EPISODE 349

[INTRODUCTION]

[0:00:00.2] JM: Everyone in the world should have some basic level of guaranteed healthcare. This is not controversial, but what should that basic level of healthcare be? Most of our healthcare costs are incurred in the later years of our lives, so should guaranteed healthcare extend into the later years of our life? How much has modern technology driven down the cost of what it should be to treat a patient? Maybe based on those cost reductions we can offer much more guaranteed healthcare.

Healthcare today has lots of problems with bureaucracy and poorly aligned incentives, but the potential of vastly better healthcare is clear to technologists and advances in software and hardware have benefited other enterprises. They're eventually going to make their way into healthcare. They're eventually going to reduce the cost. They're going to improve oversight. They're going to lead to better health for everybody. It's just a fundamental truth.

Watsi is a nonprofit with the goal of seeing a world with universal healthcare. Watsi facilitates crowd funding of patients who need low cost, high impact treatment. That sounds like a great investment to me. Y Combinator research recently funded a study in collaboration with Watsi to study using technology to improve the quality and reduce the cost of healthcare. They looked at where can we reduce waste. Where can we improve the experience?

Thomas Bukowski is a software engineer with Watsi and he joins me for an interview about what universal healthcare even means and what the roadmap to getting there might look like, as well as some of the technologies that are being used today and what might be used in the future.

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[INTERVIEW]

[0:03:25.0] JM: Thomas Bukowski is an engineer with Watsi. Thomas, welcome to Software Engineering Daily.

[0:03:29.3] TB: Thanks a lot for having me.

[0:03:30.7] JM: Watsi is a nonprofit with the goal of providing universal healthcare. What is universal healthcare?

[0:03:39.1] TB: In general, what we believe is that everyone on earth deserves the right to healthcare. If you're sick, you should be able to get the healthcare that will make you better. That's essentially what universal healthcare, is everyone can — If we know how to make you better, you can be better.

[0:03:57.0] JM: Nobody would argue against universal healthcare. We would never argue against that, but some people might think this is not feasible. What has changed recently that has made this a feasible aspiration?

[0:04:13.0] TB: Right. I think no one would argue of the principle, like, "Oh! If you're sick and we know how to cure you, it'd be great if you could be cured." I think it's always come down kind of how much it costs and who gets what. I think the — It's really really hard to sit down and do even sort of on the back of a napkin or macro-economically speaking and say, "Oh, for this country, it's feasible, or it isn't feasible for them to get universal healthcare."

A good way to think about that for example is that in the U.S. we have really really great kind of end of life care. It's the statistics around like, "Hey, the last six months of your life you spend —" I don't remember exactly, but half of your healthcare spending is in the six months — Last six months of your life in the U.S. for segment of the population, versus like — And that's kind of an artifact of how our system is run, it's mostly insurance-base and it's that versus like, say like the NHS in the U.K, they kind of control spending in a lot different way.

So it's kind of like — It's interesting you start with the question; how do you define universal healthcare, because it really does matter. Is that last six months a very expensive care gets you another month of life and then a few months life. Maybe another few months of life where you're like in a hospital bed. Is that worth it or not? That's a very difficult question to answer and also one of those questions where you're like if I ask in one way in terms of like for someone else, you might be like, "Well, yeah. Maybe that's not where I'm spending $2 million to do that.

If it's you who's sick or your mother or your child who's sick and you can get them — We can spend a bunch of money to get them another month, or two, three months of life, or whatever it is. You might be inclined to answer very differently. What has changed that has allowed us to achieve this versus — In a way, it's always been achievable. I think in general the world has gotten more wealthy, which means we can spend a little more in healthcare than we've had in the past, but it's not like a — I wouldn't say that it's been like sea-change that we're able to do that versus like, say, self-driving. I feel like there's a sea-change where like now we can do it versus in the past it was like, "Oh, that actually was kind of unfeasible."

[0:06:28.1] JM: Even if we redefined it as universal healthcare is you get everything taken care of for the first 40 years of your life, that would be a pretty ambitious goal, and that's something that I do feel we have the economics to achieve in the foreseeable future. The reason we have

that economic feasibility is because technology lets you do more with less and we have had some really good technological breakthroughs in recent years.

Some of them have not made it as far into the healthcare system and we would like, but you can just look at them as a scientist and say, "Okay, smartphones, and internet of things, and cloud computing are going to dramatically reduce the cost of a lot of these healthcare stuff," not to mention 3D printing, and robotics, and this stuff is actually kind of cheap because we figured out how to do this supply chain stuff really well from smartphone mass production and now we're getting into electric car mass production.

