Ginkgo Bioworks

Ginkgo Bioworks presentation delivered at the 40th Annual J.P. Morgan Healthcare Conference on Wednesday, January 12, 2022 at 3:45 PM

Rachel Vatnsdal: Good afternoon, everyone. This is Rachel Vatnsdal, with the Life Science Tools and Diagnostics team. It's my pleasure to introduce our next company, Ginkgo. As a reminder, if you have any questions, please submit them via the Q&A function on the conference website.

With that, I'll turn it over to Jason.

Jason Kelly (Co-founder and CEO): Thanks, Rachel. I'm Jason Kelly. I'm the Co-founder and CEO here at Ginkgo Bioworks. Quick reminder, during the presentation today, we'll be making forward-looking statements which involve risks and uncertainties, including about certain unaudited preliminary financial information. Please refer to our filings with the SEC to learn more about these risks and uncertainties.

I've been fortunate to speak at the last several J.P. Morgan conferences. This is our first time as a public company here at Ginkgo. We took the company public in September. We listed on the New York Stock Exchange trading as DNA. I know we're on hallowed ground with that ticker.

My father actually is a Type 1 diabetic. He's also a pharmacist, so I know all about Genentech and Humulin. Recombinant DNA technology made a material difference to my family. Humulin was approved by the FDA in 1982. It was actually one year after I was born.

We also know we're a new generation here at Ginkgo and that we stand on the shoulder of giants that came before us. I promise we'll work our butts off to live up to that ticker.

We've been very fortunate over the years as a private company to have built trust with an extraordinary group of long-term investors, but I recognize we're also building new relationships with a new set of public market investors and analysts.

I'm delighted today to share that we expect to meet or beat our outlook for 2021 numbers that we shared on our Q3 earnings call for the number of new programs, for Foundry revenue, and for biosecurity revenue. In fact, the biosecurity revenue exceeded our outlook by over 50 percent.

We hope to continue to earn your trust over time, for all the new folks that are getting on team Ginkgo now. For those of you who are hearing about us on this call for the first time, the most important thing you should understand about the company is that we operate with a platform business model and mindset.

We don't develop our own products, but rather, we enable our customers to bring products to market leveraging our technology. What do I mean by that? A customer will come to us with a spec in mind for what they would like an engineered cell to do.

For example, we announced a deal on Monday with Selecta Bio, where we're exploring novel capsid designs to improve gene therapies. What we do there is, we work in concert with the R&D leaders at Selecta and the scientists to agree on a technical plan.

That plan, depending on the project, might be six months. It might be three years, depending on the complexity of what we're doing. Our job at Ginkgo is to ultimately deliver a cell that's been engineered to meet that spec.

The advantage we have, the reason a company would work with us, is, we have access to the Ginkgo platform, which is made up of two key assets, our Foundry, which is a highly automated lab that I'll talk about in a second, and our Codebase, which is all the data that comes out of that lab and intellectual property that can be used to make future projects easier.

Our business model at Ginkgo is, during that R&D phase, we're receiving upfront payments during that R&D period when the organism's being engineered. Then, if we're successful for the customer, we would have a downstream value share. This could be paid in some combination of milestones, royalty, or equity in the partner company.

This value share model takes a page from app store business models in tech. A place like Apple would take a small piece of many applications on the platform. Similar idea here, we want to have a small piece of many application pies in cell programming.

One of the things that gets me very, very excited about raising new capital at the company is that we can spend that $1.6 billion largely into growing our infrastructure at Ginkgo, both at Foundry and the Codebase.

We do not need to spend the capital on clinical trials, food application testing or agricultural field trials, even though those are all activities that are run by our customers today with organisms from our platform.

We get to spend our capital on facilities like this one. This is a photo of Bioworks 5, our new facility in Boston. It's part of about 200,000 square feet of space we have here in the Seaport. I'm sitting in front of it.

We started running experiments in Bioworks 5 at the end of last year for cell engineering. Look, I spent five years at MIT during my PhD working by hand at the lab bench. I will tell you, this is a much more efficient way to be engineering these cells.

Ultimately, the numbers are what matter here. I liked that, during our pipe process, we were able to publicly share some numbers, some outputs from our facility, that we traditionally kept in-house confidential at the company.

