EPISODE 706

[INTRODUCTION]

[00:00:00] JM: Online labor marketplaces are widely used for one-to-one transactions. On Uber, a rider hires a driver for transportation. On TaskRabbit, a homeowner can hire a cleaner to come clean their kitchen. These types of marketplaces are not as widely used for one-to-many transactions, but they can be just as useful. For example, a warehouse owner could want to hire a group of workers to help with holiday shipments. A conference organizer could want to hire a group of event staffers to help run the conference.

Wonolo is an on-demand staffing platform. Businesses post jobs and workers apply for those jobs. The types of work include event staffing, warehouse operations, merchandizing and other general labor tasks. In past shows, we have covered on-demand work platforms, such as Fiverr, Thumbtack, Uber and Instacart. Wonolo presents another variation in the business model and software architecture of the gig economy.

Jeremy Burton is the CTO and chief data scientist at Wonolo. He joins the show to talk about building and scaling Wonolo and some of the key strategic decisions that Wonolo has made along the way. As with any successful marketplace business, Wonolo has solved the chicken and egg problem of how to get supply and demand on the market simultaneously. The company has grown deliberately, setting up operations in one city at a time to make sure that they can provide a good experience in both sides of the market in each of the new geographies.

Jeremy and I also talked about the broader effects that the gig economy could potentially have on the labor market. Gig economy platforms use a five star rating system and written reviews to judge workers. This is in contrast to the classic resume system, which people get hired through and it's slow. It's laborious. You have these strange norms around working 12 to 18 months at a job, or else it looks bad on your resume.

The gig economy allows for rapid job liquidity, and the potential for workers to steadily level up more quickly than they might be able to in a typical corporate job. These aspects of the gig economy are rarely discussed, and it was enlightening to hear Jeremy's views on them. I really

enjoyed this episode. It was wide-ranging discussion of an interesting gig economy platform that I had not heard about before I found about it, and it was great to do this episode, talk about the software, talk about the platform, talk about the market.

Before we get started, I want to mention that we recently launched a new podcast called Fintech Daily. Fintech Daily is about payments, cryptocurrencies, trading and the intersection between finance and technology. You can find it on fintechdaily.co, or on Apple and Google Podcasts, and we're in very early days with Fintech Daily. We're looking for other hosts who want to participate and host shows. If you're interested in becoming a host and reporting on fintech topics, send us an email, host@fintechdaily.co. We'd love to hear from you, and if you're listening to this show, we'd love to get your feedback on the directions you think we should go in, what you would like to hear covered in Fintech Daily. You can always send me an email, jeff@softwareengineeringdaily.com.

So let's get on with this episode about Wonolo with Jeremy Burton.

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[INTERVIEW]

[00:05:34] JM: Jeremy Burton, you are the CTO and chief data scientist at Wonolo. Welcome to Software Engineering Daily.

[00:05:39] JB: Greta to be here. Thank you.

[00:05:40] JM: I want to explore what Wonolo is, and then we'll get into engineering. The smartphone had a dramatic impact on the way that people work, and the example that people will probably think of first is ridesharing. With ridesharing, you had a large market that developed almost overnight between drivers and riders, but the other forms of labor, like real-world labor, they have been slower to move on to a digital marketplace format. Why is that?

[00:06:12] JB: I think there's a combination of reasons. I think many similarities exist between the ridesharing marketplace and the broader labor market place. I think staffing as a whole is a fairly antiquated industry. There's been a lack of investment in technology over the years. It's a very fragmented industry in the same way that limo and taxi service was before Uber and Lyft came along. I think there are structural problems due to that fragmentation that have made the adaption of smartphone and next generation platforms slightly difficult. But in my mind, there's no fundamental challenge to adapting smartphones and on demand platforms within the staffing industry at large. You just have to take a slightly different view.

Wonolo, the name Wonolo is short for work now locally. Our focus is 100% on real work in a physical location. So we're sending workers to a warehouse or an event site to perform a job. We're seeing the same dynamics play out in that industry that we have seen in ridesharing and other on-demand marketplaces.

[00:07:27] JM: What are some of the canonical difficulties that exist across all these different digital labor marketplaces, whether we're talking about Wonolo, or we're talking about Uber, or we're talking about Thumbtack, what are the consistent issues that these companies encounter when trying to build a marketplace?

[00:07:45] JB: I think there are issues relating to any marketplace that are definitely not unique to Wonolo. One of them is simply the chicken and egg problem of managing supply and demand. In any location where we launch, we have to find the anchor customers. We have to find a base level of able Wonoloers who are willing to accept jobs, and sometimes in an early market, it's hard to synchronize those two things so they lineup and people are able to find work and people who want work done are able to find workers.