The cost of all of these hardware components are going far down and the safety of this procedures are going up because of computer vision oversight potential. It's of course hard to get these things distributed evenly. What are the most salient technological contributions that you've seen to lowering the cost of care for some of the procedures that you see people getting through Watsi?

[0:08:15.6] TB: Right. In terms of 3D printing of limbs and prosthetics, we've actually done a bunch of — We funded a bunch of those. I guess they're not technically surgeries, but those — Prosthetics, right? Folks that have lost limbs or otherwise had limbs amputated and things like that. This is in like a clinic in Rural Guatemala. Because of these supply chain things and a lot of those kind of changes you made, it's not very difficult to get those prosthetics to a place even like Rural Guatemala and sort of get them installed and working and have that kind of be like a feasible medical procedure to do in the middle of nowhere.

I think there's at least two big categories when it comes to how technology has been changing healthcare in the last 5 or 10 years. I think one big category is definitely telemedicine and sort of new kinds of procedures that we can do now that we couldn't do before without, say, three different kinds of technological breakthroughs. Those are kind of the procedures where often they're going for clinical trials, going for FDA approvals and this and that. That's one branch of it where it's kind of — It's kind of the most obvious improvements that you would imagine. It's like, "Oh! We can make this thing before now. We can make this thing. Now, we can do something new with it."

I think the thing that Watsi is working on more is the kind of — It's kind of what I hinted earlier around — Sort of the allocation of healthcare. How do you — A lot of times it's not that — For a lot of countries it's not that they don't have quite enough resources or money to provide whatever benchmark it is. Like you said, the first 40 years of your life, or even in a more basic sense, just like primary care, like cuts and bruises, in developing countries, malaria and TV and kind of HIV treatment. They often do have enough resources to treat those, kind of these relatively simple — Or the treatments are relatively simple on most of the time.

The ability to sort of allocate funding in the right way. It's the ability to know how much of these — How prevailing these things are. It's the ability to know that the procedures or even the drugs or those currently. A lot of that kind of like — It's just really data and kind of crunching data. In a way, a very — In the same way modern computing in a way started with being to — Excel was kind of the first big thing where it was like, "Oh, this is great." Instead of doing on a piece of paper, I can just do it on the computer. We're still kind of at that stage with a lot of that kind of like healthcare funding and allocation, especially in the developing world.

Especially like — It's like there's this so many — I've seen so many systems where it's just like, "Okay, they have to send weekly reports and monthly reports and quarterly and annually reports." How do they get reports? They just literally flip through these huge books and you just add all the numbers together. It's like human Excel. Then like they send these pieces of paper like snail mail to the minister of health, with the district health office or whatever it is.

It's like that's where it's, "Wait. We can do some very simple things there." It's not quite so simple to implement, but the technology and stuff in way can be quite simple to kind of make this way more efficient. Also just know what's going on in the ground, because when you — When a task is very tedious, it's like you're like, "Okay, maybe I'll just kind of — Oh! It was 23 malaria cases last month, so I'll just write 23 this month."

It's just kind of like — It's one of those things where it's like — That's something that ends up happening a lot. If we can take the tedium away and through that increase the accuracy of data. You can suddenly do sort of allocate healthcare and the funding for healthcare a lot more precisely but also a lot more equitably that you could before.

[0:12:04.9] JM: Watsi itself enables crowd-funded healthcare. It's a nonprofit. Explain how that crowd-funded healthcare works.

[0:12:14.1] TB: We partner with a number of medical partners on the ground like I've mentioned before, in Rural Guatemala, but also in East Africa, a few in Southeast Asia, in Cambodia, Philippines. Essentially, when they have someone who comes in who can't afford a treatment that they need, they have an option to send some details about themselves, like a photo or something. A little bit about sort of their life and a little bit about their meta condition to Watsi and then we can put it on the website. Folks can fund it kind of just like you fund Kickstarter or GoFundMe. When the — That procedure for the fully funded, then sort of Watsi in a way in essence pays for that procedure instead of that patient having to pay for it, right? [inaudible 0:12:58.9] that patient.

Often, what happens is that folks sell their cow or sell their land or lease their land or sort of borrow a whole bunch of money from their community in order to be able to pay for these procedures instead of that. We can, in a way, allow folks to do that without going into what this end up a similar developer will sense of just going to go and bankrupt to pay for in a medical procedure.

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[INTERVIEW]

[0:15:02.9] JM: The kinds of treatments that Watsi tries to facilitate are low cost, high impact treatments. When you identify a patient with a low cost, high impact treatment, you can get a lot of leverage out of the particular crowd-funding campaigns that people might contribute to. By logging on to Watsi and I'm looking through these different campaigns, I can see, "Oh! Here's a person where if I donate $5, my $5 is going to go really far, because it's a low cost high impact treatment."

