Ginkgo Bioworks

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Rachel Vatnsdal (J.P. Morgan): Hi, everyone. This is Rachel Vatnsdal from the Life Science Tools and Diagnostics team here at J.P. Morgan. I'm joined by Jason Kelly from the Ginkgo team. And so, today's going to be a 40-minute presentation. Jason's going to start off with some slides, followed by about 20 minutes of Q&A. So for those of you that are listening online via the webcast, feel free to submit a question through the portal. And for those of you in the room, please raise your hand. We have mic runners throughout. I just ask that please don't ask your question until we have the mic in your hand so we can all hear you.

And with that, Jason.

Jason Kelly (Co-Founder and CEO): Alright. Well, thanks. Jason Kelly. I'm one of the co-founders/CEO here at Ginkgo. I want to start by thanking J.P. Morgan for getting us all back together this year. I'm sure it was not easy to reboot this after a couple years off, and it's really nice to see everyone. Okay.

So, I'm going to kind of cover three topics today. So the first is 2022 from my perspective was a banner year for Ginkgo and really synthetic biology technology in general. So I want to give you a few of the highlights of what happened over the last year. Second, we're at J.P. Morgan, so the kind of focus here is around therapeutics. Ginkgo operates in a wide range of markets, but I'm going to give you a deep dive on how some of our customers in the biopharma industry are using our platform for pharma discovery and manufacturing. And then finally, synthetic biology as a technology is becoming increasingly a national priority here in the US. And so, I want to give a few comments on what I'm seeing there from a government standpoint.

Okay. So, this is our first year as a public company. So we took Ginkgo public October 2021. And so, from my standpoint, I think, I'm quite proud of what the team has pulled off. So, we nearly doubled the number of programs that we run at Ginkgo in terms of new programs added this year compared to last year. And so, this is important for a few reasons. Every time we add a new program at Ginkgo, it adds three sources of value for us, right? So, the first, we get some near-term revenues in the form of service fees, right? So think of us doing contract research for one of our customers.

The second is all of these programs include some form of what we call downstream value share. So, we're either getting a royalty, or we're getting equity in a small company, or a milestone payment upon success of the work we're doing for a customer.

And then the third reason programs are critical at Ginkgo is we get intellectual property and data. So, the way we work out our IP arrangements with our customers is, Ginkgo can reuse the data and learning from the programs we do in areas outside of what the customer wants it for. And so, I'll highlight some of those data assets as we go through the talk. So, this fact that we've been able to double the number of new programs added is a critical metric for me internally at the company.

The other thing I'm quite proud of is that we're targeting $460 to $480 million in revenue this year. And today, we're able to say we're reiterating that guidance. That's really exciting. If you look back to when we first gave our guidance for the year in terms of total revenue, that's about a 35% increase from the high end of the range we shared back in March of 2022. So, from this standpoint, again, a lot of work by the team going into delivering on those numbers, again, as our first year as a public company.

And then finally, not lost on anyone in this room, it's a tough capital market for growth companies, and for biotech growth in particular. We're ending the year with about $1.3 billion in cash, which allows us to continue to operate quite strategically in the market.

Alright. So, I like what happened in 2022. I want to give a little bit of an insight for those of you who are new to Ginkgo in terms of just how we operate. So, if you put on a pharma lens, I think an easy way to think about Ginkgo is we operate as sort of a CRO, right? But in contrast to a traditional CRO, where you're going, and basically, a biopharma company will go and look to outsource, I would say, lab work they don't want to do. Okay, so, you know, I don't want to do an animal study. I'm going to call Charles River. I don't want to do this synthetic chemistry project, right, I'm going to call WuXi.

When folks call Ginkgo, they're looking to outsource lab work that they can't do internally, okay? They want to get access to a level of automation scale that they don't have internally. They want access to a set of data and machine learning models or genetic assets that they don't have internally. And you can see that in some of the comments from our partners. We announced, here's Marcus Schindler posting on LinkedIn, the CSO at Novo Nordisk after our deal with them earlier this year, that they're looking for external partners that bring new and complementary expertise. We're seeing this increasingly in biopharma and other spaces, where folks are looking to get things that they don't have internally. Similarly, we did a deal with Bayer in the agricultural division last year, where you see them outsourcing really their microbial biologics work to Ginkgo. And that's a large project, multi-year, part of the same trend of outsourcing, not to do work you don't want to do, but to outsource to get access to technology you don't have in-house.