I think that chicken and egg problem exists as a canonical problem, as you put it, in Wonolo and in any gig economy business or any marketplace business. I think the other thing that exist across many of these businesses is the issue of scale. How do you continue to rollout additional geographies? How do you develop a consistent way of doing that while still understanding and recognizing the unique attributes of a particular market?

I'll give you an example. We're based in San Francisco. I think for the U.S. market as a whole, San Francisco actually has some fairly decent public transportation infrastructure, which enables workers to get to jobs. But there are other cities where we've launched in the U.S. where public transportation is not nearly as developed. We have to think very carefully about how our workers going to actually get to their jobs. We look at the density of worker population. We look at the density of the customer population and we look at how do we connect those two so that people can work effectively, shop on time and get paid.

[00:09:26] JM: When you identify a city that you want to launch in and you're looking at the different facets of that city, like the public transportation system and perhaps the different sides of the marketplace as you can derive them from available data. What's the process of creating a strategy around balancing supply and demand when you're going to tackle that chicken and egg, because you have to tackle the chicken and egg problem almost freshly from start in each of these cities? I'm sure it gets a little bit easier in some ways in each subsequent city, but it probably also gets harder, because there are some reason why you started with the earlier

cities. Like in San Francisco, there's probably some low-hanging fruit for some reasons why balancing supply and demand in a staffing marketplace is easier in those and it gets harder in others. What's the process for strategizing about a particular new geo that you're going to attack, or I shouldn't say attack, set up in?

[00:10:29] JB: You're absolutely right. Each market is unique, but as we continue to scale, we are developing something of a playbook to launch market-by-market. I think as a macro issue, one of the things to first of all understand is the level of unemployment, but the level of underemployment, and I think this [inaudible 00:10:49] often missed in the broader discussion of the health of the economy. Unemployment is at historical lows, but there are still many people who are underemployed in the sent that they don't get enough work hours to make ends meet.

One of the first things we're looking at is what are the demographics in the market in terms of that underemployment and are we going to be able to have an impact? Are there employers in that region, in that location, that are having trouble filling work while at the same time there are people who are looking for work?

Over that, we lay other issues to do with availability of transportation, which we talked about earlier. You may have a situation where you have underemployment in the worker population. You have a lack of ability to fill jobs on the company side, but there's no meaningful way to connect those two together, because they're two geographically disparate.

So we're looking at where do Wonoloers live? Where are companies based? What is the level of underemployment? What is the level of employment? How do we connect those two together? How do we find those workers? How do we onboard them at scale? So there're a huge number of different aspects that come into operationally launching in a particular market.

[00:12:06] JM: I heard about Wonolo fairly recently when I saw that you had raised a sizable round from Sequoia, and when I saw it, I was like, "Oh! This is obviously a great business," the idea of connecting event staffing with, for example, a large marketplace of people who need event staffing jobs, or the same for warehousing. These use cases where you need a large mass of people all at once, perhaps for a particular event, or maybe it's Black Friday, you need a bunch of people in your warehouse to help you with work overflow.

Now, I'm curious, why did it take a longer time for this kind of marketplace to show up when we saw these things like TaskRabbit, and Thumbtack, and that's on the real-world labor side, and then you saw Fiverr, and Upwork and all these other digital online work economy things. Why did it take a while for something like Wonolo to exist?

[00:13:09] JB: I think that historically the staffing industry has underinvested in technology and hasn't really kept pace with the developments that had taken place in other industries. If you think about how traditional staffing works, it's a huge industry. It's 60, $100 billion depending on how you break it out. But of it is driven by in-person small staffing operations. There are often offices in many stripmall across the United States. The process of working for a staffing agency as an individual is you'd walk in to a staffing agency, you'd probably sit in the front room, fill out forms for 30 minutes on paper or on a clipboard, go into the back room, someone there would type in that same information that you'd fill out on the forms into a very antiquated system based on, say, Windows 95 or some other old system and then they would say, "Well, thanks very much for coming in. We'll call you when we have a job."

Then when in fact they get a job posting, they would pick up the phone, they would go down their call list, they call a bunch of individuals until they find someone who's available. Then on the day of the job, they have to call people to make sure they're going to show up. So it's a very people-heavy business. I think it's a business also that has been neglected by Silicon Valley, because it's not necessarily visible in the same way to other parts of the economy are to Sand Hill Road and traditional VC investors.

