The Future of Work podcast is a weekly show where Jacob has in-depth conversations with senior level executives, business leaders, and bestselling authors around the world on the future of work and the future in general. Topics cover everything from AI and automation to the gig economy to big data to the future of learning and everything in between. Each episode explores a new topic and features a special guest.

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Jacob 04:54
Hello everyone, thanks for joining my guest today is Jim Heppelmann, CEO of PTC. Jim, thank you for joining me.

Jim 05:02
Well, thank you, Jacob, for Give me the chance. I'm looking forward to it.

Jacob 05:06
Oh, yeah, I'm looking forward to the conversation as well. So we have lots of fun and exciting things to talk about today. But to get started, why don't we dive into a little bit of background information about you? Because I read that you actually grew up on a small dairy farm with seven siblings?

Jim 05:24
Yeah, I did. I have, believe it or not six older sisters, and, and one younger brother. And I think that, you know, that experience shaped me in important ways. It certainly taught me the value of good hard work. And it taught me all about machinery and you know, how things work and how to take them apart and put them back together and make them work again when they stop and probably, that is, in part why I became an engineer, a mechanical engineer, actually.

Jim 05:56
The second thing is the second of my six older sisters. became an engineer. And when she graduated from college and got her first job, she already was making as much money as my parents were. And I just said, oh, wow, you know, that that changes everything. So certainly, you know, my my decision to go into engineering and go to college you know, go into technology really was a lot fallen one of my sisters who paved the way and showed me the amazing possibilities that were out there for really anybody because I was coming from pretty modest means at the time.

Jacob 06:30
What were you doing in the dairy farm?

Jim 06:32
Well what one does on a dairy farm, you know, bring the cattle in, feed them clean up after them help with the milking and then you know, run all the machinery, you got to cut you know, plant the crops, cut the hay bale the hay, put the hay in the barn, you know, harvest the corn, you know, either chop it or

pick it or whatever, put it in the silo. So it's a it's a 365 days, you know, a year job. In the summer, it's 12-14 hour days, you know, in the wintertime, it's maybe back to 8 or 10 hour days, but it's a tremendous amount of work, which is why in that era, it was pretty typical for farmers to raise large families because it was, you know, free labor, to be honest.

Jacob 07:13
So I'm actually quite fascinated how you went from a dairy farmer, to the CEO of a company with more than 6000 employees and how did that transition look like?

Jim 07:27
Well, I went to, I went to school to be an engineer, as I said, You know, I was good with mechanical things, and I happen to be quite good at math and science in high school. And I saw what my sister did. And you know, I was kind of looking for that same opportunity. So I went to college. And when I was in college, I was very much attracted to computer science. And there was a program at the time where you could be unclassified for a while You didn't have to pick a major right away at the university I went to and then you could go visit companies in the area and get educated about maybe what your major ought to be. So keep in mind engineering brought me to college. But when I got there, I really fell in love with computer science.

Jim 08:08
And then I went to visit a very famous company, it was actually 3M company. And I remember I went and talked to a manager there. And I said, What do you think about engineering? What do you think about computer science? And this manager said, Oh, I wouldn't go into computer science. By the way, this is like circa 1982-83. I wouldn't go into computer science because there's this new thing called a fourth generation language. And these four GLS they write their own software, and pretty soon we won't need software engineers. So I thought, well, that's pretty surprising. But okay, you know, this is, this is somebody in a famous company, they must know what they're talking about. It's this single, in some ways, the single worst piece of advice I ever got, because of course, from then until now, there was such a massive explosion of computer science and so forth.

Jim 08:57
But what happened is when I went back to school, I said that Okay, I'll do engineering. But what I'll do is computer applications that support the engineering process, you know, computer aided design, finite element simulation, things like that. So I actually studied right at that intersection of where software meets engineering. And of course, the the company I'm CEO of today is a company that produces software for engineers.

Jim 09:20
So it actually funny enough, landed me in a great spot where I learned a tremendous amount in school about engineering and a tremendous amount about computer science. And I use that every day. You know, to this day, I use that same learning, along with everything I learned at the school of hard knocks, of course, and this really helped me I think, to be an effective CEO, I have some fundamental understanding of what our customers are doing with our software.

Jacob 09:46
It's interesting that this was around 82 to 83. And literally, this engineer, three M's said do not go into the field of coding, but it doesn't sound like you listened to him.

Jim 09:56
Well, I back halfway out. You know, my backup plan was To go back into mechanical engineering, so I said I'll major in mechanical engineering. But you know, I'll try to figure out how to bring software. So I kind of had more or less a dual major. I respected what he had, but I didn't completely let it bind me. And it's a good thing because, you know, I'm, I'm actually a much better computer scientist, I'm much more interested in it than engineer, but I happen to understand the engineering domain a lot, because I really did study it quite extensively.

Jacob 10:25
I could find it so interesting that even in 82-83, people were talking about computers that were going to, you know, take jobs away from humans, they were going to write themselves but even an 82-83 It sounds like he was quite wrong, because, as you mentioned, we have in computer sciences, a massive, massive field with lots of demands. So he clearly was incorrect in his, in his mentioning that to you.

Jim 10:50
Yeah, I often say it's probably the single worst piece of professional advice I ever got. And I got it at a time when I was all ears and very, you know, very intense. influenceable and in it all's well that ends well, so I don't have any complaints. But I look back and say he was so wrong.

Jacob 11:07
Yeah he was. For people who are not familiar with PTC, can you give some background information about the company? What do you guys do? How big are you?

Jim 11:16
Yeah, we're a technical software company. We produce software that's used for engineering product for manufacturing products and for servicing products. We're about a billion and a half of revenue. Six and a half thousand employees. Eleven billion dollar market cap, global company. So we really have the who's, who's who manufacturers around the world, everybody from you know, Toyota, Volkswagen, Raytheon, Airbus, you know, you name it. It's pretty good chance they are a customer of ours and we're really again helping do engineering, manufacturing and then you know, field service of, of discrete products and other forms of you know, manufactured goods so large industrial software company.

Jacob 12:00
So what would be an example? Because it sounds like the average consumer wouldn't be interacting with your product. But for example, we would buy something from a company that uses your software to make the products.