You can see some of those numbers here. We've been roughly tripling the output of our Foundries each year for several years now. You can see us going from 10 to 100 what we call strain tests. The idea behind a strain test is basically, I've engineered a cell, I've grown it up, and I'm running some sort of analytical test to evaluate its performance.

We've gone from 10 to 100 of those per day, to now tens to hundreds of thousands of those per day. Then importantly, alongside that increase in output, we see a corresponding drop in cost, roughly about 50 percent per year for those strain tests.

This is a very traditional scale economic. You'd see it if you were manufacturing cars or semiconductors. The larger the scale of the factory, the lower the unit cost. Importantly, the status quo that we're competing with these facilities is a scientist working at the lab bench.

Like me in Grad school. I assure you, I did not improve with scale. As I did more work, I'm certain I became less efficient. Then finally, the large amounts of data that come out of that facility, then yield reusable data and IP assets in our Codebase.

For our potential customers that are listening in on this call, the pharma and biotech companies, all this infrastructure and IP and data is available to you. This is why we built it. I'm not showing you this platform tac on this call because I'm planning to keep this proprietary for my own set of products.

I'm showing it to you because I want to get you excited and have you give us a call. You'll see my email at the end of the talk. All right. One of our core beliefs at Ginkgo is that fundamentally, all biology runs on the same code, DNA code.

That means a platform for engineering cells could be the same across different species, different products, and different end markets. Here are three programs that Ginkgo completed the cell engineering for in 2021 that our customers are taking to market. I like the breadth that it shows here.

With Aldevron, we engineered a cell to produce Vaccinia Capping Enzyme. This is a key raw material for mRNA vaccines. Aldevron publicly announced last year that we had increased efficiency of that process by a factor of 10 versus what they had been using before. Motif FoodWorks is a customer of ours in the food space.

Here, we engineered cells to produce myoglobin. This is an animal protein that you add to a plant-based burger, which that is a picture of, to make it taste meatier, and to have the right coloring, and things like that.

Then Cronos, our Canadian cannabis company partner, we engineered a strain cell to produce a rare cannabinoid CBG, and that's now being sold in the new product line they launch in Canada today. I love about this is the range.

You have the same platform delivering a tenfold efficiency improvement for raw materials for mRNA vaccines that's helping launch THC CBG, chill bliss gummies in Canada. This seems surprising, but it's really not.

That same underlying hardware in cells, the DNA code, and the low-level biology inside the cell that executes it is really the same across all life. You would expect you can build a common platform for all of it.

The other thing we're proud of from 2021 is that our customers, more than just the three I showed you, are bringing products to market increasingly. We nearly are more than doubled the number of programs that have gone to market this year.

This chart highlights what I think is so unique about Ginkgo across these eight programs. They're six species, four end markets, three product types, six different customers, again, just across these eight programs.

The breadth of work on one common platform has really been our vision for Ginkgo from the first day. It's really rewarding to see that coming to fruition. These are a couple photos from our annual meeting, Ginkgo Ferment.

We had about 700 people turn out in person, thankfully, in October, back in Boston. The diversity and strength of the ecosystem developing around the company is really, really exciting.

You can see a couple of panels we had featuring, Arie Belldegrun, David Chang, from Allogene talking about how synthetic biology can be applied in cell and gene therapy. Reshma Kewalramani from Vertex talking with Reshma Shetty, our president and COO here at Ginkgo.

Reshma Kewalramani and Arie joined our board in 2021 to help Ginkgo as we continue to apply our platform in the therapeutics industry. We're super fortunate to have the two of them on the team and help us understand where to apply our platform best in this space.

We look forward to continuing to welcome new partners and potential partners in the future. This is a lesson we learned from tech companies like Apple, Microsoft, Salesforce, you need to nourish the ecosystem of developers that are leveraging your platform to get the most out of it.

Everyone wins with this. The application developers get a better platform, they learn from each other. We're starting to see that happen in our community. It's really a unique time. I want to highlight this we've now had over 100 cumulative programs launched with partners across a range of industries.

What I like about this is when we demonstrate the application of our platform to a certain class of cell engineering, our application, it helps new customers understand that our platform could be useful in that area. For the companies watching the presentation today, here's a few of the areas where a customer

evaluated our platform and then decided to work with us.

For example, our project with Roche is leveraging our large proprietary DNA sequence database to discover novel biosynthetic pathways that could yield new small molecules. With Totient, we're using the platform to screen for new antibodies.