What's an example of a patient that I might see or a type of condition that I might see if I log on to Watsi and I'm looking through I might potentially want to donate to their case? What's an example of a low cost, high impact treatment?

[0:15:52.5] TB: Yeah. I think one that's — One that's very common. One that's very common is hydrocephalus, which is a kind of — I'm sure I'm going to get the medical details wrong, but roughly speaking, a certain duct in your head gets block during or shortly after birth and a fluid builds up in your head and you see a lot of these photos a lot of times where I watch these babies with really swollen heads, and it's relatively a simple procedure. You can definitely die from it, but it's a simple procedure, but it's $200 or $300, and $200 is a lot of money for someone who's annual income is $500 a year, a thousand dollars a year.

Also to come up on the spot when you're already spending something 8to give birth in a facility to travel to the hospital or the clinic and things like that, that's something where $200 is not that much money, especially for us who are software engineers, we're like, "Okay, that's not a crazy amount of money, but that's something that literally can save a kid's life." That's a very common one that we fund.

We've done some prosthetics. That's been kind of pretty interesting. A lot of those are just folks that otherwise just sit at home and just kind of — They become a dependent. They can't really

work. They can work in the fields. They can't go get a job. There's a lot of stigma around losing a limb and things like that, or just stigma around just being this abled in general. All these folks can now go and they can work in the field. They can go work — Go man the family shop and things like that.

[0:17:23.6] JM: How much does it cost to attach a prosthetic these days? Because I know you said printing it is not expensive at all, but is attaching expensive?

[0:17:30.6] TB: Attaching is not super expensive. A lot of it — A lot of times the wound and things like that have been dressed and filled already, but a lot of it is like the training and just extending times so folks know how to use it, know how to actually maintain it and to clean it and things like that.

I think one thing that makes these procedures sort of low cost and high impact is that we're not kind of going to Guatemala and be like, "Let us try and find some patients, and then find them a hospital or a clinic to get a procedure." Rather, these are existing nonprofits. Existing — The organization we're working with in Guatemala has been thee for 15 years, I want to say. They're pretty good at serving this very low income population. They often get some of the prosthetics donated from someone. And we're kind of often covering the last mile of the funding where it's like, "Oh, they just need some transport cost," or like, "They just need —" It's a little bit, where it's like — Again, could this nonprofit just kind of eat that cost? Sure.

At some point, you can eat so many of these costs before it doesn't make sense anymore, rather before it means actually the organization goes bankrupt as well. Often, we're kind of covering so it kind of makes — It's a revenue kind of neutral thing for the nonprofit to be able to do the procedure. We're not paying for some a surgeon to go live in Guatemala and make hundreds of thousands of dollars a year obviously.

[0:19:06.2] JM: You're communicating with nonprofits and you're augmenting the nonprofit, so the nonprofit identifies a case where here's an opportunity to put a low cost, high impact treatment and posts that case on Watsi for people to donate to and potentially fund the low cost, high impact treatment. Even if it doesn't get funded, the nonprofit will take care of the cost.

[0:19:32.8] TB: Yeah. I think we've never — We got our model with the crowd-funding. This is different from, say, like Kickstarter for example, is that we'll leave a case on the website for until it's funded. There's not like a time expiry or kind of a limit there. We also have — From a different corporate partnerships, I think we have kind of like a fund. Essentially, we have a bucket of funds we've raised in mind for our patients, but not for a specific patient. In some cases, we can also kind of draw down that fund for various different reasons.

We've never — It's quite tricky for us to go back to one of these organizations and be like, "Hey, this surgery, or this procedure, that they may have already done, because they're going to wait —" Once we promised that we're going to fund something, they're not going to wait around for a couple of weeks for people on the internet to fund it and then we'll just like have this guy sit there and wait until this happens. It's like we promised.

This same thing happens in insurance in companies, say in the U.S. The ideal is that there's a set of things that the insurance company kind of pre-approves and that you don't like. The ideal case, you're not standing there waiting for a phone call to the insurance company and hopefully the cost and they're not too busy, right? Before you know, the doctors — To be able to get something approved before they do the procedure. Unfortunately that doesn't always happen, preferably in the U.S., for example. There are definitely many many cases when people are — People die literally waiting for the insurance company to pick up the phone or figure out whether they want a cover or not. We don't want to be that kind of funding organization, obviously.

As you can imagine, it's very pragmatic if you say you're going to fund something and then not going to fund it afterwards. We do a bunch of forecasting to make sure that we know we didn't cover the surgeries that are kind of incoming and then we'll guarantee funding for every kind of case that we accept.

