

*Patrick Fine:* Hello, I'm Patrick Fine, CEO of FHI 360. Welcome to the *Deeper Look* podcast. Today, I'm speaking with Ann Mei Chang, an executive leader at the intersection of innovation technology and global development. Ann Mei, thanks so much for being here today.

*Ann Mei Chang:* Thank you for having me.

*Patrick Fine:* For our new listeners just joining us, we've been discussing the sustainable development goals, or the SDGs, this year. Today, we're going to be talking with you about how innovation is critical to achieving these goals. And it's a perfect opportunity to chat with my guest, Ann Mei Chang.

*Patrick Fine:* Ann Mei served as the Chief Innovation Officer and the first Executive Director of the U.S. Global Development Lab at USAID. The lab is the newest bureau at USAID and leverages 21st century advances in technology and innovation to accelerate the impact and scale of global development. Before that, Anne Mei was Chief Innovation Officer at Mercy Corps. She's also worked at the U.S. Department of State. She started in the private sector, as an engineer at Google. So, Ann Mei brings a great combination of perspectives, from the private sector and the public sector and the nonprofit sector, looking at how you mobilize innovation for social good.

You've established yourself within the development community as one of the leading spokespeople for the notion of innovation and of scalability. When you think of innovation for social good, and innovation in the context of global development, what do you mean by that?

*Ann Mei Chang:* That's a great question. You know, it's, it's been fascinating for me, coming from Silicon Valley into the global development sphere, how much talk there is about innovation, how much interest there is in innovation. I think every organization now has some kind of innovation team, has innovation somewhere in their mission statement, and so there's a lot of appetite, I think, with the recognition that we have problems that are way beyond our grasp, and that we need innovation to come up with better solutions.

At the same time, what I've also found in the global development sphere is there's not a great understanding of what innovation really is. I think people have reduced innovation, in many cases, to invention or new ideas, which I think of as the first 1 percent of innovation. That you absolutely need it to generate a lot of ideas, but unfortunately, of all the ideas that I've seen generated through these innovation initiatives, very few of them have reached any massive impact at scale.

And so, what I've been really interested in is that other 99 percent. If you think of the Edison quote of, you know, genius is 1 percent inspiration, 99 percent perspiration. It's that 99 percent perspiration that I think is so critical to really drive innovation, and that's beyond the good idea that you start with, but really looking at the long, hard work that you need to do to refine that idea, to test out different hypotheses, to understand your markets, to build a business model, to build infrastructure, to build teams and to be able to really scale.

*Patrick Fine:*

What do you think is the obstacle to organizations that are working in the international development space, or the human development space, from pursuing that kind of agenda?

I mean, at FHI 360, we have an innovation agenda, so all of the organizations that are working in this space are thinking about innovation, are saying, "We need to be more innovative. We need to try out new things." And, at least, speaking for our organization, we do a lot of experimentation. But what do you see as the obstacles that are keeping organizations from going from experimentation to actually application of scalable ideas?

*Ann Mei Chang:*

One of the biggest challenges, I think, is the funding structure that international NGOs operate under. The funding that NGOs live and breathe on is often not very risk-averse, not very tolerant of failure. And it's also often very rigid, where you respond to an RFA or RFP, and you have to put forward a design up front, and then you're expected to execute on it. So, there's not a lot of room to try out different things and figure out, you know, throw spaghetti against the wall and see what sticks.

*Patrick Fine:*

Right.

*Ann Mei Chang:* I think there's also just a different skillset that's required for innovation, that's different than some of the talent that we have in the international NGO space, which has a lot of deep sector and local knowledge, but not necessarily a lot of experience with this sort of rapid iteration and technology and so forth.

*Patrick Fine:* What does that skillset look like?

*Ann Mei Chang:* You know, someone who really has the appetite for taking risks, for trying things that, you know, are in the unknown, that they don't know if it will work or what won't work. And an engineering mindset of really the scientific method of testing out a lot of different ideas. You know, Edison, reportedly tested out, like, 1,000 filaments before he figured out the one that makes our lightbulb today.