With Biogen, we're working on improved manufacturing of AAVs. I mentioned with Selecta, we're working on novel capsids also in AAVs. SaponiQx, we're working on adjuvants. Outside of therapeutics, we have $100 million joint venture with Bayer Crop Science to work on engineering microbes for fertilizer production.

We have collaborations for plant extracts in the Cannabis industry, but also flavors and fragrances with large companies in that space like Givaudan, and Antheia in the area of natural products for active pharmaceutical ingredients. A wide range of different things.

Again, if you don't see your application on here, it doesn't mean it isn't something we could potentially help with. As long as it involves engineering cells, that's something that we really are excited to invest in our platform to deliver for you.

While improvements in our underlying platform are a key thing for investors to understand, at the end of the day, what customers care about is whether Ginkgo's technology makes the material impact on the value of their products.

What we're doing behind the scenes here can be largely a black box to customers as long as they're seeing the results they want to see. I wanted to share three case studies with some of the data behind it in terms of things we've been doing for customers.

The first one here Motif, this was shared during our financing, they first wanted to decide what is the right myoglobin protein that would be best for their application, the food industry? The CEO of Motif, John McIntyre, was recently featured on a Bloomberg show and talked about how we tried hundreds of proteins from a range of species, including sperm whales, tuna, pork, chicken, and cows.

In about a year, we were able to develop strains that produced enough product that they could do application testing, so they could try out these proteins in a burger or in a nugget. That's the where quantity they needed to go off in that industry and validate which one they wanted to go forward with.

Then in the following nine months, we took forward candidates they were interested in, and ultimately, built a strain that exceeded their performance specifications on the production side by 70 percent. I mentioned Ginkgo's Codebase earlier, that when we do these projects, we're generating assets that can be useful in the future. This is a great example.

Protein production is now an area where Ginkgo has really great assets. For example, we've evaluated over 100,000 synthetic expression systems to find systems that were ultimately 20-fold stronger than the AOX1 inducible promoter which requires methanol induction in PKS, a common inducible promoter system.

You can see in the chart there in the lower left, we're comparing the output of these promoters versus the leakiness, and selecting ones that fit that well. We've now demonstrated in 10,000 liters scale, greater than 20 grams per liter intracellular protein production levels. Again, if you're a company watching this and you could make use of this asset, please reach out.

We think this is really a unique asset in a space that could be very valuable for folks trying to produce low-cost proteins. Again, this is not for us, it's for you. I mentioned earlier, our work with Aldevron. We're happy to see quotes like this one from Tom Foti at Aldevron that they expect to release BCE under CGMP manufacturing in 2022.

They're servicing more than a dozen clients and expanding manufacturing now. Please reach out to

Danaher or Aldevron directly if you're interested in this product. The project is to understand some of the technical background. It took about 14 months to complete. Ginkgo did both optimization of the genetic constructs.

You can see our design there and some of the features we optimize for, but we also optimized the fermentation process. Optimizing the genetics of the strain alongside the manufacturing conditions doing that in consort is really key to being able to quickly succeed at something that then scales up correctly when you take it to production.

This is a strength of Ginkgo. We delivered this in 14 months, from starting the lab work at Ginkgo, to Aldevron announcing they'd successfully scaled up the process in their production facilities. One more example of a finished project. Again, I'll highlight, we have over 100 projects like this. Don't think these are the only areas we can apply the platform. I just want to give some case studies.

We're also very happy, by the way, if you have a new project that you're interested in, one part of Ginkgo's sales process is to have our scientists actually look at your project and help you understand where our platform could be useful. Don't hesitate in that case. We have about 50 meetings with companies scheduled this week and next. It's the virtual world, so it's easy to add them.

I'm really proud of the work we've been doing with Synlogic. They recently announced SYNB1353 which is investigational medicine for the treatment of homocystinuria, that it had entered IND-enabling studies, and they expect to begin clinical development in 2022. This will be the first therapy going to IND where Ginkgo's cell engineering has been involved in the discovery of the drug asset.

Here, we have engineered a live bacterial cell that degrades methionine that the patient takes, similar to how you take a probiotic. You can see on the right that SYNB1353 shown in pink shows significant decrease in plasma methionine and homocysteine levels over unengineered chassis strain EcN in light blue, or vehicle alone in dark blue in non-human primates.