[0:21:32.1] JM: Y C research started funding a project with Watsi to study universal healthcare. What are the goals of this research project?

[0:21:45.1] TB: Right. The Watsi research project is kind of a step forward kind of towards our kind of — Over our organization's mission to be able to make sort of universal healthcare possible. What we're doing there is to look at — Essentially, explore if there are ways we can

use technology to make funding primary care more efficient and sort of accelerate progress towards universal healthcare. I think it's important to remember our focus is on developing economies. We're not trying to solve this problem in the U.S. or in the U.K., on Canada. Mainly because we're not — That's not we're expert in, and the majority of our team's experience has been in the developing world, has been in kind of working in these settings. Also, it's kind of — It's a place where technology can have a really large impact.

I think there's lots of startups trying to different things or change sort of the way the insurance is done in the U.S. and things like. Some of them are seeing some really great early signs of success, but the thing about working in a system that already exists like in the U.S., I mean the U.S. sort of healthcare system that existed for probably a good 80 or 100 years. It's like you just have a lot of — Obviously, there's a lot of regulation, but also a lot of existing — It's hard to start something brand new.

In the developing world, there's sort of spectrum. There are definitely countries that are not ready. They actually don't have resources at all to kind of think about doing, even universal primary care. Some countries, they're pretty far along and have health insurance systems — They're kind of getting pretty close to what healthcare in a developing world — Developed country would look like.

There's kind of a sweet spot there where there are places where they're just starting to kind of develop system, just starting to think about, "Okay, I think we can kind of afford rolling out kind of a universal primary care program or something like that, focusing all of the country's citizens and where we even can get a chance to kind of come in and build something kind of with technology from scratch rather than being like coming in afterwards and be like, "Okay. Well, there's already all these paper claims.

How can we make this paper claiming process more efficient?" It's like, "Maybe the notion of claims doesn't even make sense if you know what's happening, if you can know what's happening in the hospitals and the clinics because you can record a lot of that stuff and workflow with technology in real time." That's kind of the sort of things we're trying to explore with that YCR project.

[0:24:18.6] JM: Y Combinator is showing itself to be really ambitious in terms of its scope. Not only has it funded all of these companies, like Airbnb and Dropbox and all these other companies who's gotten really successful. They are pursuing these research projects like universal healthcare. I believe there's also a research project around universal basic income that you could attach a business value too. You could say, "If we're moving towards a time when there's universal healthcare or universal basic income, what does that mean for businesses?"

My sense is that the goals of Sam Altman and Paul Graham are more philanthropic in nature. What are Y Combinator's goals as a philanthropic organization?

[0:25:16.3] TB: I think that's a good question you should ask them. I think from my experience, I think they care about — I think this was clear when they started funding nonprofits as part of the YC standard startup patches, is that I think their — I think what they get excited about is that technology is changing a lot of things, changing a lot of what is possible. Kind of in the similar way where we see, "Hey, you get a chance to do something totally differently if you built if from scratch with technology." We've seen that a lot with like the way that Airbnb works, the way that Uber works, and these kind of companies.

I think they just see that a little broader than just being, "Oh, technology can really change how a lot of these things work, so let's try and build a company. Let's try and build a company around it." They're like, "Well, some things are not quite so suitable to be in the kind of a sea corp structure." I think their goal — Essentially, what they had said is like they get excited about being able to accelerate the progress to these things. They get excited about being able to have an idea and being able to sort of get it going really quickly and really kind of maximize, I think, of brain, something like that, into reality.

I think, in a way, like both their nonprofit programs in terms of the sort of standard YC patches as well as the YCR, the YC research projects that they've been funding kind of fit into this thesis of like, "Hey, if we can—" They're all about making these happen and making — Being kind of like the catalyst and making these things happen where it would just take much longer or just kind of will just — Take much longer to realize or kind of just — The sputter along for — Or take another five or 10 or 20 years before someone will kind of — The right set of circumstances would kind of align to let this idea of being — Of applying technology to this particular area in

this particular way kind of come to fruition. I think that's really their — Their motivation is just like, "Hey, this stuff — There's so much potential. Let's realize the potential of faster.

[0:27:20.7] JM: There are these inefficiencies in the healthcare system of the United States and there are similar inefficiencies in other healthcare systems, whether you're talking about Africa or any country, there are issues around fraud. There are operational issues. What are the low-hanging fruits that can be ironed out with technology in terms of the inefficiencies?