Jim 12:11

Yeah, exactly. I mean, I'm looking at my watch here that was modeled, engineered and manufactured with our software. I'm talking to you on a Lenovo ThinkPad that was engineered and manufactured using our software. So our software is not consumer based, it's business to business. But many of the products you'd see around you, you know, everything from Planes, Trains and Automobiles to the appliances in your laundry room or your kitchen to consumer goods you interact with, there's a reasonably good chance that that product was designed and then produced using our software and our software, depending on the nature of the product might still be used to to service and support it after the fact.

Jim 12:54
So customers like John Deere and Caterpillar, you know, heating and air conditioning Companies, as I mentioned, the aerospace and defense companies Airbus, you know, Toyota, Hyundai, Volkswagen, you know, BMW, they're all using our software in different ways, you know, associated with the lifecycle of their products.

Jacob 13:16
Okay, got it. And so as the CEO of a company that has around six, six and a half thousand employees, what is the typical day look like for you? So maybe you can walk us through when you wake up in the morning to when you go to bed? How do you structure your day?

Jim 13:30
Yeah, well, you know, there's pre COVID and then there's COVID timeframes. You know, one thing that's gonna surprise you is I actually live on a farm a little bit back to my days growing up, you know, I really appreciate that lifestyle and so forth. So believe it or not, I live on a on a cattle ranch. Not too far from Boston near kind of in the Boston suburbs. So part of my release in the morning is I get up and I go take care of my animals. Make sure everybody's okay and fed. And, you know, I'll take care of. That's very relaxing to me. That's probably

Jacob 14:03
What time are you up in the morning?

Jim 14:04
Yeah, you know, I generally get up by six between 530 and six. I'm out doing that. And then, you know, normally, I might work out and then head into the office. Of course, in COVID times, there's generally I've kind of missed that head in the office part and I just walk into the office at home, or walk out onto the patio, if it's nice day and start my day there.

Jim 14:25
But, you know, then, when the day is over, I tried to get back home, I tend to make dinner, believe it or not, I'm the cook in the family. So it's kind of unusual, and that's okay. Everybody's their own person. And you know, I have set my life up, the way I like it. And the way my wife and my daughter like it's so everybody's generally happy. But of course, I travel a lot too, in normal times, but in COVID times, like everybody else, I haven't been traveling at all, which is it's nice, but I'm starting to miss it.

Jacob 14:57

And when you are typically in the office, again, You know, pre COVID times, what does your day look like? While you're actually at work? Are you just back to back meetings? Or do you have certain ways that you structure your day as the CEO?

Jim 15:10

Well, I tend to be in back to back meetings, but I would put them in a couple of different categories. One is customer visits. So in our headquarters, we host a lot of companies who are coming in and spending a day with us and, and on a typical day, there's three, four or five different companies here visiting, so I get a lot of energy out of the customer interaction, you know, what are you trying to do? How can we help? Do you have any feedback on our software, if you're using it and trust me, they always do.

Jim 15:37

And then there's a lot of internal meetings, but I'm pretty well blocked all day long. And, you know, I don't mind that as long as it's interesting dialogue. I'm, I'm really still a technology guy. I'm not a bean counter. I'm not the head of operations. I'm really more the vision guy, the technology guy. I'm trying to work with our engineers on the next generations approach they're building, I'm trying to work with our customers on where the company's going and the vision we have for the company. And that stuff's very energizing for me.

Jim 16:08

Of course, I have to review all the financial models and stuff like that, that's a little less energizing, but, but necessary, but I really, I really get a lot of energy from the technical work, which is kind of my background.

Jacob 16:20

What does a CEO actually do? Because a lot of people assume that the CEO just kind of sits at the very top of the company, they kind of just tell everybody else what to do, they sit in your beautiful corner office. And that's the perception that a lot of people have of what a CEO or maybe even a top executive looks like or what they do. Um, what is, you know, if we were to kind of peel that back and give, you know, the real life of the CEO, the real life of a leader inside of a company like PDC What does the CEO actually do? What are you responsible for?

Jim 16:49

Yeah, I mean, I don't want this to sound derogatory in any way, but maybe I'm responsible for herding cats, because there's a lot of people that a lot of initiatives, a lot of programs, a big organization. And I'm trying to keep all of that moving in the right direction generally, so I'm not doing the precise tweaks, but try to keep everybody understanding where we're going. And make sure they're moving in that direction, and they're moving at the right pace. So that, you know, it all comes together each quarter when we're delivering products or projects or trying to make the quarter quarterly results happen.

Jim 17:23

So I'd say a lot of my meetings are just checking in with people, Hey, what are you working on? How's it going? Have you solved this particular problem? Have you thought of this or tried that, you know, to just

keep the finance people moving in the right direction, all the different product lines, you know, the sales, the services organizations, it's really a lot of kind of influence and you know, you don't really tell them what to do you kind of check in and make suggestions and, and try to guide people maybe more than then direct them and I think it it takes a fair amount of energy, and it takes a lot of interaction with people on an ongoing basis. And of course, there's a lot of people interact with the CEO.

Jacob 18:03
Do you also try to make some time for yourself because you mentioned that you're kind of like the vision guy, you think of ideas. But obviously, if you're just in back to back meetings all the time, it's very hard to kind of like sit down and think. So do you make it a habit to give yourself just some time every day to kind of explore ideas and tinker around.

Jim 18:20
I tend to do that more in the evening. You know, dinner's over, cleaned up, spend some time with the family. My wife's off reading the book, my daughter is doing her homework and I'm, I'm on exploring technology. And then I don't know how to say this, but I have a gift, actually. And that is I dream about things. And I wake up much smarter than when I went to bed. I frequently wake up with some new idea or some new tactic to try to solve a problem. And a lot of times I don't even consciously dream of it. But I wake up and I realized I really thought that whole problem through while I was sleeping, and now I can, I can see some path for and again, I call it a gift because I don't try to do that but it's it's really Give me some great ideas over the years.

Jacob 19:02
So how do you balance that though? Because I would imagine that if you if you go to sleep, and sometimes you know, you wake up and you have this like epiphany of this great idea. Sometimes it can be very challenging, I'm assuming for your team. It's like, Oh, you know, Jim went to bed, he's got another idea he's bringing into the office. How do you balance the kind of the dream versus the practicality the reality of it?