We kind of looked at that whole problem and we realized that there's a fundamental need here to make work more flexible both for the workers and for the businesses. How do you build a work calendar around your other responsibilities? Maybe you have childcare responsibilities. Maybe you have another passion in life you need to work around. Then on the business side, how do you find work flexibly? How do you find workers on-demand based on your needs that might occur at very short notice?

There's really a structural problem in a very large industry that just hasn't been solved, but obviously in other industries, the on-demand gig economy has really transformed them. I think

it's a question of awareness of this problem. I think it's a question of Silicon Valley and maybe kind of lack of visibility of frontline workers, the people that deliver pizza, the people that set up your event, the people that pick, pack and ship your orders just generally not visible to the Silicon Valley community.

[00:15:38] JM: We'll get into the engineering shortly, but just to add a little bit more clarity to the problem, the top level problem, of offering a marketplace that increases liquidity between the market of people looking for staffing jobs and the people who might need warehousing, or merchandising, or event staff or the different tasks that you might need a large volume of on-demand staff workers for. So there are all these different tasks. There are the warehouse operations, the event staffing, the merchandising. Are these tasks all roughly the same from your point of view when you're building a marketplace? I remember when I was learning about TaskRabbit a long time ago, maybe 4 or 5 years ago, one of the issues they had was they expanded too quickly into a wide variety of different tasks that people could potentially do on the platform, and they found that doing that customer service and trying to build a market for all of these different verticals was really tricky. But I could imagine, maybe in staffing, it's easier, or you have more of a commodity, more similar businesses across these different verticals. Is it the same across these different things, like warehouse operations and event staffing, or do you have to do different things for different verticals?

[00:16:54] JB: The way we break down the kinds of jobs that exist out there is, first of all, we look at what we call uniform output versus subjective output. To give you a concrete example, if you want to find someone who's going to pick, pack and ship orders in your warehouse, you would hope that within reason, different individuals with a little bit of basic training will do that job more or less the same. At the other end of the scale, if you're in the business of finding someone to build a new website for you, different candidates to do that would create very different outputs and you would want to be more selective about who you're going to choose to do that job.

It doesn't necessarily mean that the job is skilled versus unskilled, or blue collar versus white collar, it's really about the uniformity of the output. To give you an example, a nurse is highly skilled. They have to be licensed and trained, but their output is uniform in the sense that any nurse given a similar situation is likely to provide patient care in the same way.

We really try and focus on that uniformity of output, and those are the kind of positions that lend themselves to automated matching that our platform does, just in time matching. In that sense, they are similar across all these different industries. Obviously, the qualifications that people need for these different kinds of positions across these different verticals, they are different, but we have a mechanism to match on those standardized experiences and qualifications. Where Wonolo really excels is anywhere where that output is uniform, whether you view that as skilled or unskilled.

[00:18:42] JM: Okay. Let's get into the technology stack. Give me an overview of the technology stack at Wonolo.

[00:18:49] JB: I was actually struck by the similarity between Wonolo and Airbnb. I listened to the episode that you did recently with one of the directors of engineering at Airbnb. It's remarkably similar. We started with a Rails version 4 monolithic application. We have to mobile applications, one for iOS, one for Android built natively that talk to that Rails version 4 backend through an API. We have PostgreS as our database. On the data science side, we use Python and scikit-learn and a few other machine learning libraries.

As we've developed and grown, we've had to really segment out the different aspects of our platform. So the big transition that's happening now within Wonolo is we're taking all the web functionality that it's currently parts of that Rails monolith application and we're breaking out that web functionality as a separate stack using React and Redux, and that's giving us a lot more flexibility in terms of separating the effort to develop the true backend on all the business rules and all the optimizations around data from the frontend web development side of things.

[00:20:07] JM: What have been your biggest challenges in making that refactoring go expeditiously or just go harmoniously with the fast growth I'm sure you're having?

[00:20:21] JB: Yeah. It's always a challenge, because you are trying to move quickly, and whenever a new feature request comes in, it's slower initially to implement that in React versus just making a modification to the existing web functionality that's part of a Rails stack. So you really have to have a commitment to making that transition and buy-in to that transition at the

product, engineering management, business operations across the entire organization that this is a transition where there is going to be an initial upfront investment, but that will payoff overtime in terms of quality of the user experience, ability to maintain to maintain the codebase. I think it's really just the question of education for the rest of the organization to ensure they understand the value of that refactoring.