[0:27:52.1] TB: I've been at Watsi about four years now and I think the thing that always surprises me is that a lot of times it's the very simple applications of technology that can be really helpful. It's like being able to sort of see a list of all your cases, or see a list of what has happened in the last week. Being able to track state across a case. Like, "Oh, this has changed, it still ha to follow up. This isn't a follow up." A lot of those kinds of things.

I see a lot of — For example, a lot of our partners on the crowd-funding Watsi org site, they all are like going for the most thing. Where they're like, "Okay, let's try and use Asana to track our patients, and let's try and use — We use Trello to do it." They're all kind of doing the same kind of thing we do where we're like trying to track whatever we're doing, like product ideas, or like engineering request. Where we're like trying to wrangle these same tools, wrangle these kind of abstract tools like Asana or Trello to kind of organize our work.

At the same time, in the same way that we find awesome work, we're like, "Oh, you know, Trello works pretty well, but it's really heavyweight and you really need to be much bigger for it to be useful and to make sense. In the same kind of way, there's a lot of software, like EMR, electronic medical record systems, and like hostel management systems, all these kind of things, but they're all super expensive. They have huge sales teams. They're big enterprise appointments. They're often very not designed for the developing world. They're not designed for the internet cutting out. They're designed to be like the power cutting out to just serve that's hosting all the data and the software, things like that.

Often, it is just kind of getting organized like that, that is very tricky. That's something that, I think, well-designed software can really make a big difference. You do have to kind of really understand how exactly do they work and it's not about you can't quite just be like, "Let me

come in and apply, just put in the sales force instance." It's a little further outside of, I think, our experience, like living in the western world, living in the U.S., like living in — Also, living in these places where there's a lot of technology where everyone has iPhones, everyone is used to kind of using — Everyone's used to the idea that you have this huge system, all the cloud and all these data all over the place. Those are not concepts that are familiar.

When we got the pilot for the universal healthcare grant from ICR off the ground, we have built this app, we're recording kind of all the health interactions that happened in this one clinic in Uganda. I think after about a month or so in, the clinic needed to do a monthly report and they're actually like, "All these data we entered, is there a way to see it? Do you guys have the data?"

It's like, to us, if you're entering data into an app, you're like, "Of course, it goes somewhere." But they're just like, "Oh, is that possible?" We're like, "Yeah, we can do this report." It doesn't take very long to pull a couple of queries and a report. "I mean, if we do this report for you, what do you need to know?" They're like, "You needed to know how malaria cases." Actually, it's quite difficult to understand — To kind of get to the discussion level of like, "Hey, what do you need to know from the data?" Because even the console of like, "Hey, there's this whole data store," and we can query it and give you answers.

I think most people, even if they might not understand all these database and these queries, but they understand kind of the intuitive interaction with that, that kind of entity. Just getting to the point where they're like, "Well, can you just show us a list to all that cases?" We're like, "We could, but there's 1,100 cases." You probably actually want to — What actually do you want? Because I'm pretty sure if I give you 1,100, you're going to start counting for a bunch of things you want to count for. Maybe you tell us what the counting is for then we can give you the counts.

Even that kind of interaction, like a lot of that stuff — Again, is that technology very complicated? No. But you actually don't want to deploy very brand new, like kind of cutting edge technology in the middle of nowhere in Uganda, for example. You actually want to like, "Okay, let's go over the time test, things that work pretty well," because the whole bunch of other stuff goes wrong. Then you're like, "Okay." It's not quite as straightforward as that, "Oh, I built an app. Let me get all my friends and then we'll just go there, try it." It's like the infrastructure not.

The things that you don't even realize you're depending on when you're building software, you end up not being able to depend on. It kind of really surprise you because of how the way it just breaks your cognitive dissonance.

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[0:32:24.2] JM: Your application sits on layers of dynamic infrastructure and supporting services. Datadog brings you visibility into every part of your infrastructure, plus, APM for monitoring your application's performance. Dashboarding, collaboration tools, and alerts let you develop your own workflow for observability and incident response.

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[INTERVIEW CONTINUED]

[0:33:48.5] JM: What are the early findings from this YC research project going after universal healthcare?

[0:33:56.1] TB: I think a couple of things that have been interesting are maybe — I think the first thing that's been interesting is that there are definitely a decent number of just straight up dosing errors, and also like a lot of antibiotic usage, a lot of things like that where it's like you kind of take any — You can pick any M.D. off the street so to speak and take a look at some of the records, and we're like, "Yeah, this one probably didn't prescribed that drug. There's not

really a test for this." Actually, this typhoid testing structure they're using, those actually don't work at all. It's not even a thing anymore. No one uses them anymore, but no one has quite gotten to like this part of Rural Uganda to tell them that like, "Hey, don't use this anymore. They're not very accurately useful."