I want to switch gears a little bit and talk about biosecurity. That's what we've been doing on the cell engineering side. As I mentioned, things have been going well on the biosecurity side. I think it's worth understanding that this is something we've been thinking about in the field of synthetic biology really since the inception.

You can see an old DARPA study here from 2003, this is nearly 20 years ago. Drew Endy, who is my thesis advisor at MIT, Pat Lincoln at SRI, and Richard Murray at Caltech, led this study. They had a slide in there which I really liked which showed our biosecurity defenses as akin into a Maginot Line.

It had been built to fight the last war. As we were entering an era where we could start to design and program biology to do new things, we need to have a more flexible defense. That was the recommendations back in 2003.

There's an updated report from 2018 by the National Academies of Sciences called "Biodefense in the Age of Synthetic Biology," Patrick Boyle, who heads up our Codebase team here at Ginkgo, which is responsible for designing all of our synthetic DNA.

He was part of that study to speak to what are the impacts of new tools that are coming out allowing us to better design cells on biodefense? How could people end up using these things maliciously? What should we be worried about?

Ginkgo itself has had contracts with IARPA and DARPA over the years in this area, going back several years, on things like, "How do you evaluate DNA sequences for malicious intent?" and those sorts of things, more on the R&D side.

COVID took all this from the realm of R&D projects and academic studies to reality. I actually thought this was a pretty funny tweet I saw yesterday or the day before about hotel prices in Union Square in San

Francisco right now. It was $80 bucks for a room that otherwise would be probably $2,000.

Look, not being able to gather is socially tough. It's also economically damaging. If we had better biosecurity tools right now, we'd be meeting in person. From my standpoint, it would have been in the economic interest of J.P. Morgan, local hotel owners, the city of San Francisco, to invest in that biosecurity.

By the way, we've seen this in other industries, in cybersecurity, where we don't hope that something's not going to happen. We build out a set of tools that basically greatly reduce the odds and increase the defenses and allow us to communicate safely and things like that. To me, that's the framework we should be thinking about.

It's not just economic, on the right is the map from Burbio. It shows school disruptions just in the last couple of weeks. This is school closures due to quarantines or lack of staffing. Some of our most important institutions in this country like our K-12 schools need better biosecurity.

There was a time, if you look historically at how these public health measures have played out where, for example, cholera, led to quarantines at borders and closures of institutions. The answer wasn't to keep doing those types of things. It was to build modern sanitation infrastructure so that we didn't have these infectious diseases disrupting our society and economy.

I think it's a similar moment, now. We should be establishing the permanent infrastructure to contain respiratory diseases in general. We should be doing it for COVID, absolutely. That's the thing right in front of us.

We're certainly open, I'd say exposed, to a new potential variant of COVID, but there's other infectious diseases, respiratory diseases in particular, we've now shown ourselves in modern society to be quite susceptible to.

Importantly, as we enter the DNA age, where we can more easily program biology using tools like we've been talking about today, this is also going to be essential for global biosecurity so that we are defended against malicious action.

I'd say Ginkgo's now an emerging leader in this new biosecurity market. As mentioned earlier, our revenue from biosecurity exceeded our outlook for 2021 by more than 50 percent.

Vaccines are clearly one of the pillars of biosecurity, especially rapid vaccine development, and we've been happy to support efforts there with our essential work on VCE to try to optimize supply chain.

Another key technology is going to be in the area of testing, and not just diagnostic testing. Diagnostic testing is someone exhibiting care-seeking behavior. They feel sick, and they're like, "I should go get a test. I should go to a testing center, my doctor, whatever."

There's a different type of testing, which is regular testing for screening, surveillance, and monitoring, so things like taking a rapid test before visiting an elderly relative over the holidays or a weekly pool test that might be happening at your kids school right now, which Ginkgo's doing a lot of, to catch outbreaks before they spread around the school and keep that school open.

A key feature of these biosecurity technologies is, they complement public health leaders. They don't replace them. These public health leaders, they need information about where the virus is spreading. They need to know about the emergence of new variants.

They need to be able to take more-targeted public health interventions, for example, sending home a classroom, not a whole school or keeping a healthcare conference open in person, for example.

We're proud to be working directly with these types of public health leaders. We're now partnered at Ginkgo with 10 state departments of public health in the US. You can see those in dark blue. By our

partnership with Eurofins, we're supporting HHS's Operation Expanded Testing in an 11 additional states, including DC.