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[INTERVIEW CONTINUED]

[00:22:54] JM: Let's go through a couple of different flows. What happens when a requester posts a job? For example, if I have a warehouse, I'm selling t-shirts for Software Engineering Daily and I run a big warehouse that's full of t-shirts. I need people to come in and staff during

Black Friday when people are buying tons of Software Engineering Daily t-shirts. What's my flow for posting a job to come in and work on Black Friday?

[00:23:23] JB: We really divide the job posting into four main sections. There's the what do you want done? There's the where do you want it done? There's the when do you want it done? Then there's the how much are you paying? The flow as a request to run our platform is divided into those steps. You'll first of all choose a category of work. You'll describe the kind of work you want done in the job description. You'll say how many people you want. Maybe you want 20 or 30 people to fill this shift. Often, you'll be populating that from a template that's been either created by us or previously created by the customer.

You'll talk about what is expected in terms of requirements for the job that workers on the platform have to agree to do. You'll talk about where the job is happening. Obviously that's an address, and we geo code that and use that to manage check in and check out. You'll about when. So you can post the job for a single day, or you can post the job for multiple days, which is very much like posting a recurring calendar entry in say Google Calendar, and then you'll post the pay.

We have a feature inside the platform called Fill Advisor, and what that does is it uses machine learning to predict how likely it is that you will fill your job based on the pay and a bunch of other attributes that is trained on our experience of similar jobs. So that gives you a simple red, green, yellow view of whether you're likely to fill this job based on what you're paying and the other terms of the job. Then you would hit post on that job.

What happens then is we are looking at the entire worker population that we have on the platform. We will exclude anyone who is not able to take that job. The main reasons that would happen is they have a job already on the platform that overlaps. Maybe they don't meet the requirements of the job in terms of the qualifications and a few other factors that maybe they're not eligible. Then we take that list and then we use a ranking formula to build a list of best matches to least good matches on the platform, and area like San Francisco where we have a high density of workers, we might have, say, 10,000, 12,000 workers who are able to match to that job.

We build that list using that ranking formula, from best match to worst match, and then we send push notifications to each person on that list in that ranked order until the job is filled. The speed of which we do that is dependent on a bunch of factors, including how much lead time do we have till the start of the job. How much density of workers do we have, and a few other factors.

Ultimately, we're trying to balance how quickly we can fill the job with how willing we are to wait for the best worker, the best match to fill that job. The vast majority of jobs on our platform are picked up during that push notification phase. Over 90% are picked up by workers who receive the push notification.

[00:26:27] JM: 90%. That's great. That's a great metric.

[00:26:30] JB: Yeah. Fill rate is absolutely the number one or maybe revenue and fill rates are the two joint number ones that we track in terms of how well we're doing. Our customer ultimately wants confidence that their job is filled. They want to see that the job is filled quickly, and our average time to fill a job is four minutes. From posting the job to getting a job filled, just four minutes, which is very different to traditional staffing.

[00:26:57] JM: What happens if somebody post a job and it's not getting sufficient workers applying to it. Can you do anything like go out to Craigslist or go on some other platform and try to get people to platform dump and come on over to Wonolo? How do you handle those kinds of jobs where people are not getting enough workers?

[00:27:17] JB: I think there's a variety of different situations there. First of all, we have a fill rate team that's a team that's part of the business operations team and their job is to fill any gap that is not filled by automation, but there is a huge amount of automation in the platform aimed at filling jobs quickly. As we approached the start time for the job, if the job is not filled, we're going to take various automated actions to re-notify to send out additional communications to try and get the job filled. We're absolutely able to reach out to individual workers that we want to target. I think a good heuristic, a way of thinking about this is that of that 90%, 95% is completely automated and there's a final 5% of human touch that really aims just to fill in any hard slots to fill that we might have open.

[00:28:15] JM: Can you use ads for this kind of thing? If you have a job where you really need to fill it and you can make some kind of expected value calculation and then make a really aggressive Google AdWords bid to really get some workers on-demand, does that approach work or do you have to do stuff like actually just emailing people directly? How do you target people in those kinds of situations?

[00:28:37] JB: It really depends on the lead time. Absolutely, we can use ads to drive additional workers to sign up to our platform. Often, our customer is up against it. Perhaps they had a surge of orders over the weekend. They had a promotion. They suddenly don't have enough people in the warehouse to pick, pack and ship those orders. They're often dealing with perhaps a 12-hour, 8-hour, 4-hour lead time till the job starts, and we generally don't get the response on job boards or ads that makes a meaningful difference to that situation. That's where our automated tools kick in. We're notifying people. We're using push notifications. We're using text messages to really, in real-time, try and fill those slots.