So, the other thing that happened in 2022, we completed eight acquisitions. And one that I want to highlight, particularly critical, is a company called Zymergen, based here in the Bay Area.

And one of the technologies I'm showing you in this video is their automation platform technology. And at the start, what you saw were little carts that could basically be plugged into this magnetic lev track where you see samples being moved, parking in front of these rail locations, and then an arm being able to pick up the sample off that track and move it on to a piece of equipment.

So why is this important? Those carts can be swapped in and out. And that allows you to have a high throughput operation that's also flexible, for us to change the type of equipment that we're plugging in. That ends up being very important, given the range of microbiology activities you need to do in cell engineering.

If you're interested in stickers or hats or shirts with this "No Pipettes" logo on it, I'd be happy to give them to you. I come from this world, right, I did a PhD at MIT. It's five years of learning really how biology works, taking these really smart people, making them into good biological engineers, and then also teaching them how to do tedious manual labor at the lab bench, right? And that is an absurdity, right? So if you play out five to 10 years from now, you should expect total laboratory automation in cell engineering, right? The idea that a scientist should be picking up a pipette is absurd, okay? And so, we are happy to be driving that transition. We think as you, as a biopharma company, are looking at your research infrastructure, you should not expect to see scientists at lab benches pipetting in the areas of synthetic biology and cell engineering in the future.

We have some stats to back that up. So we measure the output of our facility. Here on the left-hand side, you can see a measure of what we call a strain test. It's basically us—we built a strain, we've engineered it, and we're doing some sort of assay on the performance of that strain. And so, we're quite happy that we doubled the number of these strain tests that we did in the last year. I do want to highlight, if you look at the little blue dots—it's hard to see, unfortunately. But we've gone from 50 to 100 strain tests a day back in 2015 to now into the hundreds of thousands of strain tests per day if you look at the meat of that line. But then you see these blue dots at the top that are one million, five million, 10 million strain tests in a day.

And, well, this is another thing we're going to touch on in some of our upcoming earnings calls at Ginkgo, where we'll give a little more of a deep dive on this technology. But what we're seeing is arrayed testing on plates, as well as pooled testing, thanks to genomics and DNA barcoding, allowing us to tap much larger numbers in certain types of assays. And so, I expect you'll see more of that in the future, and we'll be evolving these metrics as the technology changes.

Alongside that, about a 20% drop in, if you were to kind of look at those strain tests costs across the company on a per strain test basis. And again, these are preliminary numbers, but I wanted to give you a sense.

The other asset we have is what we call our Codebase. So remember, as we do these projects with customers, we're retaining our data and learning. We're also, thanks to these acquisitions this year, we've historically acquired Warp Drive bio, but recently, Radiant Genomics, Lodo Genomics. As part of an acquisition as part of Bayer's agricultural unit, we brought in a large strain collection. We now have, I believe, the largest proprietary gene collection in the world from microbes. Over a billion gene sequences. This serves as an excellent repository to go looking for new types of enzymes, maybe new types of gene editors—I'll show you some data in a minute—to tap into that database. And again, this is available to any customer on our platform.

Importantly, when you go hunt for an interesting gene in that database, you then want to synthesize it, put it into the genome of a cell, and test its performance. And so, here's some data that I think is really cool. So, on the y-axis here, you have enzyme type by EC number. So, 1.1, 1.2, 1.3, going down from the top, okay? And then on the x-axis, you can see number of samples we've tested in that class of enzyme. And again, a bit hard to see at the bottom here, but those long rows go out about five million tests.

Okay. So what that means is—and the colors are different programs we've been doing for customers. So, because we have the rights to reuse these programs, we've done all these programs for that first enzyme class at the top, five million strain tests. And then that is used to inform your machine learning and AI models. And I know if you talk to folks in biopharma, they'll tell you that they've been having all these meetings this week, they're hearing AI and ML so much, they want to stop hearing it. The important thing to keep in mind is, AI and ML algorithms, at this point, are a commodity.

What is not a commodity is the data that trains those algorithms. So when you're hearing from a company about an ML or AI asset, and they're running it on publicly available data, that is an end-to-end commodity object, and you should pay for it equivalently. If they're not showing you something like this, millions of data points that are going in to train those models, then don't expect to get something that's different from the guy next to you, okay? And so, this type of proprietary data is what comes out of those strain tests from the automation at Ginkgo that have doubled in the last year. So I'm really excited about this flywheel. And you'll see in a minute how it actually saves us time in the lab to have those models.