*Patrick Fine:* Which turned out to be cardboard, by the way. *[Laughter]*

*Ann Mei Chang:* But it is that rigorous testing, getting data, driving feedback loops, and iterating and improving over time, understanding how to build business models that really can drive overall growth and scale. Because that's not how the nonprofit sector has traditionally worked: We don't always have people with the skillsets who have thrived in this world before. I really think the most innovative teams are those that draw from a diverse set of backgrounds. So, you absolutely need the people who understand the sector, who understand the programs that have come before. But, you also need the engineers, you also need the businesspeople, you also need the entrepreneurs. And I think it's in bringing together these different diverse perspectives that you get the best solutions, and that you really are able to see around corners that none of them can see individually.

*Patrick Fine:* Yeah, I, I agree with you, and I think one of the big constraints to assembling those kinds of teams, or providing the time for people to do that kind of work, is a financing obstacle. Because I think of our organization – we've got people who are creative, who are very entrepreneurial. They really are passionate about the work they do, and so they will put their heart and soul into doing it, and into searching for opportunities that will allow them to take forward ideas. But that's constrained by a financing model, or a business model, that is very prescriptive, and that doesn't tolerate failure, so

you get punished for failure. And that doesn't really provide the kind of discretionary resources to allow that kind of undertaking.

*Ann Mei Chang:* Yeah, absolutely. When you think of the health of a corporation, one of the measures that Wall Street takes to look at whether a corporation is headed on the right track is their investment in research and development. If you're not investing in research and development, the stock market will think you're mortgaging your future, you're just going downhill from there.

*Patrick Fine:* Mm-hmm.

*Ann Mei Chang:* Whereas, in the global development space, we don't value that investment in research and development.

The funding mechanisms don't provide the sufficient funding to allow for that sort of forward-leaning research that will yield better results in the future but may not yield better results tomorrow.

*Patrick Fine:* Are there things that we should be doing to change that, to get funders – whether it's foundations, or whether it's public sector funders, or whether it's corporate sponsors – to buy into that vision that, in the realm of human development, there needs to be research and innovation, as well?

*Ann Mei Chang:* Yeah, I think we're slowly and surely seeing progress on that front. At the Global Development Lab, we had funding mechanisms such as DIV, or development innovation ventures, and then the global innovation fund, as well as our grand challenges, that really tried to encourage that type of research, through prizes, through this kind of tiered, evidence-based funding. That provided a different type of funding that was much more supportive of innovation than your traditional monolithic grant.

*Patrick Fine:* And what kind of reaction did you get to that from the groups that were competing or accessing those funds?

*Ann Mei Chang:* Yeah, we've seen overwhelming interest, in fact, we can't keep up with the level of interest. We have gotten thousands of applications, and often from new players that typically can't access those large grants. We're getting more engagement from social enterprises, from corporations, and also from local innovators and

entrepreneurs in the developing countries themselves. I was very excited that, in a recent call for proposals for the Securing Water for Food Grant Challenge, I think it was something like 75 percent of our applicants came from developing countries.

*Patrick Fine:* Yeah, that's fantastic. And that opens up the field to a whole new group of actors that have felt excluded in the past.

*Ann Mei Chang:* But, unfortunately, these types of vehicles are still very much in the minority.

I think we're showing that it's possible, and we're showing what you can achieve by doing it, but we haven't yet transformed the majority of how development funding works to really incorporate innovation in a more holistic way.

*Patrick Fine:* So, in the nonprofit or the public sector, is it possible to scale innovations?

*Ann Mei Chang:* I believe it's absolutely possible. And we've seen it in a very small number of cases, but I think it shows the path for how it can happen.

*Patrick Fine:* Okay, so what's that path look like?

*Ann Mei Chang:* So, I think there's a number of different paths. One of the reasons it's harder than the private sectors is, you know, private sectors, there's one path: You keep making money, and you keep growing, right?

*Patrick Fine:* *[Laughs]*

*Ann Mei Chang:* In the international NGO space, I think there's a number of ways. So, one is, absolutely, that you can make a profit, but, and you can have a market-driven business model. Often, it requires some concessionary funding up front, so one of the solutions that I'm really excited about is the work that we've done with off-grid household solar, that's used as a pay-as-you-go business model, and through mobile money. And we provided a lot of the concessionary funding with that upfront, with DIV, to have them test out the business model.

But, after we gave a total of about \$6 million in grant funding, to kind of bootstrap the organization and build up the business model, they've since been able to bring in over \$100 million in private debt and equity. And not only that, but there are also a number of other organizations that are also scaling and reaching hundreds of thousands of people, and so, the model is replicating.

