then really reskill our workforce.

Francisco Betti: There are millions of facilities and companies around the world that we want to reach and engage in the unique learning opportunity the Global Lighthouse Network provides. Our network will continue to grow, and we invite you all to reach out to us to be able to experience the journey toward becoming a lighthouse.

Daphne Luchtenberg: That was a great discussion, and thank you again to our panelists and our colleagues at the World Economic Forum for an insightful event. Once again, organizations are selected to be part of the Global Lighthouse Network based on their leadership and willingness to share their insights. If you are inspired to begin your own Lighthouse Learning Journey, we invite you to learn more on [McKinsey.com/GLN](https://www.mckinsey.com/GLN), or on the World Economic Forum website.

This program is just one in a series that considers the challenges that companies and economies are facing, as well as the opportunities that leaders can seize for competitive advantage. We will explore other important topics, such as how to connect boardroom strategy to the front lines, where and when to infuse operations with technology, and why empowering the workforce with skills and capabilities is key to success.

Revathi Advaiti is the CEO of Flex. **Francisco Betti** is the head of advanced manufacturing and value chains and a member of the Executive Committee at the World Economic Forum. **Robert Bodor** is the president and CEO of Protolabs. **David Goeckeler** is the CEO of Western Digital. **Daphne Luchtenberg** is a director of reach and relevance in McKinsey's London office.

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