Jim 19:25
Well, you know, it's funny that you say that, Jacob, because there is sometimes a joke here that about the time Jim's getting bored with something that really starts to work. And, and maybe it's because, you know, my attention span isn't that long, so I try to be patient. But I'd also tell you having a CEO who's a little impatient, and let's say without a super long attention span, I think it's a good thing.

Jim 19:48
You know, I've been CEO for 10 years now. And the biggest problem with CEOs at my level of tenure is they just become entrenched in old thinkings. You know? They made a decision five years ago. Maybe even eight years ago, and for a couple years, they improved it a little bit. And then they've just spent the last five years tell everybody why it works. And we're not going to change it. And I'm a little bit of a different cut. I say, Hey, we did this. We improved it, it's working. But we got to think about what's next. And then let's not wait until it's not working to think about what's next. Let's some of us start thinking about what we're going to do next, even while this is still working pretty well.

Jim 20:27
And that's why I joke that, you know, sometimes people say, you know, he's getting bored, so it's really gonna start working. And it really means that you know, it's starting to stabilize, and I'm starting to think about what's next because my personality just doesn't have the patience to just ride success. I'm always looking for the next round of changes that would, you know, make us even better or perhaps protect us from some new threat that's headed our way technology disruption or whatever. So I think it's a good quality actually in the CEO.

Jacob 20:55
So I to two questions based on what you said. One is going back a couple of minutes You said that you're obviously in a lot of meetings and you're checking in with people. Do you have a certain way that you structure your meetings or a series of questions that you ask? Or is it just kind of like, Hey, how's it going? Tell me what's up? Or is it a little bit more kind of? I don't know, planned out than that.

Jim 21:16
Yeah, I don't over structure it I think they generally have. They have a similar flow, which is I ask people, you know, to get on my agenda and take me through something they're doing and you know, as they take me through it, I'm typically doing a little bit of the Colombo thing, you know, I'm asking questions and sometimes even the questions start to reveal a little bit the direction I'm steering them in.

Jim 21:40
So I really try to do like, tell me what you're doing. And let me let me ask about it and throw out some ideas as the discussion starts to become a little bit more ad hoc, and so forth, and then maybe try to get some consensus as we're wrapping up about, you know, where we got to take this next, whatever kind of the action items come out of the meeting that we had to go for and so forth.

Jacob 22:01
So it doesn't sound like you specifically tell people what to do all the time you kind of let them come to their come to their conclusions based on the questions that you're asking.

Jim 22:10
Yeah, for sure. I mean, I think that's an important CEO quality, I think, I think a CEO has tremendous power, but almost you dare not use it very frequently. Because it does not, it does not enfranchise people well, it leaves them frustrated and angry, and so forth. So I think it's a much better way to try to collaborate towards some common understanding that can be actioned than to just tell people what the answer is and end the meeting early.

Jacob 22:38
Yeah, makes sense. You don't have to say for a CEO of a 6000 plus, plus person company, you seem very relaxed and happy and not stressed out. You're up in the morning, taking care of animals, you're cooking dinner, I've talked to some business leaders where they cannot find enough hours in the day to do what they need to get done. And so I'm really curious. It is Work is this balance of making sure that

you can spend time with family that you have a life outside of work and important element for you that you purposely kind of designed.

Jim 23:10
Yeah, for sure, I think it needs some mental relief. And I will tell you, maybe I learned along the way, when I first became CEO, I really stuck my nose into everything very deeply. And I was burning the candle at both ends, and I was getting very, very stressed. And then, you know, I sat down with the chairman a couple times and talked through how it was going. And, you know, he and I both agreed that what I should do is focus my energy, where I really bring a lot of value to the table, again, which tends to be around product strategies, marketing strategies, marketing messages, competitive strategies, and so forth. And, you know, let somebody else manage the financial plan, let somebody else manage the professional services, margins, and things like that because I don't need to do that and I don't bring a tremendous quality to it, you know, nothing super unique or special. And at the end of the day, you got to pick your battles, there's just not enough time for a CEO to be in charge of everything. So I got a lot happier after I realized I should roll with the punches and just really add value where I think I have the most value to add.

Jacob 24:18
That's actually great advice. Because I know for leaders, especially for new leaders, that can be a big challenge for them, you tend to just put yourself in all the different buckets, all the cookie jars, and you get burned out and stressed out and you can't be a great leader.

Jim 24:29
Yeah, and with that, there was a time Jacob, when our board used to say, Jim, you don't have to answer every question we ask. You know, because no matter what question they answered, they asked, you know, I jumped in with the answer. And they were like, just just, you know, let the team shine through a little more. And that's really when I when I kind of reconfigured the way I thought about my day, and I've been happier and frankly, the company's done better. So I think it was good move.

Jacob 24:55
Very cool. You also mentioned this idea of challenging and trench thinking which Something that a lot of people struggle with, not necessarily themselves, but they work with people who they believe are stuck in entrenched thinking and they're trying to get them to break free. Obviously, as a CEO, you can just kind of say, Alright, we're not doing that anymore. But for people who work with others, they're not in a CEO position. How do you get people to break out of their entrenched thinking?

Jim 25:22
Yeah, I mean, let me let me share my experience here. First, when I became CEO, you know, the company hadn't been doing that well. And I was a new CEO, I was a first time CEO. And so I basically said, I'm not gonna keep doing what my predecessor did, because frankly, it didn't work that well. So I had to try some new ideas and to make some changes.

Jim 25:43

And some changes were fairly obvious, you know, things that kind of had a no fly zone under the previous administration. And I was saying, No, we're going to go make we're going to go make some changes there. And so what I realized early on, though, is that people don't like to change So many times, you know, I would say, okay, we're gonna change went take a left turn, and we're gonna do all this stuff. And then, you know, some weeks or months into it, I look back and say Where's everybody I mean, they're still back doing what they used to do.

Jim 26:13
And I realized that humans as I said, don't like to change it's really a problem of inertia, you know, a body in motion wants to continue in motion at the same vector and velocity. And, and the only way you can overcome inertia is to apply a force. And the best sort of force is, is a positive force, you know, instead of yelling at people, whatever, try to inspire them, you know, to try something different.