The other thing I want to highlight is because we have these assets, customers are signing up. So I mentioned this earlier, but we went from 31 cell engineering programs back in 2021 that were added to the platform. And again, we're reiterating our guidance today of 55 to 60 programs. And I'll also highlight, some of those are with existing customers. We love to expand with our existing customers and add new programs. But a number of those are new customers that are getting on the platform for the first time this year, both large customers like Merck and Novo, and also a number of smaller companies, and both inside and outside of biopharma. So, really happy to see new logos and that growth.

Okay. All right. Now I want to dive in and give you a little bit more of a deep dive on biotherapeutics particularly for the sort of crowd here at J.P. Morgan. So, the number one point I want to make, and this is a big source of confusion about Ginkgo, is we do not develop our own therapeutics, okay? So there is not a drug pipeline I'm going to show you. I'm not going to show you pre-clinical results from our asset, or this, that, and the other thing. When I'm engaging with biopharma companies, I'm not going to their BD team with an asset to hand them. I'm going to them with a technical capability. And there's upsides and downsides, right?

Downside is, people love to transact in assets in biopharma, and that's not part of my business. That's a downside. Upside, I can be in every modality, right? Because I'm not actually doing the downstream drug development in all of these areas. I am a platform enabling all of my customers to be operating in all of these areas. And we basically can play anywhere where cell engineering plays. So anywhere we're designing the genome of a cell, making it do something new at scale, is important. And it turns out, that's basically everywhere, including in small molecules.

And so, you can see here, we've listed some of our publicly announced partnerships. And this ranges from discovery efforts, working with Selecta on capsid design, as well as manufacturing in AAVs, for example, with Biogen. On the biologic side, manufacturing with Novo. A number of discovery deals in the microbiome space, mRNA space as well, and so on.

And so, I'm going to now go and give you a couple deep dives in some of these areas so you can see the type of data that biopharma companies would be seeing when they're deciding about working with Ginkgo, at least at a top level. We don't have a ton of time today, but I'll give you some of it.

Okay. So, in cell therapy, these are some of the areas we're working in, regulatory elements, novel CAR designs, iPSC engineering. And I'll just note, this is all driven—we just announced the opening of a new 6,000 or 7,000-square-foot facility in Boston with all dedicated robotic automation to mammalian cell engineering, okay? And so, this is probably the fastest-growing area of business for us right now. Expect us to do a lot more here.

But I want to do a specific deep dive on some data we shared at the SITC Conference, immunotherapy conference in Boston a couple months ago in novel CAR designs. And so, what you're looking at here are ICDs, so intracellular domains. And we have two sort of libraries we're building. One is a two-domain library, and one is a three-domain library. And you can see the 100 by 100 by 100 across the domains. So if you have 100 domains across 100 domains, you've got a 10,000-member library. 100 by 100 by 100, you've got a million-member library, okay? And so, I'm going to show you the data from the 10,000-member library, but the million library's also in flight.

So, if you take a look here, what we do is we start with this 10,000-member CAR library. We're using Lenti to transduce primary T cells. And then what we're looking for here, like the specific demonstration we wanted to do for folks, was to look at the challenge of exhaustion. And so, what we do is we cull culture with tumor cells. We allow these to expand. There's a three-week period where we're looking to see which designs persist. In other words, which ones resist exhaustion the most and keep expanding.

And so, you can see the data here. It's really quite nice. So we have sort of—on each axis, it's just a replicate of the same experiment. And the dark blue dots are these 55 clones, these 55 genetic designs, where we see more than 30-fold enrichment compared to the rest of the pool. And importantly, we do this both with high affinity and low affinity extracellular domains, and we see sort of different results. And one of the things we want to do in the future, as you might imagine, is combine libraries of extracellular domains with intracellular domains. There's real cool opportunities there.

And so, I'm not going to show the data for it, but we did take these hits and then subject them to high content arrayed tests and get a whole bunch of data about the sort of phenotypes of these cells. That does give us some pretty interesting mechanism hypotheses on this. So we're really excited about it, and we're really excited about taking this to even bigger libraries.