[00:29:24] JM: I've spent some time trying to build a marketplace before, or there's a company I started and didn't really work out. My experience was that the "core technology" of the platform, like you build a Rails app to host to this marketplace and you're going to balance supply and demand. That stuff's not that hard. It's the chicken and egg problem is just pervasive and it never stops and it's all about these skirmishes, like short term tactical warfare and figuring out the automation over the things that are actually not short term. They're long term chronic issues of your marketplace. It seems like really the chicken and egg problem is the main challenge of building a marketplace. Would you agree with that?

[00:30:18] JB: I think that's true. I think the impact of that changes overtime though as the business develops. I think early on, one of the things that the founding team did is we actually went out and did the jobs ourselves and we still have a policy here that everyone in the company does a job on Wonolo every quarter, because we think it's really important that we don't sit in our Ivory Towers, that we actually experience these jobs as workers on our platform.

Early on we are very much like scrambling to fill every job we had, and there's a microcosm in a sense of that that happens in every market that we launch in. But what has gotten easier as we've grown is we have larger customers who have geographic presence in many different

markets. So we are lucky enough to have often three or four anchor customers in a new market as we launch, which makes it a lot easier to tackle that chicken and egg problem.

I do think there's an additional layer to the chicken and egg problem, which is not necessarily true in all marketplaces, but probably is true in a lot of them, which is there's a fair amount of seasonality in the business as well. We are right now in our busiest time of the year in Q4. Many of our customers are in ecommerce fulfillment. They're ramping up very, very quickly for the holiday season. There's that seasonality that also impacts that chicken and egg problem as well. I would agree with you, chicken and egg is a huge issue. I think that scale as you continue to grow and develop definitely helps mitigate that problem.

[00:31:57] JM: The aspect of having those flagship customers that can help you expand to new markets with some big jobs, that sounds like a real tipping point. Once you hit that tipping point, you can really start to have a little bit more predictable revenue to the business.

[00:32:15] JB: I think that's right. That definitely factors in to the modeling that we do. It definitely helps to have customers that are no names in terms of the appeal to the worker population. I agree 100%.

[00:32:29] JM: When you build all these internal automation for not exactly edge cases, but the kind of thing where you want to automatically post, repost a job on Craigslist, or you want to automatically send a push notification to somebody, because the job is about to close and you don't have enough workers yet. Maybe you want to automatically post some Facebook ads because things are getting tight. What kind of infrastructure do you put in place to do that? Because I can imagine you just get to this point where you have a sprawling array of little services that are just kind of running and it's maybe hard to document all these things, and it's hard to whiteboard the entire workflow of all the tiny little services that are running. Do you have any best practices for preventing that kind of sprawl?

[00:33:16] JB: I do. I think one of the things that paid off really well for us is investing in two things early. One is really investing in data science early on, and what our data science team is able to do is look at the data that we have already collected in the platform and look at 40, 50,

60, 70 dimensions and really drill down into which of those dimensions are most predictive of the outcome that we want.

To give a concrete example there, one of the first problems that we tackled was how do we prevent bad outcomes? One of the most damaging outcomes is you're a business, you're maybe new to our platform, you post a job, someone picks it up but they don't show up. We call that a no show. We have a no show rate that is pretty low already. It's much lower than the sort of traditional staffing no show rate, but it has such a damaging impact on the customer relationship that we really wanted to try and mitigate it. We built a machine learning model that looks at a whole bunch of dimensions of the job of the worker, of the transportation infrastructure and availability and we score every single job as it gets picked up in terms of how likely it is that person went no show, and clearly the more we do that, the better we get a prediction.

I think the investment in data science early on meant that we weren't lined in terms of which were the drivers of these negative or positive outcomes. The other thing that we did early on is we built a mechanism into our match and dispatch engine to A-B test different ranking formerly against each other.

Ranking formerly have a relatively small impact, but because we're talking about tremendous volume, small differences, small improvements in the fill rate for one algorithm versus another have actually pretty material impacts on our business. I think another best practice is to invest early in that A-B testing infrastructure. Have a consistent way of doing that across different aspects of the product, and that really helps you learn incrementally and make sure you're getting better all the time.

[00:35:34] JM: I love the foresight there. In this gig economy companies, it can take work to – Or it can take deliberation. You have to deliberate about injecting foresight into your decision making process, because sometimes when the company is taking off, you really can just put everything into building new features and building adjunct business and really just take on all these technical debt, which can really undermine your long term stickiness as a product. But in the process of moving more slowly, you may suffer. You may have some other marketplace platform come in and eat your lunch.