Jim 26:38
So, part of what I did is I set out to change the culture of the company. And job number one was to create a culture that liked change. I mean, to the extent humans could ever like change, but so we we did many things. We adopted some slogans, you know, take a fresh look, man, I don't, I don't know what you do. I don't care what you do, but every once in a while, call a timeout. Step back. Look Around the industry, compare what you're doing to everybody else. And just make sure that what you're doing is still the best way to do it. That's what take a fresh look, meant.

Jim 27:07
Then at one point I had, you know, we had gone through some change, and I realized certain employees were saying, hey, Jim, you wanted us to change, we did change now leave us alone. And then that led to a thing from a place to a pace, which I said, we're not trying to change for this place to that place. We're trying to change from this place, to that pace to that company who changes all the time, you can't pin them down, because they're too busy changing.

Jim 27:34
So this certainly was a lot of effort, put into change, celebrating change. You know, we used to kick off our quarterly employee meetings, by celebrating tenure, you know, people have been here 20 years, 25 years, whatever. And I said we should change that we should recognize people who stepped out, took that fresh look and did something different. And so we started celebrating what we call changemakers. And then that led to a whole series employee recognition programs and so forth, around really celebrating somebody who did something surprising. And sometimes even if it didn't work, hey, at least you tried, you recognize the problem, you challenged it and went after it.

Jim 28:13
And so I think that did change the culture. And then, you know, as we made more changes, actually, the performance of the company was better. And then it became a little bit self reinforcing. And so now, I think we work in a company that really, you know, is afraid to stand still. And, of course, if you're going to be in some of the fields, some of the tech fields that we're in, you don't dare stand still, because the whole field is moving so fast. So I think, I think we found our way to a to a good place with a culture that really sort of pulls on change almost at this point.

Jacob 28:43

So it sounds like if I were to kind of deconstruct the elements that made the change happen, it sounds like one of the crucial elements is you have to make it just kind of a part of the company branding. I mean, you mentioned you, you added those tag lines, those values, so you made it kind of ingrained into what the what the company stands for. It sounds like that's a crucial step.

Jim 29:04

Yep.

Jacob 29:04

Okay. And then the second sounds like you were doing, you were leading by example. I mean, you were, you know, living what you wanted other people to do. And then the third, you mentioned, doing it in a positive way. So not screaming at people not yelling at people, but kind of encouraging them and helping them understand,

Jim 29:23

celebrating all the successes, and you know, even celebrating the failures where there was a real attempt to try to solve a difficult problem.

Jacob 29:30

And anything else besides those three criteria that you think were effective, or is that kind of a good summary of those?

Jim 29:36

That's a pretty good summary.

Jacob 29:38

Okay, cool. So I want to also go back to something else that you mentioned earlier, before we jump into some of the more work related stuff. You mentioned that you also learned a lot from the school of hard knocks. And so what is what does that mean?

Jim 29:54

Well, you know, I've, I've worked for companies along the way that have struggled my Italy, some of them more or less going out of business. And, and even you know, I was acquired into PTC, I'm skipped that part. But I had started the company and PTC acquired it. And when I came in, PTC itself had many problems. But of course, the business I brought in was doing quite well. And I hung around and I took the attitude that there's a lot of goodness here to work with. We just got to solve the problems.

Jim 30:26

And we shouldn't run away from the problems we shouldn't quit, you know, shouldn't go find another job, we should try to solve these problems, because I think they're solvable. And so, I've worked in a lot of companies during periods when they weren't doing well at all. And I didn't run away from it. I've

always taken the attitude that a problem is an opportunity inside every problem you solve is an opportunity to do better. And, you know, I'd hate for work. I'd hate almost to work for a company that didn't have any problems because I'm not sure what we do every day. Right, because these are the opportunities we're going after.

Jim 30:59
So I just think that learning persistence, around, don't run away from problems. Don't be afraid of them, own them, look for creative solutions. Think of them as opportunities. You know, one of the things I say to my colleagues is there's a reason we call it work. You know, if all we did was fun things all day long, we'd call it play. But we call it work because we come to work to solve problems to create value. And let's not be afraid to do that. And let's not be down about it. Let's, let's be excited if we see a problem, and we think there's a solution there because, you know, it's going to add to the share price is the growth, the profit, whatever it takes, when we solve that problem.

Jacob 31:36
Yep, no, I totally agree. Okay, so we talked a little bit about that. So it sounds like the Hard Knocks for you went through you were a part of organizations that were going through some tough times.

Jim 31:47
Yeah.

Jacob 31:48
Do you have a story that comes to mind of maybe when you when you got a black guy or bruised ego through one of these organizations, anybody ever, ever yell at you or put you down have any bad Leaders anything popped into mind?

Jim 32:02
Yeah, I mean, there was a, one of the earlier CEOs of PTC took me to task one time because, you know, he, he asked me, basically asked me for a miracle put me in charge of delivering a miracle and and I said that I don't think that can be done but I'm sure gonna try and I tried and we failed and he looked bad. And he was angry. And he took me to task and it's probably the closest I ever came to leaving because I said, Hey, I'll put up a lot of crap, but I don't want to get beat up. Because I delivered a good result. That wasn't a miraculous result. Right? That's, that's not worth doing. But fortunately, the board intervened and I stayed and he left. So yeah, it ended well.

Jacob 32:48
Well, it's actually interesting because it sounds like you and I feel like a lot of employees sometimes have a hard time with this kind of standing up for themselves sometimes, especially when it's to somebody who's more senior. I don't suppose I don't know if you have any advice for that. But if you do have a leader who's asking something of you that is maybe not attainable or not possible. And you know, you're kind of going into a situation where there's just no way that you can come out looking good on the other end. What do you do? I mean, can you, you know, you talk sense into the leader. I mean, like, how do you manage that relationship if that happens?

Jim 33:24

Yeah. You know, some of my military friends characterize this as speaking truth to power. They have the power, you have the truth, and you have to say it, you have to say, That's not possible. You know, I'm gonna try. I'll try to do practically anything, but you can't ask me to do something that can't be done, or can't practically be done. Because we know how the story is gonna end.

Jim 33:46

And that's a little bit what happened in this situation is I was I was asked to do something that was virtually impossible, you know, in terms of business results. And while we had pretty amazing business results, they weren't the they weren't the miracle I was asked for. So I think you do have to speak truth to power. And if, if the power is going to be, you know, entrenched in its ridiculous views, then then it is time to leave.