We're also working with the CDC via our partner XpresCheck in four major airports to test incoming travelers and sequence positive samples, looking for new variants. We're testing across those modalities about 200,000 individuals per week across those programs. You can see our weekly testing ramp-up here.

It should be said that the US didn't get really serious about using testing as a tool for catching cases before symptoms until the Biden Administration. There was the American Rescue Plan, ARP bill, which passed back in March of last year. In that bill, it had $10 billion going to states specifically for regular K-12 testing.

You just saw President Biden announce today, because of all the challenges around Omicron, they're further surging testing into schools via the HHS program -- that we're involved in with Eurofins -- as well as via the distribution of rapid at-home tests. In this space, Ginkgo serves as the direct interface to public health leaders in those schools to deliver testing.

We take questions from teachers and staff. Our software manages data results back. We contract testing to local testing labs across the country to speed delivery of those tests where it's needed, and we handle all the logistics and infrastructure to make that hum.

One of the things you learn when you have to actually deploy these technologies is there are tons of on-the-ground issues needed to make a successful biosecurity project that actually works at scale. These learnings are a hard one at Ginkgo, and I believe they're going to serve us well as we seek to continue to add new products in this market.

I want to mention these products are very different than traditional diagnostics. For example, you need to meet people where they are. This is a test that needs to be done in your living room or in a classroom. It needs to be easy enough to be done by non-medical professionals, and the data needs to go back to the community to empower them to make decisions.

For example, you can see a district dashboard here on the right from one of our school customers. This is data that's informing decisions at the school leadership, but it's also being shared with families for peace of mind and empowerment.

This is the sort of thing we love to see with these tools -- these new public health tools in the hands of public health leaders and then that data being shared openly with the public to build trust. This is the foundation for what we think is going to be that regular monitoring infrastructure that gets put in place.

I think there's an ecosystem developing here that can get us out of this. Don't get tricked with, "We should just move into some hellish metaverse." Having beers together in person is fun. If we had good biosecurity, we would have the infrastructure in place such that we could do that and also be safe in the future from things that we don't know what's coming.

That's going to involve both passive and active monitoring to quickly identify emerging infectious diseases and enable effective response, and rapid therapeutics, and vaccine development. I think that passive element is going to be key also in the long run.

You're seeing an emerging ecosystem of new players in the space. Folks like Biobot have been collecting wastewater and then comparing that to cases to see if you could predict outbreaks in cities and towns passively. Instead of actively collecting from someone's nose, you're passively collecting in the sewer system.

We did a partnership with them to sequence 2,000 wastewater samples. You can see if you could get information about variants passively. Our partner, XpresCheck, is doing testing in airports for travel-focused biosecurity.

There's an explosion of activity in at-home testing, as I'm sure you're all aware of, as well as innovation in the big lab testing centralized providers with things like pool PCR testing to lower costs and drive scale. We're working with both Quest and Eurofins there.

I put my email at the bottom. Again, please do reach out if any of this is of interest to you on the investor side or the customer side.

One of the things that has me so excited about taking Ginkgo public this last year is we get to bring so many new investors onto our cap table. Companies are incredible vehicles to organize people and technology to tackle big things, and we're excited about the world that can be built with synthetic biology.

We believe it can be done responsibly, and we welcome folks to the company who share that vision. I'm happy to take questions, and I appreciate your time today. Thank you.

Rachel: Perfect. Thank you, Jason. I appreciate the overview of some of the recent projects that you highlighted, and it's great to hear that you guys had the thirty programs signed this year. To get us started, can you talk about which industries you're seeing more of a buzz and inbound interest in your platform, and then how does Ginkgo think about which projects to take on?

Jason: I'd say on the industry side, I would couch it a little bit differently. We're seeing a lot of interest in particular from start-up and smaller companies that are interested in basically getting on Ginkgo's platform without ever building a lab in the first place.

This is something I'm super excited about because if you look at the history in, for example, cloud computing, people forget but in the '90s, you had to have whole servers and everything to launch a website, and then you had these cloud-native companies get born. Now, every company is cloud-native.

We really see this...those are great customers to help demonstrate to people just how efficient it can be to not build out that lab infrastructure, but use our facilities.