Then to add to that, I really am fascinated by these gig economy platforms, because many times they're subsidized. Well, in the case of Uber and Lyft particularly, you have this battle of subsidies, and it's hard to know if the price of the rides that we're getting are real or if they are just to derive demand, to derive KPIs at the ridesharing platforms, because the investors in the platforms maybe want to just sell their current batch of shares and get out. You can have this kind of pyramid scheme. I don't know if that's actually the case or not, but there's a potential for that, that subsidies within a gig economy business can really lead to this crazy just war for liquidity in the marketplace.

That's all to say, these can be really tricky battles to fight between competitors. Of course, you also have the notion that it's not always winner take all. Like Fiverr and Upwork, for example, I use Fiverr and Upwork a lot, and I see the same people on both platforms. It's not necessarily zero-sum, but on the other hand, if somebody gets a job on Fiverr then they're not getting that job on Upwork. I say all these to just prompt, how do you think about competition? How do you think about the competition and the market dynamics and where you invest resources to win competitive battles, or do you just ignore a competition?

[00:37:39] JB: I think at some level you have to ignore competition in the sense that you can become very distracted by competition. The analogy I normally use is if you're running as fast as you can in one direction and you look over your shoulder and there's no one following you, then you're probably running in the wrong direction.

So you need to look over your shoulder occasionally, but at the same time you need to spend most your time looking ahead. What I mean by that is you really need to focus on if you're making your users and your customers happy, you will outgrow and you will ultimately succeed versus competition.

To drill down a bit in the specifics of Wonolo, there are really two ways of looking at competition for us. So one is there are incumbent staffing agencies. So there are the Adeccos and the Randstads and the Manpowers of this world and all the brands that they use. Those are the companies that we sell against in the sense that when we contact a customer initially, often they have some preexisting staffing relationship, and we are selling against them.

In that sense, we really offer something that traditional staffing cannot offer. We have an on-demand platform. We're able to fill jobs in four minutes on average. We're able to satisfy their last minute need and provide them with a platform that is really easy to manage.

If you look at other startups that are in our space, they are obviously also very small compared to the staffing industry as a whole. I think some of the other startups in our industry have fallen into the trap of operating much more like traditional staffing agencies. So they've built regional offices. They've hired a bunch of people to run processes that could be automated. I think one of the things that we so far have done well is to invest early in automation that allows us to scale our business without having to invest a lot in additional headcount within the business.

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[00:39:52] JM: We are running an experiment to find out if Software Engineering Dailydaily listeners are above average engineers. At triplebyte.com/sedaily, you can take a quiz to help us gather data. I took the quiz and it covered a wide range of topics; general programming ability, a little security, a little system design. It was a nice short test to measure how my practical engineering skills have changed since I started this podcast. I will admit that though I've gotten better at talking about software engineering, I have definitely gotten worse at actually writing code and doing software engineering myself.

But if you want to check out that quiz yourself, you can help us gather data and take that quiz at triplebyte.com/sedaily. We have been running this experiment for a few weeks and I'm happy to report that Software Engineering Daily listeners are absolutely crushing it so far. Triplebyte has told me that everyone who has taken the test on average is three times more likely to be in their top bracket of quiz course.

If you're looking for a job, Triplebyte is a great place to start your search. It fast tracks you at hundreds of top tech companies. Triplebyte takes engineers seriously and does not waste their time, which is what I try to do with Software Engineering Daily myself, and I recommend checking out triplebyte.com/sedaily. That's T-R-I-P-L-E-B-Y-T-E.com/sedaily. Triplebyte, byte as in 8 bits.

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[INTERVIEW CONTINUED]

[00:41:51] JM: What's the roadmap for expansion? Do you want to move into additional cities? Do you want to move into additional workplace verticals, like white collar work? How do you think about product expansion?

[00:42:06] JB: there's really three axes in which we are expanding and area likely to continue to expand. One is definitely geographic. We will continue to launch new metro markets. There many, many opportunities that are untapped. There are many cities in the United States that have really strong transportation infrastructure that have distribution hubs for ecommerce businesses. You're going to see us continue to roll out market-by-market.

The second axis on which we're continuing to grow is skills. Early on when we started Wonolo, we very deliberately needed liquidity. So we needed any of the workers on our platform to be able to do any other jobs in our platform, and that forces you to focus on entry level work. As continue to scale, we're able to build additional skills and competences into the platform so that workers who have particular domain expertise, particular skills, particular certification, qualification can find jobs on our platform.