There's a lot of those kind of very basic [medicards] that just there's no — Again, if you grab a Harvard M.D. and then put them in this clinic in Rural Uganda, they can. They will be able to find those things after a week pretty quickly. Even just being able like, "Now, we can send a case to someone that haven't looked at it." Even that just has identified a lot of these kind of errors.

Even just the mere act of collecting data has given that a lot of insight and a lot of like very obvious improvements you can make. I think on a meta level, and this kind of, I think, portrays how complicated healthcare is, I think we've had to — Technology is definitely a part of what we're doing, but we've had to put together a pretty — A lot of different parts of like — Essentially, we're rolling out a bit of a health insurance program. We have to put together a lot of other parts to kind of make the whole thing work and make sense for folks to come in and sort of get this primary care.

One thing we did was that — We made the copay for visiting the doctor essentially very very low. It's about a thousand Ugandian Shillings, which is roughly 30 U.S. cents, per visit. That's the copay. It doesn't matter if you're coming in to give birth to a baby or if you're coming in because you have a cold, or like a bruise, it's kind of all the same price.

The thing that's really interesting about that is that has dramatically increased the — Two things have been interesting. It's dramatically increased the usage of the clinic and it's also — The program started March 1st. Before March 1st, almost no one came, because everyone was kind of waiting. It's actually a little bit kind of heartbreaking. Folks were getting like their malaria, for example, is getting quite bad, but they're like, "Well, I didn't go now and it's going to cost me six or nine or 12,000 Shillings," which is like a couple of dollar," or I could wait a week and stay sick but then it'll only cost me a thousand."

One thing that's interesting is that like we've made this decision which — It's a controversial decision, the idea that like patients essentially don't have to pay for their healthcare. That's a

very controversial decision to make, but we're like, "Well, we've kind of isolated the factors here, so let's start with —" We're trying to collect data on the clinic and the healthcare interaction in this clinic." There's not much data to collect if no one comes in to clinics. I guess that's removed the barrier, the financial barrier to get access care.

We did that, but then that has a whole bunch of other effects where it's like, "Okay, great." Now, people are getting — They have a lot of more access to care. It's a lot more affordable than before, but then suddenly the onus is like, "Okay, this —" Like, we're both in each registration where we've made a controversial decision in terms of how a healthcare system should be run without really quite realizing that we did that.

Also, we have to deal with how sustainable is a system if everyone's only paying a thousand shillings for their visits? That requires a decent amount of external support. That external support doesn't necessarily have to come in donors. Governments obviously pay for healthcare all the time. Part of what we're trying to do is more like build the financial model and be like, "Hey, this much healthcare access for this kind of quality, this is how much you have to pay for it per person per month." Kind of very much how an insurance company will build an extra model around that.

We're trying to be able to build that out and have real data to back that up and reliable accurate data and data that's like coming in everyday, that's like, "Hey, look. This is happening right now," and really show that, and not necessarily make a huge kind of like philosophic argument around whether a patient should or should not pay for care. It's very controversial. It's like we're definitely — We're getting into healthcare systems in global health, but we're definitely not experts in whether or not you should pay — Whether or not a patient should pay in the effect that it has on access and the effect it has on delaying treatment and whether that is okay or not and whether — Also, all the kind of effects that happens around that.

We kind of — Let me back up for a second. I think it's interesting that like — It's one of those kind of problems where it's not like, "Oh, I'll just — We just built an app that we put it there and it's going to work." It's like, "Well, you have to make all these other decisions and all of a sudden you're designing healthcare system. Yeah, okay, this technology piece that you're doing that's interesting, but you have all these other — This whole healthcare system. You need to decide all

the decisions to make and those decisions are not — They're like fraught with pearl in a lot of different ways. Obviously — You can make the wrong decision and people die because of it.

Because of how the gravity of that, people have a lot of opinions about those decisions and about what — Whether people should pay or not. All that kind of stuff. Yeah, it's definitely like a 10, 15 years ago, especially in the .com boom. There was a lot of — I think there were a lot of kind of low-hanging fruit ideas where it's like, "Hey, you need a way to buy things online? Let's build a site where you can buy things online." Obviously, there's a lot of debt that comes to that, but the kind of way that technology applies and also kind of the work you do that's not technical to get to a working product, let's say. It's actually relatively low.

I actually feel like in the last five years, let's say, a lot of those kind of low-hanging, kind of easy to apply technology to ideas or arenas in those industries are like mostly done. Now, kind of to find a place where technology can really make a big different, you have to dig a little deeper. It takes a little longer. You have to become an expert in other areas or at least be cumbersome in other areas, industries that in order to then be like — Also, we think we can bring this really interesting chain of technology.