Jacob 34:11

Okay, good. So I'm gonna shift gears a little bit and just get your general perspective on workforce trends that you're paying attention to. So there's obviously a lot that's happening in the world of work. I know that you have written and talked a lot about technology, and specifically augmented reality. So we can touch on why you think that's so crucial. But first, the big picture, when you look at just workforce trends in general, what are you paying attention to?

Jim 34:37

Well, I think digitization in all forms is what we've learned from COVID. You know, things that could be done digitally, have continued forward and things that couldn't be done digitally, have kind of ground to a halt. And maybe if I could just segue from that, you know, when I look at the global workforce, and I'm thinking about people and about business opportunity for PTC here, about three quarters of the people in the world are what you would characterize as frontline workers. They're out there in the world, they're using their hands and feet, they're, they're doing things in the physical world that can't be done on computers.

Jim 35:11

And then the other roughly one quarter really are sitting on a computer all day. And digital has done amazing things for knowledge workers who sit behind a computer all day. Because if you sit behind a computer, well, doesn't matter if the computers in the office or computers at home, you get a lot of work done. But if you're somebody who goes out in the physical world, and now you're not allowed to, or your support infrastructure isn't there, then suddenly you have a big problem. You know, you're either laid off or you're unproductive or what have you.

Jim 35:42

So I'm looking for ways to take digital from the realm of knowledge workers not to take it away from them, but to expand it over to the realm of frontline workers. And again, in order to do that we have to take computing off the computer screen and put it in the real world. That's what augmented reality is it's augmenting the real world with digital information. So now people that work in that real world can get digital information as they work, and can be guided with that information in very powerful ways that

makes them more productive. They make fewer mistakes. And it really just kind of unleashes more of the human potential that everybody has.

Jacob 36:24
Give me examples of how that's being used, or where you even see this going in the future, maybe the next 5-10 years.

Jim 36:31
Yeah, let me let me start with sort of an abstract example and then maybe apply it a little bit more. So first of all, I like to think of augmented reality is a technology that takes digital information, let's call it bits and bytes, and it turns it into sounds and sights that appear in the physical world.

Jim 36:51
So an augmented reality device like a HoloLens or even a phone or a tablet, converts bits and bytes, which a human doesn't understand to sounds and sights, which we do understand we have senses for that. And then vice versa, it converts sounds and sights back to bits and bytes. So to me, an augmented reality device. Let's think of a HoloLens is like a modem that converts from Digital protocols to human protocols, and allows that information to flow seamlessly in both directions.

Jim 37:20
So let me give you a kind of a fun example. And then I'll get to more realistic examples. Let's say I wanted to play chess and I wanted to play amongst the best chess masters in the world. And I'm going to focus on this guy, Garry Kasparov, a really great...

Jacob 37:35
First of all, do you know that I am obsessed with chess, or is this purely coincidental?

Jim 37:39
Purely coincidental. You see the chessboard behind me? Yes, I do actually know.

Jacob 37:43
I take chess lessons from a grandmaster. Yeah. So I love where this is going.

Jim 37:50
Yeah. So now I'm not that good at chess. I just never applied myself enough to it. And it takes a long time to learn, right? So if I wanted to be able to play with it, Great chess masters, I'd have to study this for many, many years because I have to keep it all in my head, all the patterns and algorithms and you know, experiences I have to remember all this and it has to become innate almost.

Jim 38:13
Now, meanwhile, IBM came up with this computer, you know, a decade or more ago called Deep Blue, that if Gary agrees to play on the keyboard, Deep Blue can regularly beat him now. Okay, but Gary has to play on the computer like a knowledge worker. So how about if I take a HoloLens and I agree, I'll meet Gary at any Starbucks, you want, Gary, just tell me where and when. And I'll show up. And I'm

going to put on that HoloLens. And that whole lens is going to be connected to deep blue. And even though I don't really know how to play chess, all I'm really going to do is action, the information, that deep blue is giving me move this piece to this square, move this piece to that square, and I'm going to start beating Gary on a regular basis and people are gonna say you're a tremendous chess player, I'm gonna say no, actually, I don't even know how to play, I was just collaborating with that AI machine in the cloud that was giving me information just when I needed it.

Jim 39:09
And I didn't study chess at all. I just kind of action, that information that was supplied to me just in time. And in the context of the chess game in the Starbucks, I'm I'm in right now. So augmented reality is a way to replace the whole learning process and take it from in advance just in case learning, which is what we've all had to just in time in full context, information being supplied to you. And that just unlocks incredible superpowers for people because suddenly they can do so many things, because they can be guided with information in the moment and never having studied or mastered that stuff in advance.

Jim 39:49
So it to me is an incredible technology now. I'm not really trying to solve the chess problem. I'm trying to make industrial companies more efficient, and so they Have workers in factories trying to, you know, do parts of the production process, they have workers out of customer site installing and setting up, you know, installations of equipment or whatever the product is. And they have people on service calls, trying to keep the machines running and tuned in, you know, replace spare parts and so forth. And we can deliver so much information to those people using augmented reality.

Jim 40:26
And again, we can actually make humans so much more productive. And you even start thinking about does automation make as much sense as it used to? You know, we used to say humans aren't productive let's replace them with robots. But you know, robots have huge setup times and humans have very short setup times. But humans lack the knowledge of what to do so if we could give them the knowledge take advantage of their short setup times like I'll meet you at any Starbuck you want doesn't take long. It's a powerful combination of the best of human and the best digital working together in a collaborative way using augmented reality.

Jacob 41:01
Well, you know, um, so augmented reality is obviously been around well talked about for a while. And then the there's a lot of hype around it a lot of excitement around, it feels like you kind of plateaued maybe went down a little bit. Now it's kind of picking back up. Where do you think we are kind of in the augmented reality scope? Like how long would it take before this becomes mainstream? I know there are a couple of companies sort of experimenting with it. But we're What do you think we are in that time horizon?

Jim 41:26
Yeah, well, let me first tell you, we at PTC have thousands of industrial customers using augmented reality today in various stages. I mean, they're all fairly early. But the big thing to me is you need that

device that acts as your modem that can see the same world you see and convert digital information into things you see and hear.