So, I think market-driven models are absolutely one path – not always the, a possible path, depending on what you're providing. Replication is another important path: We've started seeing replication work through things like microfinance, oral rehydration therapy, and so forth, where replication has actually brought it to a huge number of people.

And I think more and more, local governments are a route to driving scale, because local governments today, compared to 30 years ago, have something like eight times as many resources, from domestic resource mobilization. And so, they are able to fund programs for their own populations, and a lot of times, they just need better, more cost-effective solutions that they can serve more and more people with. And so, being able to work with governments to integrate some of the things that we learn into government policies and into government programs is another path to scale.

*Patrick Fine:*

Yeah, I wonder if we think about the, there's the market path that you mentioned, and this example of solar energy. And I think that's a great example, because I remember, just 10 years ago, traveling in Africa, and you had these small solar products, like a flashlight, or a lamp that could light part of a room, that were basically donor-funded. You had USAID, and you had European donors like DIFID or the Dutch, who were funding these startup organizations that were developing those products and starting to market them, in Africa. And you had the start of demand generation for those solar products, and they were small consumer items.

Now, if you go to any market in Africa, you'll find solar products just being sold through the commercial markets. So, that's an example of a consumer product where the seed funding came from public funds, and the research and innovation essentially was publicly financed, and it's led to what is now a ubiquitous industry for these small consumer products.

And now you can see it going from the, from the light that will light one hut, to now panels that will be on the roof of a house, and they'll provide electricity for a refrigerator, and a TV, and for lights within the house, a household operation. To even larger installations that will have a solar array that will power a clinic, or power a whole school. So, you can see that, that industry sort of progressing up the ladder, starting with the research and development public funding. But that's, especially at the consumer level, that's a consumer market, right? I mean, it's a consumer product market that lends itself to commerce.

Then, in the second example you gave of replication with microfinance, that's financial services.

Are there categories of products and services that lend themselves to scaling?

*Ann Mei Chang:*

I think there's absolutely types of interventions that are not going to have private sector business models – particularly in the health and education space, things that are typically provided by governments. And I think in those spaces, the best path to scale is through the local governments, and partnering with local government, and integrating it into local government policies and systems.

Right, Zambia has actually done some interesting work in this space, where, I know another DIV grantee worked with the Zambian Health Ministry to determine the best way to recruit community health care workers and was able to do an RCT, a randomized control trial, to determine, if you were to recruit health care workers by talking about the professional opportunities, and the money you could make, and the opportunities for advancement, versus if you recruit health care workers for the social good, and you can help people, and so forth. They discovered that using the first technique, where people were aspirational, they came, that they were able to get people who were something like 30 percent more effective, in terms of the number of patients they saw and how –

*Patrick Fine:*

Is that right?

*Ann Mei Chang:* Yeah.

*Ann Mei Chang:* Also in Zambia, there is another RCT that was run, that demonstrated by providing a sort of reward of these mama kits, of a small \$4.00 kit of supplies that new mothers would want, if they went to deliver in a health facility, that they were able to dramatically increase the number of women who would go to these health facilities, for a very small amount. And that's also now been written into the, the protocols there. So, I think that as governments become more and more capable, I think working with governments to integrate some of these services, that are generally provided by government, the government is the best place to deliver them.

One of the barriers to really being able to scale is, in the typical global development sphere, we tend to push very hard to deliver numbers as quickly as possible. When you start a program, you know, you gotta hit 10,000, 100,000, a million people. And we measure our success by the number of people we've reached, and we measure that in an absolute number.

In Silicon Valley, we look at scale not as an absolute number, but as the slope of the curve. What we want to do is see an acceleration in the slope of the curve. So, you're not just getting linear scale, so for every dollar, you can get one more person or whatever, but that you're actually getting exponential scale, because you find some driver for scale, whether that's through government adoption, through replication, through a private sector business model.

And so, I believe that for innovation to truly scale, you need to start slow so that you can grow fast. You start slow by really refining the model so that while you're still slow, you can design the product, and iterate on the product, to make it really meet user demand, so that people really want it, and they're going to tell all their friends about it, and it's going to be something that people really seek out.

*Patrick Fine:* Right.