The other area, though, is in therapeutics. We are seeing a lot in cell and gene therapy in particular. Obviously, you saw our announcement today -- or Monday -- in AAVs. That's a big one, a category for us, coming up.

To answer your last question, how do we pick? We try not to have to pick. The real mental model for Ginkgo is...yeah, it'd be like asking Amazon Web Services how do they pick which websites do they decide to run on the servers. They don't, right? They do all of them.

That's really what we're trying to achieve here. We don't want to be in a situation where we're having to limit who can come on the platform.

Rachel: Then a question here on email. "Some of your business models, some of your competitors have opted to take more of a product approach versus Ginkgo's platform approach." If you could, just talk about some of the advantages of Ginkgo's business model.

Jason: Yeah. Look, there's pros and cons to both, right? The cons for us on having a platform business model is we don't control our destiny on any given product. At the end of the day, Cronos will take what and when it wants to take things to market, or Roche would develop a drug when they were going to develop a drug, or Aldevron. That is out of our hands.

The way we effectively make up for that is by having a portfolio. We have enough things that that sort of individual product's not working out and another one's being very successful, it should sort of come out in the wash. That would be the criticism of the platform approach.

The downside on the products is you just can't do as many products. At the end of the day, you have to do

all of these follow-on steps, like you're going to market, you're breaking out branding and clinical trials.

Whatever market you're in, there's a whole bunch of things beyond the cell engineering that you have to do to get those products out the door.

You can only handle so many of those, and as a consequence, you have less demand on the cell engineering infrastructure, so you can't build as big of -- if you're a believer in our model of automation -- as big of Foundries and Codebase and data assets. You end up not having our scale on that side, but you do have advantages in terms of your ability to go to market with alacrity.

Rachel: On Foundry revenue, you've been running roughly about $20 million per quarter, so when can we start to see an inflection in some of the Foundry revenues, especially as you add these new programs and begin to ramp?

Jason: Mark, do you want to talk a little bit about our view on how we're thinking about guidance for next year and in general?

Mark Dmytruk (CFO): Rachel, I think the $20 million per quarter, I think what you're saying is if you back out what the Cronos downstream value share was in Q3, you're sort of backing into a services revenue line that we were around $20, because we actually reported a higher number than that for Foundry revenue.

The inflection point, there's a couple of dynamics in play, which is the way that we get paid for Foundry services will, from a GAAP revenue perspective, often you'll see less revenue early in the cycle of a project if the project is a multi-year cycle. Then you'll see more of that revenue recognized as you hit certain technical milestones along the way.

Because we're in this sort of phase where we are onboarding, as you know, a lot of new programs, we do, relatively speaking, have more programs in the first third of a project lifecycle versus the back half. That will always be true, because we're growing, and so we're always adding more programs than are coming off.

I think there is that sort of inflection, like I can't tell you if it's going to happen in Q2 of next year or not. Certainly you will see that come up as more programs mature and reach the latter part of the multi-year program and we hit those technical milestones.

The other thing is we are finding ourselves deliberately making trade-offs between downstream value share and upfront payments or other components of the deal structure, and that can impact Foundry services revenue in the near term.

Again, our objective is to get programs on the Foundry, as many and as rapidly as possible. We benefit in multiple ways when we do that, including through generating Codebase, so we are making trade-offs that at times will either shift revenue to the future or it just means that we may take a little bit less now, like I said, in return for something else.

It's a tough one. I don't think there is a way to know exactly what that inflection point would look like, because there are a few moving parts and puts and takes in that.

Rachel: You've got a few questions here on email about the downstream value. "Ginkgo's taken a novel approach to partnering with clients by taking equity stakes, and getting royalties as well." How do you think about managing these royalties and equity investments? At what point will you exit, and what are some of the key characteristics that you look for during your diligence process to decide if you will take on that earlier-stage customer from a downstream value perspective?"

Jason: Anna Marie, do you want to speak a little bit to that?

Anna Marie Wagner (SVP, Corporate Development): Sure. I'll reiterate one thing Jason said, which is

that and again, our goal long-term is to really make sure that if a program is technically rational to do at Ginkgo that we have the capacity and bandwidth to take it on, and that we're not making a trade-off between "maybe this program is better than that program, and we can only do one."

We'd like to get to the point where we can do them all. Obviously, we do have an underwriting process for programs to make sure that they are technically feasible or reasonable, etc.