Jim 41:48
So, you know, I mentioned the HoloLens, but what's democratized it incredibly is the phones and tablets we have and the incredible cameras they now have. So I think reality now runs pretty darn well on phones. The only shortcoming is it ties up your hands. So if you got a wrench in one hand and a part in the other who's going to hold the phone for you, and that's really to me where Okay, HoloLens is kind of like a wearable phone that that I can see the same information while holding the part and the wrench.

Jim 42:20
Now, I think we're on the brink of wearable devices getting a lot better. You know, the HoloLens two is much, much better than the HoloLens one, you know, various different companies are, in fact, a lot of companies working on even the next generation yet of wearables, you know, Apple's rumored to be working on it. Google, of course, has had Google Glass and they keep working on the next iterations. Magic Leap is something there's a number of Chinese companies working on it. So I think I think we're on the precipice of there being wearable devices that feel like a pair reading glasses or sunglasses, but then deliver all this digital information just in time in full context.

Jim 43:02
And you know, what we're trying to do at PTC is have all the software ready, because those devices won't mean much if we don't have the software and the data. So we're using phones and tablets and a lot of cases to prepare the information, but we'd rather deliver it on on wearable devices. I think the next two to three years, we're going to see a big spike in, you know, advancement of wearable devices.

Jacob 43:25
So for the wearable devices or for augmented reality, is this something that you mainly just see for people who, as you mentioned, are frontline workers or are there any applications of this for people who do work behind a computer or screen?

Jim 43:37
Well, you know, the problem I'm focused on I mean, I think augmented reality can mean a lot of things to a lot of people and obviously could mean a lot to to consumers. But the problem I'm focused on is how to make humans more productive, you know, in my customers, which are those global manufacturing companies, but let me say, you know, frontline workers are also in hospitals they're doing surgery. They're nurses and doctors, you know, they're in stores, they're in warehouses.

Jim 44:04
So there's lots of different applications of this technology. I think, you know, knowledge workers can also use AR, but meanwhile, they have something. And the problem is frontline workers don't have anything. So I think that augmented reality gives frontline workers the equivalent to zoom. Because instead of having a meeting, like you and I are having right now, where we see each other on the

computer screen, you can bring information into the physical world around me and actually decorate dynamically in a in a conversation, decorate the world and say, See this part, Jim, that's the one that you've got to replace. And I say, Okay, I understand because you marked on the actual part on the machine, crystal clear what you want me to do and you're talking to me in the meantime, if you mark on your screen that doesn't do any good because when I'm looking at your screen, and I turn and look at the machine, I don't get it. You know, I can't make that map.

Jim 44:57
But if but if I'm using if I I'm using my phone to look through the phone at the machine and I see you marked up on the machine while we're talking. Okay, that's clear. So AR is the equivalent to zoom or teams or WebEx or whatever. AR is also the equivalent to YouTube. You can make a YouTube video showing me how to do something. And again, it's good because I can study the video and study what you did. But the settings always wrong. You know, maybe you're explaining to me a bake bread but you made in your kitchen and my kitchen is not like that. So what AR does is it separates the foreground from the background, and then sort of repins the foreground the information in the background you're in. So it'd be like you explaining how you make bread, but you're explaining it in my kitchen. Oh, wow. That's incredible.

Jim 45:46
But again, through augmented reality, and then publishing till you know, all the all the stuff all the technical documentation we publish in PDF could again be published instead in the real world instead of on 2d paper. You know, on the on the 3d world, come over here, look here, do this. Okay, now come over here, you know, look here do that, we can do that all with augmented reality.

Jim 46:09
So I sort of say AR gives us the equivalent of zoom YouTube and PDF, but in the real world, and that's an incredible breakthrough that, you know, literally billions of people can benefit from around the world. So I'm excited about that.

Jacob 46:26
Fascinating for sure. Okay, so besides augmented reality, what are some of the other broader workforce trends that you are paying attention to

Jim 46:35
So others, you know, would be remote work, remote monitoring, remote diagnostics, so you may know we have a big business in Internet of Things. And let me again, qualify that maybe as industrial Internet of Things. But, for example, all these medical device manufacturers have all this equipment around the world right now is working furiously trying to come up with a vaccine but you Know that equipment has to be monitored. And, and sometimes there needs to be an intervention either to add new consumable products to it or, or perhaps it's drifting out of spec or whatever, we can manage that now, remotely by using Internet of Things to collect sensor streams and to analyze what's going on and apply some AI and machine learning and, and then cause an alert to happen and, and maybe I either log in remotely and tweak the machine or else perhaps using AR, I call on somebody who's near the machine and ask them to intervene with maybe some of my guidance delivered through through AR.

Jim 47:37

So I think the whole notion of separation. And then if you take those two ideas and put them together with other ideas, you get what I call spatial computing, or what we call spatial computing. Spatial computing basically says you have a 3d replica of a worksite you know, digitally and you have an understanding digitally of what the machines or assets. And what the workers are doing. This could be a hospital, it could be a grocery store, it could be a warehouse could be a factory. And you're now able to virtually interact with the digital twin, and have those interactions passed back into the real world.

Jim 48:18

And of course, the real world reaction to those interactions captured again, the digital twin, so it's just virtualizing everything, but in a real time, hyper realistic way. So I can go walk the halls of a factory, from my office at home. And when I'm done walking the halls of that factory, I'll go walk the halls of the next one is if I were there, seeing what's really happening, but also seeing data and being able to interact with the machines and the workers using IoT and AR technologies.

Jim 48:47

So I think virtualization of work is a is a huge deal that will get a great acceleration because of COVID. But it's an idea that was coming anyway and COVID is just a big acceleration of this idea.

Jacob 49:00

That's fascinating stuff. I know that you've also talked about things like the ageing workforce skills, gap, things like that. So what Where do you stand on that? Maybe we can start with the skills gap. Would stuff like augmented reality help close that? And how could you do that now

Jim 49:15

For sure and you know, particular here in the US, I'd say other Western countries have the same problem. But here in the US, the demographics have changed, such that we no longer have a lot of those frontline workers, particularly in the industrial world. People didn't go into this line of work because it felt like it was going to China in many cases it was and it wasn't cool enough, and so forth.