*Ann Mei Chang:* But then you also test out the business model, and you figure out, how are people going to pay for it, or what are the different avenues of funding, what are the incentives, and so forth, that get that aligned, as well as optimize for the impact. And when you can

optimize for the value to [the] user, for the growth model, and for the social impact, and you do that all by staying small for a fair bit of time to really refine the solution along those three axes, then you're in a much better position to drive exponential growth going forward. Whereas, if what you do is you put together a solution that basically works, but you get it out there too soon, and then you're really focused on driving numbers, you don't have time to really refine the product to have the characteristics that will drive scale later on.

*Patrick Fine:*

That is a great insight – if you're thinking of it in terms of designing an intervention, seeking a linear growth trajectory, which I think is what we typically design our programs to do – versus designing them so they have an exponential growth trajectory, where they may stay small for a certain amount of time, and then create the conditions that will drive demand for much more rapid growth and uptake. That example of solar lights and solar electrical devices in Africa would follow that exact curve, where it started out small. It took several years to get real traction, and a lot of iteration on the products.

So, if you look at some of those early products, they're not very durable, the quality of the light is not that great. To now, where it's, it's a self-sustaining industry with tremendous demand, and you can go into most, even most poor households, and you'll find they have a solar charger for their cell phones, they've got some solar lights, flashlights or house lamps. And then often, now, you see them, through the pay-as-you-go model, putting in solar electricity to power a refrigerator and a TV. Or maybe, it's a different order: a TV and a refrigerator.

*Ann Mei Chang:*

Mm-hmm.

*Patrick Fine:*

One of the challenges that I see in the current discourse around scaling solutions is how to determine what really is a public good and a public responsibility. And what is something that we can look to and encourage or incentivize the private sector – or it might be civil society – to do?

*Ann Mei Chang:*

Mm-hmm.

*Patrick Fine:*

It frustrates me, because, in the current climate of restricted

budgets, where public funding is under such stress, I see a political impetus to say, "Well, this should be done by the private sector," or, "The private sector could do this better." When, in fact, it's not really a private sector responsibility, it's a public responsibility. An example from the U.S. would be prisons. The notion of private prisons, for me, is very disturbing, because it creates these perverse incentives that drive policy to jail people, or to keep prisons full, or to restrict services to people who are incarcerated.

Have you thought about that dividing line between what should be scaled publicly and what should we look to the private sector for? And what should we combine on?

*Ann Mei Chang:*

Yeah, I think that's a perennial question that, as you say, we're debating right now in the United States, whether it's around prisons, or health care, or otherwise, or education, for that matter. I don't think that there's one line there. I think it's a line that each country, society needs to make for itself. I certainly have my own opinions, but I think that, when it comes to development, I think countries need to make their own choices about where they want to draw that line. Some, like the Scandinavian countries, will decide that the government will want, it makes more sense for the government to provide more of the services. Other countries will decide that it makes sense for the private sector to provide more of those services.

I don't know that there's only one right answer; there's multiple ways you can do that. And, and there is a hybrid in between, but, you know, I think where government really comes in is really for basic services – and we can argue what basic services are – to be equitably available to people across the board. And again, each society is going to have to decide what that is.

*Patrick Fine:*

Yeah, you're right.

*Ann Mei Chang:*

I was at a discussion recently about philanthropy. And there's an interesting question someone asked from the audience, which is: "Isn't it unfair for the wealthy people to decide what things we're going to fund?"

Yes, it absolutely is, and that's why we have government. You know, government taxes people, and we come up with a policy that

we agree as a population. And then the government, with representatives of the population, makes these decisions about how we equitably provide services for people.

I think one of the interesting things I'm watching right now is in Liberia, the government has decided to do this trial of different education systems, where they're funding several different nonprofits – or maybe some for-profits, as well –

*Patrick Fine:* It's for-profits, as well, yeah.

*Ann Mei Chang:* Yeah, so nonprofits and for-profits, to run schools, to show who can demonstrate, at the same cost point, better results for students. With the idea, in theory, that the government will scale whatever turns out to be most effective. It's another example of how government can play a role in innovation and adopting these innovations, if these providers are able to come up with a curriculum, or a pedagogy, or whatever, that works better than what the government is doing today.

*Patrick Fine:* Yeah, that's a great example of public sector innovation. Where you have a government that is saying, "Let's try different approaches and see which one works best, and if that one is scalable."