Then the third axis is the vertical expansion. There are two industries where we're starting to make significant inroads. One is insurance. We have four very well-known insurance companies that use Wonolo to match and dispatch benefit counselors and laws adjusters and then healthcare. We took strategic investment from AMN Healthcare, which is the biggest staffing company in healthcare in the U.S., and Wonolo is increasingly being used to match and dispatch nurses and other clinicians across the United States. We may expand into a few more verticals, but those are the verticals we operate in currently.

[00:43:54] JM: The idea of identifying workers who do a really good job and then up-scaling them or offering them premium jobs, that is so interesting. I find it – It makes me really optimistic about some of these gig economy marketplaces. One experience I've been having recently – So

I'm actually in the process of writing an album where I'm finding vocalists on gig economy platforms. Is one Fiverr. You find all these singers. You find rappers. You find musicians, guitarists, and it's really interesting engaging with them and paying them for their services, and I've just realized that the market is totally inefficient. There are people who charge $7 for a beautiful 3-minute vocal, and there's people who charge $140 for a kind of mediocre vocals, and you can imagine the gig economy platforms helping these people to sort of guide them and say, "Hey, you're satisfaction rate from your customers is really high. Maybe you should raise your prices, or maybe you should buy a new microphone, or maybe you should go to our Fiverr Pro services and kind of up-skill." It makes me optimistic.

[00:45:10] JB: I think that's right. I think there're two sides to that. I think on one hand, staffing traditionally has had very limited transparency, and I think that manifests itself into ways. First of all, there's been no price transparency. If you go to a traditional starting agency and ask for a particular kind of work to be done, they'll quote you a rate that includes their take on top of what the work gets paid. So they may it's $20 an hour, and you have no idea whether the worker gets $10 an hour, or $5 an hour, or $15 an hour. We really believe in transparency. So whenever a job is posted on our platform, you see what the worker gets. You see what our fee is. You see what the other charges are on the platform. I think that transparency really helps everyone both the workers and the companies understand the true value of the labor that's happening.

I think also there's traditionally been no feedback loop within the staffing industry, so there's no motivation for you as a frontline worker to do a great job, because everything is very transactional. Each job exists in isolation. By adding some of these gig economy mechanisms that you talked about in terms of ratings and feedback, you actually now have a feedback mechanism on both sides. On Wonolo, every job done, it gets rated by the worker who's rating how they were treated by the customer and it gets rated by the customer in terms of the job the worker did, and that brings a lot more transparency and accountability.

I think the last thing I would say is, traditionally, working in as a temp, in a temp staffing position, I would argue it's been almost a badge of shame. I think there's an opportunity to make that more of a badge of honor and to offer workers who traditionally have been underserved a sense of upward progression platforms. As you work, as you do a good job, as you get these great ratings, as you learn more and develop skills, you have a path forward that means you earn

more money, you have access to better jobs. You continue to develop rather than just working paycheck to paycheck, just treading water, getting nowhere in traditional temp staffing.

[00:47:25] JM: Completely agree. I think the idea of the resume as the guiding light to how well this person has performed in past jobs, there's so much that's broken about it, because if you do a reference check on somebody, there's almost no incentive for that person to give you a negative review of the person. They can get in trouble and they can – If it makes it back to that employee, maybe that employee is vindictive and it's just always safer to say, "Yeah, of course, this person did a great job."

In contrast, if you have something like a star system, I mean it's very easy for people to be cynical about a star system, like, "Oh! You're just going to reduce the worth of somebody to stars or very short comment ratings. But in some sense, you can anonymize those. It's much more quantifiable. There's a lot of benefits to those well-defined rating systems.

[00:48:21] JB: I think that's right. We have the star rating system that most gig economy companies have, an di think that that has value, it creates a feedback loop that wasn't there previously, but we have a lot more feedback, a lot more richness around how workers evaluate companies and how companies evaluate workers. I think the other point is within the population of, we call them gig economy workers, or contingent workers, they're generally not the kind of people that are on LinkedIn. LinkedIn is focused on professionals and white collar.

We also provide a worker profile for every Wonoloer on our platform that gets populated through the action they take, the work they do, the experiences they gain. It's not just about star ratings. It's about being able to highlight each worker's experience in different categories of work, the positive comments that they've received and it's all part of giving them this upward trajectory on the platform that's beyond just individual job by job.

[00:49:28] JM: Okay. I know we talked a little bit more about your platform than the engineering, but I'm just so fascinated by the marketplace dynamics. I guess one other question about engineering, have there been any particularly difficult engineering challenges or management challenges or data science challenges that you can highlight for us that have stood out to you as unique in your career?