Jim 49:38

So right now, if you go into your factories of great American manufacturers, you see a lot of fairly older people in there, and they're all moving toward retirement and they're having trouble finding people to come in and backfill them. And there's kind of two problems. One is getting somebody to take that job, but the second one is trying to transfer 40 years of knowledge from the person who's about to retire to the newbie who's going to supplant them.

Jim 50:04

And so AR can play can play a huge role. Because for example, we can capture the expertise of the retiring worker, that kind of AR YouTube idea. We can capture that expertise, store it. And when a new worker shows up through a Hololens, or phone or tablet actually redeploy that coaching that's been digitized into the physical environment for the benefit of the new worker. So the new worker can be

coached in the actual environment by somebody who retired two years ago. It's just a very powerful idea.

Jim 50:41
And in the US, the National Association of Manufacturers is tracking the workforce shortage and they say that in the manufacturing world, this is the the US manufacturing Organization says that over the next 10 years, we'll have a shortage of 2.8 million frontline workers in the manufacturing

Jacob 51:02
Crazy.

Jim 51:03
It is crazy. And in fact, you know, some of the things that are happening in the world actually threatened to make that worse, you know, there's suddenly a huge amount of re-shoring discussion happening. Maybe we should bring our production back from China or, or Asia or whatever and bring it back to the US. You say, okay, great idea. We can sidestep those trade wars and maybe get some safety from supply chain disruptions like we saw last year. But how do I find these workers? How do I convince them it's interesting work? And then how do I train them and make them productive?

Jim 51:34
In a lot of companies think the answer. That's augmented reality, because again, it allows you to capture experience as bits and bytes and then inject that experience into a workers frontline work environment, as sounds insights at the appropriate time.

Jacob 51:49
Yeah, it's fascinating stuff. I mean, it really is. So you mentioned you were talking a little bit about talent. I'm curious. So what do you do what is PTC do as a company to attract and retain top talent? What does it like to work there?

Jim 52:01
Yeah, well, I think part of its culture, part of his work, obviously, some of it is compensation, part of its location. So, you know, again, I got to think, pre COVID and post COVID, because I think this will change it. But, you know, we moved our headquarters actually down to a very exciting area in Boston here. In my little conference room right now at the headquarters.

Jim 52:26
We came here because, you know, the workforce we want to hire tends to be younger as you would expect, fresh out of college full of good ideas, especially cutting edge ideas around things like AR and spatial computing, and IoT and AI. They don't want to work in the suburbs. We used to have a big campus in the woods on a lake in the suburbs. And you know, I quite liked it, but I realized the new workers don't like it at all. They say, Jim, I don't own a car, and I don't want to buy one. And I can't easily get here with mass transit. So I don't like this job.

Jim 53:00

So I think locations part of it culture, obviously, you know, you you have to have an environment with it has purpose and, and it has to be some, you know, attractive elements of the culture overall. I think the work you do, you know, people are picky. The best people really want to build their careers, and they want to build their careers around exciting cutting edge technology. So I think it's a lot easier for us to hire like the best and brightest out of MIT, for example, into our augmented reality technology, rather than maybe into some of our older technologies that are 20 years old or whatever.

Jim 53:36

And then, you know, obviously, compensation people are looking to, you know, get paid And do well and get going on career. So I think, you know, I've been in situations where I didn't have any of those elements, and now I have a few of them working in my favor, and it's, it's been great. Let me just say I think COVID changes it because if we're going to work from home a lot more, then that's going to be a different consideration. Although I think I think we'll end up at some place that's halfway between where we used to be and where we are now in terms of when do I work in the office? When do I work from home?

Jacob 54:10

That was actually gonna be my next question is so as a result of COVID. And there's been a lot of debate on this side, I live in the Bay Area, for example. And some people are saying, I, you know, the Bay Area is gonna get crushed. Nobody's gonna work for companies in the Bay Area. People are saying the same thing about New York. What's your thought on this? Do you think after we get through COVID things we'll get back into being in the office? Or are we seeing like permanent long term change the destruction of headquarters in these big cities where everybody used to work?

Jim 54:40

Yeah, I think we'll get we're going to go roughly halfway back to where we used to be. And I say that because you know, when COVID started, I got sent home, everybody got sent home. And we were amazingly productive. But you know, over time, the fatigue has set in. And the fatigue of not running into people in the hallway not having social interactions. You know, if I want to talk to somebody, I have to arrange a zoom or a team's call with them now, where I used to just walk over their desk and spend 30 seconds and then leave. And now I have to schedule it. And, you know, it's a different thing, and I don't think it's sustainable.

Jim 55:16

The other thing is, you know, when you're hiring people that doesn't really work that well, I don't like hiring people and then never actually meeting them face to face, or working with for months and months and months. And you know, you still not have never actually met them. So I think that we probably could do more work from home than we used to. But I think companies will have a very difficult time sustaining the high level of work from home we've been doing during the COVID period. I just think it's unhealthy actually, for work cultures.

Jacob 55:46

Well, so is the CEO, PTC, are you planning on making any changes as a result of COVID whether it's around workplace flexibility or anything like that?

Jim 55:55
Yeah, for sure. We had a official policy pre COVID that Employees can work from home one day a week. And we're probably gonna change that to three days a week. And then we're going to revisit our real estate. Now, I don't think we're gonna get rid of offices, you know, headquarters and regional headquarters and so forth. But I think we'll try to set them up differently. And we might need less space.

Jim 56:20
Because, you know, if you use hotelling, and open office concepts, then you can size the office, not to the employee base, but to how many employees you expect to be there in a given day. And I think that, you know, if people work from home half the time, basically you need, you know, half the space or perhaps a little more, but, but I think we're going to definitely try to optimize the layout in the quantity of square footage we have in our offices and give people more flexibility to move back and forth.

Jacob 56:48
But it doesn't sound like you think offices are going to disappear.

Jim 56:51
I don't think so. Because I don't know about you, I actually missed the office.

Jacob 56:55
Everybody I talk to says that.

Jim 56:57
I have a perfectly nice office at home. I'm Miss the people, I miss the people I work with and, and I miss socializing with them and interacting and collaborating. And all the little stuff that like I said happens in 30 seconds doesn't happen anymore. And it's frustrating, you know, the laughing and the joke making and so forth. It doesn't that doesn't really happen over zoom calls. They're way too structured in pre planned to accommodate that.