[0:40:08.3] JM: We have the consumer adoption model, which is pretty well-understood. You get some early adopters who really want to buy books online. A book is a low-risk transaction. People are willing to shift their spending to online for books, and then they find it's great and they're happy to lever it up into toothpaste and so on, or you've got enterprises that are looking for a competitive advantage and they're willing to adopt to new technologies and so you can sell technology to them. Selling into the healthcare system is different, and it's different because when you're describing these extremely low-hanging fruit problems that are basically like visualizing your data or getting a tool for just retrieving the data that you've entered, or even just the idea of an electronic medical record is still controversial. In a lot of ways, in an adoption.

Part of it is an adoption problem. Part of it is the interface is terrible. The interfaces that people have to use because they're HIPA compliant, at least in the United States. Maybe it's HIPA compliance exactly that is the reason for that. A lot of these seems like it's adoption, it's mindset, people have been doing things for a long time and it works okay, or at least it works in a way

where we understand the risk model of these technologies and string outside of the bound to A-B test set of technologies when the risk of a negative event could lead to somebody getting severely injured. It's just not a — It's not like the consumer model, or the enterprise model where you've got these low-risk transactions that you can gradually wean people on to it.

In the healthcare system, it's just higher risk. However, because where I'm going with that is in a place like Uganda, it seems like there would be less red tape. It seems like you would be able to get people who are willing to take these kinds of risks if you can lower the cost a little bit. Are these developing countries a good place to test more advanced models for doing healthcare in terms of the applications that you're using just because you can deliver those direct cost reductions and there's not red tape?

[0:42:35.2] TB: Let me actually quickly address a previous in terms of the adoption models.

[0:42:39.7] JM: Sure. Yeah.

[0:42:40.2] TB: I think we often think about with the kind of YCR project, we also think about that our ultimate customer is actually the government, right? There's the consumer auto. You're like, "Oh, that's a way to do something or a better way to do something," and it's easy maybe in the long term, but it's low friction to get a customer to try — If you have consumer to try using jet.com instead of Amazon, let's say.

Then there's the enterprise, or kind of B2B model. I think the interesting thing about — I don't know if I can make a point about selling to governments in general, but I can say in terms of healthcare and healthcare systems, is that often you need to be able to demonstrate that this is actually better or cheaper, right?

The tricky thing about that demonstration is that it's very hard to — If you make medical devices and things of that, that's kind of has a more — That has a more established way of doing things. Also, at the end of the day, you're doing something that makes one person healthier, so you can start with one person.

When it comes to healthcare system, when it comes to sort of how you finance healthcare, you kind to have to put together a whole — A mini-functioning system, right? We have 2,700 or so people enrolled in the system we're running out of the clinic, that's one clinic in Uganda. I feel that's kind of the "mini-est" we could get it. Any smaller, it doesn't really — It's not really kind of real enough.

We're in this kind of like — In a way, a protract exercise to demonstrate that, "Hey, we've put this whole system together. We've made some decisions." It's got nothing to do with technology, that are controversial, or many decisions that can be easily argued with. Like for example the part where the copay is very low. Also, then we have the technology part where we feel like that — Better transparency, better data, better understanding what's going on, easier and more accurate pricing, all that kind of stuff.

We'd be able to kind of demonstrate this is whole system works pretty well and then kind of lobby for adoption or a pilot with a government clinic or like kind of other paths like that. That's kind of a whole — Maybe the old kind of term that governments move even slow than kind of enterprise, or corporations, is definitely true. They also require a lot more proof and a lot more kind of like, a lot of improvement and a lot, lot more kind of — Not networking. In a way, it's like self. In a way it's like you really have to partner with the government. You have to do it with them, and it's not as much a, "Hey, I've developed this one solution that I can just sell to one company and then two companies and a hundred companies." Now, all of a sudden, you're a sales force.

Can you remind me of the second question? Sorry.

[0:45:20.6] JM: I was asking about just the adoption of technology in a place like Uganda relative to the United States, because in United States the risk model will scare people away from doing things differently, but in the Uganda, the savings might override any sort of risk model.

[0:45:43.9] TB: Right. I would caution against — Thinking in that way. I think the folks in developing countries, folks in Uganda, in lots of these countries, they are minister of health departments there. They have folks that are just as highly educated, just as intelligent, care just

as much about a system that works well, a system that doesn't harm people. They're not, in any way — I wouldn't say they're any less risk averse than, say, if you went to Kaiser, or into Medicaid and be like, "Hey, why don't you guys try this thing out? I think this thing will cheaper."