[00:49:51] JB: Yes. I think I will pick an example from the data science sphere. So when a Wonoloer picks up a job on the platform, the customer sees that Wonoloer appear in their list. They don't have a huge amount to go on at first touch. They see a picture or a profile picture of the Wonoloer and they see the Wonoloer's name. They can click into the Wonoloer's name and see that Wonoloer's full profile.

But we're really interested to look at any kind of bias that existed on the Wonolo platform. So we actually work with a team of people at the Haskell, the Berkley professor there and some PhD students to look at how could we, first of all, detect bias? It's all well and good to detect bias, but it's also even more important to work at how to mitigate bias that might exist on the platform.

To cut a very long story short, we ended up providing a very large dataset of profile pictures. We provided a matching dataset of outcomes on the platform and we are ultimately are able to train a neural network to identify which attributes of a profile picture were associated with certain impressions of that profile picture. Was that person – Did they look reliable? Did they look professional? Did they look hostile? Did they look argumentative? Then we're able to train and algorithm to recognize those aspects from just the profile picture. Ultimately, that is getting surface as a feature in our platform that when a worker takes a picture of themselves to build out their profile, we can provide real-time feedback to guide them in terms of how to improve their profile picture so that they look more professional, so that they look more trustworthy, so that they are better received on the platform and therefore are more likely to get more work.

That was a really interesting data science experience that had both interesting academic element to it for the team at Berkley, but also a very definite business impact for us in terms of the metrics that we use to measure to success.

[00:52:10] JM: We've touched on a lot of different areas here, and you mentioned something earlier, these two conflicting stories about the U.S. labor market. On the one hand, you have the market that's on a bull run and you have the "official unemployment rate" at 10-year lows. But on the other hand, the official unemployment rate doesn't count people who have stopped looking for jobs. These numbers can be toyed with.

Just to close off, you get a lot of data from looking at how your gig economy, Wonolo, is may perhaps be a projection or a significant sample size of the way that the overall labor market is operating. I guess just to close us off, do you have any interesting conclusions or predictions or things I might not hear elsewhere about how you think the gig economy is going to affect labor market in the next 5 to 10 years?

[00:53:08] JB: I think one of the things that we see is that there are side effects of regulations and law that are maybe not anticipated. I'm not going to touch on the politics of it, but one of the results of the Affordable Care Act is that there are employers who will not give workers more than 29 hours a week, because they don't want to pay them benefits.

However you feel about that, that's a reality for millions of people who have maybe a job, but they can't survive on the pay that comes on just 29 hours of work a week. So they need to have multiple jobs. They probably need to get about 50 hours a week in order to make ends meet. If you accept that structural problem exists, you have a huge number of workers who have to work multiple jobs, maybe two or three jobs, and that becomes a big coordination problem both for the individual workers and for the business, because there's fundamentally a scheduling problem. How do you as a worker work around your schedule and the different jobs you have to have to make ends meet and how do companies work around that problem in terms of finding labor consistently when they know that any individual that they have working for that is working in multiple different places.

There's a need for coordination and flexibility in the labor pool, and I think that it's really – I'm obviously a techno optimist, but there's really technology that can solve that problem especially as you see the fact that smartphones are becoming ubiquitous and all of these gig economy platforms are making people much more comfortable with the concept, I think the reality of the labor marketplace is really around flexibility and enabling people to work when they want, for who they want, around a schedule that works for them.

[00:55:07] JM: Okay. Jeremy Burton, it's been really great having you on the show. I enjoyed the conversation.

[00:55:10] JB: Thank you so much. It's been great to speak with you today.

[END OF INTERVIEW]

[00:55:15] JM: GoCD is a continuous delivery tool created by ThoughtWorks. It's open source and free to use, and GoCD has all the features you need for continuous delivery. Model your deployment pipelines without installing any plug-ins. Use the value stream map to visualize your end-to-end workflow, and if you use Kubernetes, GoCD is a natural fit to add continuous delivery to your project.

With GoCD running on Kubernetes, you define your build workflow and let GoCD provision and scale your infrastructure on-the-fly. GoCD agents use Kubernetes to scale as needed. Check out gocd.org/sedaily and learn about how you can get started. GoCD was built with the learnings of the ThoughtWorks engineering team who have talked about building the product in previous episodes of Software Engineering Daily, and it's great to see the continued progress on GoCD with the new Kubernetes integrations. You can check it out for yourself at gocd.org/sedaily.

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