Jacob 57:22
Have you found that your leadership has changed at all in a virtual remote world? I mean, how are you said, You're the vision guy, you know, you can get your, your, your dreams, your all these things across to your people. And I would imagine, it's very different to do it behind a screen than when you're kind of in a room with everybody and you can kind of present and share ideas. So has your leadership, your communication styles changed at all?

Jim 57:45
I'm like the biggest whiteboard guy you ever saw. And that really doesn't work in a zoom call. You know, zoom teams, WebEx, whatever you want to whatever you want to go with. And yeah, they might even have a function for that, but it's just not the same.

Jim 57:58
No, it's not the same.

Jim 57:59
It's not. Nobody can see what you're writing and, and you got all the people and the only way you can see the screen is get rid of the people. No, you can't see the people and, and so forth. So yeah, I mean, that's a classic example of something I hate about zoom calls is I just don't have a whiteboard. And I, I was that guy who would you know, many, many, many meetings would jump up and start start collaborating, brainstorming actually visually on the whiteboard, and I can't do that anymore.

Jacob 58:26
Well, I know we just have a couple minutes left. So last few questions for you before we wrap up. First one is, can you think of a moment or situation that most impacted or influenced your career or your approach to leadership?

Jim 58:41
Yeah, I mean this is this is kind of a funny one, but a weird one, perhaps. But when I graduated from college, I was actually a very shy guy. And I'm pleased that you said I seem relaxed now because I was actually very, very shy. And I wasn't isn't the kind of person who would stand in front of the group and say, here's what I think, here's what I think we should do. You know, here's my argumentation for it. I knew all that stuff, but I just couldn't get it to come out.

Jim 59:11
So anyway, I just like built up my confidence. And you know, the presentation went just fine. And I was never nervous again. And then I take that into other aspects of leadership, you know, maybe just be confident in yourself. Because that was my problem is that I thought somebody would laugh at me or ask a zinger question I couldn't answer or something like that in, in in really after mastering it that one perilous moment there. Ever since then I told myself You have nothing to worry about. Just be confident in what you know and what you think. And you're not always right. But But don't be afraid to express it.

Jim 59:12
And I remember, the boss scheduled me to give a presentation to a just an internal group, and I was so intimidated. And, you know, just spent the whole night before like, what am I gonna say? How am I gonna? And then finally, I said, you know, I'm asked to do this, because I'm talking about something that I figured out, and the audience hasn't figured it out. And I'm being asked to explain to them what I figured out. So why should I be worried about it? You know, frankly, they're the ones who are, you know, needing this information. I'm asked to give it to them, because I somehow figured it out.

Jim 59:49

And I think I really emerged as a leader then because went from that shy guy who's smart but can't talk to really somebody who can kind of light up a room and develop some followership to go driving initiative forward. And that was just an incredible moment in my in my career.

Jacob 1:00:43
I love that story. That's an awesome one, and it actually transitions on to the next question I was going to ask you, which is for leaders, those who are in a position where they are responsible for other people. What's the best piece or the one piece of advice that you would give them to become better leaders something that perhaps you've tried That made you a better leader?

Jim 1:01:02
Yeah, I mean, I think I think it really comes back to the idea of followership, I mentioned that word. But you know, a leader and a manager are two different things. To me, a manager has given some authority or some remit, and they can use that as they need. But a leader, there's no such thing as a leader, without a follower, you know, like one person can't play follow the leader because there's no followers, and therefore, there's no leader.

Jim 1:01:28
So I think that the best leaders that I've worked with and the ones I've tried to emulate, really have this quality of convincing people to follow them to support their initiative, to pony up the resources to do what we believe basically, and they spend some time you know, trying to sell their ideas and so forth, but but they're very careful with the whip, so to say, because that does not create followers that creates people despise you and so I think you know, like at PTC. When I wanted to lead the company into IoT into AR, I wrote all my ideas down and went so far as to get them published in Harvard Business Review with in collaboration with a famous Professor Michael Porter. And, and, you know, I mean, people read that, and they said, Wow, that's incredible. And it actually, it's good enough that you got published in this very famous business magazine. And, you know, I like what you have to say, I mean, tell me more, Jim. Because I'm very intrigued by your ability to think this stuff through and articulate it and so forth. That's just one example of, of how to do it.

Jim 1:02:37
But passion is another, maybe get some sense for me. I'm very passionate about things I really do care about. I care deeply and I get a little bit emotional, usually in a good way. But you know, people say, Wow, he really believes this. He's not just saying it. He believes it. And because he believed so deeply, I believe it a little bit more than I did five minutes ago, right? So I think I think it's really that whole concept of develop followers who you know want to help you take the hill, whether you demand they do or not they want to help you because they believe.

Jacob 1:03:11
Yeah, and there's a big difference between just saying something versus saying it and believing it at the same time. So I definitely get that for you. I can I can see the passion in there behind the scenes that you're talking about. Well, we are at the top of the hour. So Jim, why don't you let everybody know where can we learn more about you or PTC? Anything that you want to mention for people to check out, please feel free to do so.

Jim 1:03:34

Well, you know, the best, best place to learn about PTC of course, is our website PTC.com is pretty simple. You know, if you want to if you want to learn more about me and my ways of thinking, either Google up these Harvard Business Review articles that I've written, really, three of them now with Professor Porter on IoT, and AR things related to that.

Jim 1:03:56

And then, you know, go on YouTube and you can watch I've given many keynote addresses over the years and usually do a good job of trying to lay out the vision as I see it at the moment, you know, and evolves over time. But those are great places to see how I think and how I talk and maybe see some of the passion that I that I try to bring to work every day. So that's what I'd recommend.

Jacob 1:04:18

Very cool. Yeah, you're pretty easy to find, by a Google search, so not too bad. Well, Jim, thank you so much for taking time out of your day to speak with me. I really appreciate it.

Jim 1:04:28

All right, great. Thank you, Jacob.

Jacob 1:04:30

And thanks, everyone for tuning in. Again, my guest has been Jim Heppelmann, CEO of PTC. I highly recommend you Google him, check out some of his work, you will not be disappointed and I will see all of you next time.