Yeah, they care more about savings, but it's hard to — I wouldn't say they care about it kind of so much more than, say, Medicaid or like any insurance company in the U.S. would care about a way to be able to save money, right? I think a lot of folks have the impression that, "Hey, I can go over and try this thing out." Like, "Oh, they're so poor, and they'll be willing to try anything out be it'll save them a little money," and so on and so forth. I think there's lot of fatigue in these governments, in these departments of health.

I've got folks coming in and be like, "Hey, we're going to just try this thing out." Of course, they're like the horror stories where it doesn't work out so well and a bunch of people will get injured and so on and so forth. They're just as much like, "Look, we're not your testing laboratory ground for your new cool device," and so on and so forth.

Even though you sort it — It's definitely easier, I think, that there's definitely — It's easier to get to a point where you can try something in a developing country than, say, in the U.S. They're not any different than we are. It's the same —

[0:47:29.8] JM: I was talking mostly in terms of things where it's a different way of managing your data, or a different way of presenting data to a nurse. A hospital in the United States is going to be completely averse to anything new — Most hospitals are going to be totally averse to any way of doing something new. There's a lot of legal risk associated with it too. I don't know. I could just imagine maybe a healthcare provider in Uganda being more open to something like that, but maybe I'm totally mistaken.

[0:48:05.0] TB: I think they would be more open, right? I think you get the same thing. You get the same kind of like aversion to new technology/new things/just change, that I think you would get anywhere. Everyone always loves skeptical when you bring in this new thing. It's like, "Oh, it's going to be way better," and it easier.

I guess you can do that there as well. I don't know if it's hard — It's easier or harder. I think the tricky part is — It's a different kind of tricky. I think in the U.S. it's difficult because of regulation to get a data. It's difficult as the data is still the way it's not digitized. There's a lot of just being able to get at the data that's difficult in the U.S.

That's a similar kind of problem in a place like, for example, Uganda, where it's more about the data, is kind of literally not recorded. It's always recorded, but often it's not accurate. Often, there are a lot of issues with that kind of stuff, and so you're like, "Okay, I can get all the data and you digitize off it." Mostly, get it on to a database. It's like, "Wait, is it really even that meaningful?"

A lot of these — The developing — That far behind, really. In some ways, they're a lot more ahead. There's lot of — There's assistant, DHIS, the District Health Information system. It's an open-source package, for example, right? That's something like, I think, 40 something countries, government minister of health departments run on, and like data gets reported from like the clinic level up to the district up to the whole country ministry. They can see all the relations and see things like when disease breakouts, all that kind of — All that stuff is — They have all that stuff already. Is it like great software? Is it like the best UI ever? No. I challenge you to find healthcare reporting software that is a really joy to use in the U.S. as well.

A lot of that is there, and it's not like as much of a backwater as people think it is. I really think the opportunity often is the blank slate when it comes to a lot of these systems. It's the blank state when it comes to — There isn't an existing health insurance program in any kind of governmental country-wide sense, and it's on the cusp of putting one of those. In a way, the opportunities are kind of these countries kind of developing, putting in a health insurance system, or putting in some kind of like universal healthcare system for the entire country, or kind of all the milestones like that, and being able to use technology in those situations as supposed to, "O, this is a really — I could bring them something that does exist in the U.S. but doesn't exist over there." Do you see what I mean? It's more about being able to do it, "do it right from scratch", but really do it right in the sense of — When we first evolved the U.S. healthcare system, there was no technology and you had to — Human Excel was the only way you're going to do any of these accounting and collating all that kind of stuff.

A lot of how our systems work, a lot of even insurance companies work just internally are still built off of — Are still vestiges of the fact that there were no computers that could do this. There was no internet to be able to send things. The companies weren't networked in that kind of way. Now that it's 2017, we can — If we were to build it form scratch, we would have built it in the same way. There's some places where they haven't got all the stuff in place already, so let's build it from scratch in the right way, or at least in the 2017 way as supposed to like the 1926 way.

[0:51:42.6] JM: Right. Okay. I think that's a great place to close it off. Thomas, thanks for coming on Software Engineering Daily. It's been great to talk to you about Watsi and where we're going with healthcare.

[0:51:53.4] TB: Thanks so much for having me. Hopefully, this was interesting, a lot of higher level maybe than a lot of the typical shows on here.

[0:52:00.9] JM: That's great. It's good to have a balance between the lower level stuff and the higher level application user level stuff.

[0:52:11.0] TB: Yeah, thanks so much for having me.

[END OF INTERVIEW]

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