The way that they tend to weed themselves out is actually our budgeting process for the customer. We send them a budget, and they say, "Hey, whoa. We didn't think this was a $10 million program. We thought this was a $5 million program." That tends to be what helps us effectively underwrite the rationale of a program.

When it comes to managing the portfolio of downstream value, the way that we tend to think about it is, if we are still in a position to be driving alpha for a customer for a program, we certainly want to have exposure to that cash flow stream, whether it's a royalty, whether it's equity, because our platform is constantly improving.

That is one thing we control is the quality of the platform and our technical success, and so we like that exposure. I think there is an open question we'll have over time if that portfolio becomes very large. If there are programs that have completed or something like that, does it make sense for us to continue to hold those?

I think that's a question that we'll deal with at that time. It'll depend on a lot of factors, including our capital position and what our strategic alternatives are with that capital.

Rachel: Helpful. We have a follow-up on the business model. Can you talk about why Ginkgo has been able to succeed with the horizontal platform model when others have failed? What specific competitive advantage does Ginkgo have to enable that success?

Jason: It's a good question because there have been, I think. In the history of the industry, there's been Synthetic Genomics and Intrexon, a few other places that have tried this. It mostly comes down to achieving a critical mass of scale.

If you look at those curves, in the interest of time, I didn't hang on it too long, but if you look at how our cost fell over time, we didn't really even get to parity with a scientist at the bench until -- I want to say three or four years ago -- you look at the chart.

There was eight years of the company where we were building infrastructure and trying to get to a scale point, where we were as good as your scientists, just as good. Prior to that, we were worse. That is a very brutal thing to get over.

Importantly, you actually want to be engaging with customers while you're building the platform. Make sure you build it right. You're trying to sell people on something that at the time is not as good as the status quo, but it's just the nature of it because you're trying to build a new system.

You're trying to automate something that's historically been done by hand. It's got a lot of flexibility. A scientist is not a robot. They do variable activities. It's a really a lot of technical challenges. Getting over that hump is what breaks most of the places.

Then the other thing you can mess up is if you don't use the platform for all the project like, "Oh, I got this little special other platform for just this project." Then you don't get the scale economic. I think you've seen that mistake get made as well.

Our mission and goal at the company was to build a general-purpose platform. We've always been very strict about it. We're gluttons for punishment. We just march through the first 10 years. Here we are now.

Rachel: Great. Question here about the internal investigation that you guys performed following the short report. Internal investigation found that the claims were baseless, and that no restatement was needed. Can you just give us an update on the latest with the informal DOJ inquiry?

Jason: Sure, yeah. There hasn't been any material update since we provided the public update on the informal inquiry and the conclusion of our internal investigation in November.

Rachel: Let's spend a few minutes here on Codebase before we wrap up. Can you talk about how much of a differentiator your Codebase is? Then, one of the draws is that your Codebase is really reusable data that can be applied to further projects.

A question in from an investor on that, saying, "Does Ginkgo have any protections in place if you're the first customer in a sector or in a target so that competitors can't then join the Ginkgo platform and really leverage the Codebase that that customer really paid for the learnings for?"

Jason: Yeah, a super good question. This is one that we talk about a lot with our customers. Another way to state it is, I don't want the work I've done for my product to then go and directly compete with my product.

We kind of handle that pretty well. We basically are like, "OK, the technology being developed for you, by and large, is not available to someone else trying to do the same thing. I'm not going to take your work, work we did for you, and hand it to a competitor."

The trick is, there's a lot of general-purpose assets. My view is if you look across the whole biotech industry, there are elements, genetic elements, intellectual property data that would be totally useful to someone else that is not at all competitive with you, and it's locked up in your organization, both from intellectual property reasons and technical reasons.

If we could unlock that as an industry, we actually start to solve the real problem, which is getting things to work. What we want to do at Ginkgo is sort of serve as an aggregator and basically force that aggregation of those assets and then make them available.

When we have that conversation with a customer, one of the things that helps me out is I say, "Look at everything I've got. All of this is going to you because other folks on the platform have agreed to these terms before," and that increasingly wins the day because of the scale of that asset today.

It is absolutely a question we always deal with.

Rachel: That is all the time we have for today. Thank you, Ginkgo team, for joining us, and everyone have a great rest of your day.

Jason: Yeah.

[crosstalk]

Jason: Thanks for having us. OK.

[music]