There's a great example from Pakistan. They have a large private education system at the primary level, so about a third of the kids in Pakistan go to private schools, including the poorest kids. So, they've got private schools that cater to poor communities and are very cheap. They spend about half of what the public sector spends, and yet their results, they're like 20 percent better than the public sector results. So, that's another example where you can look and, and see, "Well, what is happening in those private schools that they're getting such better results for a much lower amount of money?"

*Ann Mei Chang:* Yep.

*Patrick Fine:* And, you know, what is the secret sauce, there? And it, there's been a fair amount of research done on it, and it looks like the key factor is teacher accountability. So, if the teachers don't show up to school, they don't get paid. Whereas, in the public sector, you don't

have the same level of accountability linked directly to the, to compensation. And oversight – the private schools have a much more rigorous system of inspectors going to the schools and providing oversight to see that the school is actually doing what it's supposed to do. So, it, it came down to accountability, in that case.

*Ann Mei Chang:* Interesting.

*Patrick Fine:* Yeah. Which you would think is replicable in most places, but then, if you look and see how many, how many countries – including Pakistan, was it able to replicate that lesson in its public sector? It wasn't.

*Ann Mei Chang:* Yeah, and, and then the, then there was a question of, you know, does the government then adopt that in terms of the government-run schools? Or do they have charter schools, which are still privately run but funded by government? There's a lot of different models there, but I think the point is that government can play a role in innovation in some of the services that they provide their citizens.

*Patrick Fine:* So, let me ask you a different question. How do you think these kinds of approaches will influence work to achieve the sustainable development goals, the SDGs?

*Ann Mei Chang:* I think that the sustainable development goals are a great set of audacious goals that the world has agreed to focus on. The studies have shown that we are something like \$2 to \$3 trillion a year short of what we would need to invest to meet the SDGs. And so, there's a huge gap between what we have today and what we need in order to meet the SDGs. My experience is that innovation is one of the ways you can close that gap, by finding solutions that are more cost-effective, that are more impactful. I think across almost all the SDGs, there's room for us to drive greater innovation.

And I think that means focusing not just on delivering results tomorrow, but on finding solutions that can be far more cost-effective, far more impactful, that will actually get us to the scale of the need. If you look at most of the programs that INGOs run, we're talking, you know, about \$100,000 or \$1 million seems like a large program to us.

*Patrick Fine:* Right.

*Ann Mei Chang:* But for most of the things that the SDGs are covering, the scale of the need is somewhere at around a billion people. So, at a million people that you're covering, you're at 0.1 percent of the need, right?

*Patrick Fine:* [Laughs]

*Ann Mei Chang:* And so, I think we really need to think about and be more ambitious. I think when we are ambitious and we say, "Hey, the target is a billion people, so we need to think about the problem a little differently." Because it's a really different problem to solve when you think, "How am I going to get this to a billion people," versus, "How am I going to get it to a million."

*Patrick Fine:* I was recently at the Milken Institute Conference, and one of the main topics of conversation was artificial intelligence, and how AI is going to influence and really transform society and the way we live. How do you think that might impact our strategies for the SDGs?

*Ann Mei Chang:* Yeah, so I'm not an AI expert, but what I would say is, we've looked a lot at the impact of artificial intelligence and automation, in combination, in developed countries. And we're already seeing an upheaval in developed countries, where people are being disrupted from jobs, and we're only beginning to see that trend happening, and you're seeing the political upheaval from that. I think the challenges are going to be even worse in developing countries. Because in developed countries, if you already have a fair bit of wealth in a country like the United States, when jobs are disrupted, there is at least the possibility within the country that there is enough wealth that you can generate service jobs that can offset the loss of manufacturing and other kinds of jobs that may be displaced.

*Patrick Fine:* Right.

*Ann Mei Chang:* But in developing countries, which don't have the wealth to fund a local service economy, what's going to happen with technology – through artificial intelligence and through automation – is that the routine, low-skill jobs that are the first jobs that somebody who's

coming from being a smallholder farmer in a rural area, coming to the city, you know, who may not have a deep amount of education, those are the jobs that are going to be the first rungs for them to move up the path of prosperity. And –

*Patrick Fine:* Which is what you see in places like China, right now.

*Ann Mei Chang:* Exactly, but China's a little bit further ahead of the curve, so what you saw in China in the last couple decades, right, people coming off the rural areas, going to work in these factories that are low-skilled routine jobs. I think China may at this point have enough wealth they're starting to transform more into a service economy.

*Patrick Fine:* To a service...

*Ann Mei Chang:* And that's a traditional path out of poverty for countries. Countries that haven't gotten there yet really face, I think, an existential crisis around growth. You don't have enough wealth locally to be able to drive the service economy. And you need, in order for a poor country to become richer, they need to have something to be able to export to richer countries, to bring in more financial resources into the country. And traditionally, that's been by arbitraging the cost of labor, but when the cost of labor is not nearly so much of a factor, because that low-skilled labor has been displaced by machines, then what happens to these countries? I think it's a real question that we have not yet grappled with when it comes to the SDGs or global development at large.

*Patrick Fine:* Well, and it runs right into a demographic bulge, as well. So just as you have –

*Ann Mei Chang:* Yeah, so you're going to have all of these youth – *[Laughs]*

*Patrick Fine:* You have this youth bulge right at a time when demand for labor –

*Ann Mei Chang:* You have the youth bulge and you have urban migration, so you have a lot of people coming to cities, a lot of young people coming to these cities – there's not going to be the level of job creation, likely – at least on the current path we're on – to be able to employ all those people.

*Patrick Fine:* Well, and the ability for those youth to live a purposeful,

productive life.

*Ann Mei Chang:* Yeah, and there's going to be a lot of high-end jobs that are open that you can't fill, you know, people who design and program the robots, right?

*Patrick Fine:* Right.

*Ann Mei Chang:* It's not realistic for somebody who has minimal education to take that many steps up the skill ladder at once; you may be able to do it in a generation.

*Patrick Fine:* You know, one of the things I heard at this conference when this topic was being discussed, and the concern about the displacement of workers was, we tend to think it's the laborer or blue-collar jobs that will be the first ones that are displaced, but those may be the last ones that are displaced. And you hear strategies like, "Let's train people to be coders." He said, "Coders is one of the first jobs AI is going to replace." So, people may need coding skills just as a basic kind of literacy, but the job of coder will not be a job in five or 10 years.

*Ann Mei Chang:* At least not the very sort of mundane type of coding to do, like, business logic and things like that.

*Patrick Fine:* Right.

*Ann Mei Chang:* There'll still be jobs for people who are inventing new, you know, software algorithms, and things like that.

*Patrick Fine:* Right, and servicing the robots, as you said, yeah.

*Ann Mei Chang:* Yes, exactly. But I, I think it is going to be a big challenge, because if you think about somebody who has minimal education, minimal training, the kinds of things that you can easily train someone to do, in the course of a few months or so, are the kinds of things, exactly, that artificial intelligence and automation are going to easily be able to do, as well.

*Patrick Fine:* Right, a number of these executives with tech firms were saying, "Yeah, my job is going to be automated." Which poses this challenge – and it's one that we're thinking about at FHI 360 –

about what does the workforce of the future – and not the far-off future but the near future, three years or five years from now – what does that workforce look like? And how do you prepare people for that future, where more and more work is automated, where they can still have purposeful, meaningful lives?

*Ann Mei Chang:* I think this is a huge unanswered question. I have not heard anybody, and I certainly am not brilliant enough to have the answer to that question, but I think it's a question that deserves a lot more attention than it's been given to date. Again, I think that most of the attention has been in the developed countries, but I don't think we've really grappled with what do you do in developing countries.

*Patrick Fine:* See, I've thought that in developed countries, that we'll have to figure out what does that transition look like, and that that will be a painful transition, and there'll be political disruption from it, and so forth. But, that in, in developing countries, in the poorer countries, maybe they can just leapfrog it. Maybe if we can envision social arrangements, social relationships, that, that provide for people to have purpose-filled, meaningful lives, that they won't have to go through the transition, just like they didn't have to go through the transition from landline telephones to cell phones, they just leaped over landlines, and now they use, they use cell phones.

*Ann Mei Chang:* I'm not sure you can leapfrog prosperity, though. You still need – if a country is relatively poor, you still need to bring in more financial resources into the country for it to get rich. So, they need something to export. That can be export of goods or it can be exports of services.

*Patrick Fine:* I don't know, I mean, I can imagine a, a society where a lot is automated, so a lot of products and services are delivered through machines. But that there are some things that people just prefer to have done by other people, and that you start to see niches or enclaves of work, where the value proposition is that it's not automated. It, it can be done by somebody who's –

*Ann Mei Chang:* Absolutely.

*Patrick Fine:* – by a machine that's automated, but this is going to provide sort of a handmade version of it.

*Ann Mei Chang:* And I think that will absolutely be true in richer countries, right, where, for example, I think there likely will be a blossoming of the arts. Because you'll have people who make the robots, who have excess income, who can fund the arts, and so that could be an outcome of this, and they prefer arts that are created by the creativity of people rather than robots. But again, in developing countries, if there's not enough wealth already in the country, who's going to fund those services?

*Patrick Fine:* Maybe that's what they export, maybe they export the handcrafted work.

*Ann Mei Chang:* Maybe.

*Patrick Fine:* And, and that has a higher value to people who are in societies where things are automated.

*Ann Mei Chang:* Yeah, the question is whether you can do that at a sufficient volume to really create jobs for all of the people.

*Patrick Fine:* For the people coming up, right. So, tourism would also be another potential growth sector, there.

*Ann Mei Chang:* Mm-hmm.

*Patrick Fine:* But unless you combine that idea of preparing the youth for jobs where there is demand, with contraception and family planning and women's empowerment, so that women have control over their own fertility, then, I don't think you can ever win. So, an effective workforce development strategy that lacks a component that looks at women's empowerment and control over their fertility – combined with access to contraception – won't be successful.

In other words, to have an effective workforce development strategy, you are also going to match it with an effective strategy for empowering women and providing them access to contraception.

*Ann Mei Chang:* Yeah, I mean, for the two sides to meet, for the unemployed to get jobs, you need fewer people through family planning and otherwise, and then you need more jobs, right? And so, hopefully

somewhere in between there, the two can meet. And, and some people, I think, these days, are starting to punt and say, "We're not going to be able to solve this problem." And so, you're seeing more and more discussion of concepts like universal basic income. I think that's still an experiment. There's a few trials being run now, both in, I think, Oakland and somewhere in Africa, maybe Kenya?

*Patrick Fine:* There was in, in Canada, too. *[Laughs]*

*Ann Mei Chang:* Yeah, maybe in Canada, as well. I actually, I personally don't believe it's going to be needed in rich countries, because, again, I think there'll be enough wealth to generate the service economy. But I think it may be something that is necessary in poor countries.

*Patrick Fine:* I think that it also is a policy option that will make sense in many circumstances, but that it will have to be done in such a way that it still provides people the opportunity to live purpose-driven lives.

*Ann Mei Chang:* Mm-hmm.

*Patrick Fine:* And right now, a lot of our purpose comes from the motivation to do the work that we do, so if we take that away, even if you provide an income for people so they're not starving, there still needs to be some motivating factor around community, around their relationships with their family and neighbors, and around the sense that they're, they're contributing to something bigger than themselves.

*Ann Mei Chang:* Yeah, and I think we haven't answered what that will be yet, if you end up in a situation where you need universal basic income. But the other thing I think we need to think about is also, do we need to retool education? Are the basic skills that we teach in education too much the skills that robots and artificial intelligence are going to be able to master quickly? And should we be focusing more on skills that are uniquely human, that are harder for robots to be able to displace?

*Patrick Fine:* Yeah, I think there, there will be a core set of basic skills, you know, that will still be numeracy and literacy, basic knowledge of science, so an understanding of your environment, and an understanding of ethics, which I don't think we do enough of right now. And I think added to that, literacy will be expanded to

include not just reading and writing, but also coding in other languages, so, spoken languages and also computer languages will just become part, and you can already see it happening, it's not like this is something in the future. It will just become more, in my view, more prevalent. A person who is considered well-educated will have this suite of basic skills that are language – including computer languages, literacy, numeracy, science, and then ethics, I hope. *[Laughter]*

*Ann Mei Chang:* Yes, absolutely.

*Patrick Fine:* Ann Mei, what a terrific conversation. I just love it when we get together and have these exchanges. You're so thought-provoking, you give me so much to think about, and you spark so many ideas. Thank you so much for taking the time to come in and share your ideas today.

*Ann Mei Chang:* Thank you so much for having me – it's such a pleasure, let's keep doing this!

*Patrick Fine:* Yeah, we will, thanks.

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