Some of the other things you should expect us to do coming up, we're going to try this under different cell culture conditions that are a little more tumor-like. I don't have time to talk about it today, but we acquired a company called FGen, which does encapsulation in alginate beads that allows for looking at single cells. And so, we're running that on the platform now. We're going to apply that to get more single cell data here. And also, as everyone asks us about here at J.P. Morgan, we'll be putting this into animal trials as well to get additional data.

The last thing I will mention, since I've got the attention of some biopharma folks, is we can take that library right now and put it behind your extracellular domain, right? So if you want us to try this, really, this is all set up to run. In a matter of weeks, we could be trying these libraries in your CAR constructs and running a similar type of assay, or other types of high content assays, at Ginkgo. So, really excited about this. I think this is something we're seeing a lot of interest in in the market.

The other area—and these are mostly partner programs, so I don't have as much data to show you here, but I just want to highlight we're working in this area—is in AAV and gene therapy generally. Regulatory elements, as I mentioned, we're doing some capsid work with Selecta and others. ITR engineering, so working on the payloads, and then working on the challenge of manufacturing in AAVs. We see opportunities in all of those areas for our platform and do have some partnerships there.

This is one I think is pretty interesting, and I want to draw on what I mentioned earlier, which is, we have this huge microbial genome collection. And so, we did what got announced as a computational analysis. And there was a paper, I want to get the name right, Makarova, in 2020, who did a similar analysis looking at NCBI, and looked for computationally CRISPR-like systems based on what was out in the public data, and found 6,700. We've done a similar analysis now at Ginkgo where we found about 93,000 in our databases. And then you can break it up by type, so type one, two, three, four, five. And you can see the enrichment relative to what's out there in the public databases. 19-fold, 2.5-fold, 12-fold.

So if you are out there, you are a gene editing company, I want to highlight, this is available to you, right? Don't feel like you're limited to just what you have access to. We're readily available. We operate with a CRO business model. You can access this on a service basis. And you can access it from an information content standpoint, but then importantly, we can find you a bunch of hits and plug them into all our automation, and very quickly get you results on which ones actually work well or have functionality in the lab.

And our model at Ginkgo is a small piece of a lot of pies. So if you think about kind of the structure of our deals, you should expect it to look different than if you were talking to a single asset pharma company, right? If I'm a small biotech and I've got my one asset, boy, do I want the world for it. That's not my model at Ginkgo. My model at Ginkgo is to be a utility. We want to be like an Amazon Web Services. We want to be working with every biopharma company on every project in all modalities. And if I'm going to do that, I don't actually need to take that much downstream value on a per program basis. So again, if you're in the editing space, I encourage you to reach out.

This is fun. So, we announced the launch of Ginkgo Enzyme Services. This is our first sort of turnkey services offering. It's a little faster for us to do the deals. The deal terms are a little more standardized. And we announced actually a deal in this space with Merck recently, a $133 million deal, to work on improvement of biocatalysts, in other words, enzymes, okay? And the request is often pretty similar. People want to see an increase in activity of the enzyme on the particular reaction it's catalyzing. So this one had a low synthesis to hydrolysis ratio, for example. And then they want to see less off target, right? So more specificity in terms of what the enzyme is making.

And so, what's cool here is we generated and screened just over a thousand candidate enzymes. That's actually on the lower end of the numbers for Ginkgo. And one of the reasons is, these were not chosen randomly. These came out of structural and ML models that were informed by that EC data I showed you at the beginning of the talk, right? So because we have all of this data to feed into our algorithms about how these enzymes perform, it allows us to actually do less lab work, which improves my economics and allows me to offer even better deals to our customers, right? So there's a nice feedback loop, where the more we learn, actually the less we need on a

per project basis to do in the automation. And it means we can use the automation to generate even more data in other areas. But we had great results here, 6.5-fold improvement in activity relative to what the customer's current best enzyme was, a 5X improvement in the specificity.

Oh, one last point to mention on the enzyme side. There are also a number of companies developing therapeutics where sort of the enzyme is the point of the spear, right? It is really the drug. And so, we have a project with Synlogic, which is working on, in this case, HCU is the disease. And what's really cool about this is the first Ginkgo-engineered organism that's gone into clinical trials. And so, really excited about this. But in this case, it's an enzyme being delivered by a probiotic microbe for treatment of a metabolic disorder. But if you are in the business of trying to develop an enzyme as a biologic or as part of a microbiome therapeutic, again, I would say our platform is very likely to be relevant to you, and we'd love to talk to you.

Okay. Last thing I want to mention on this sort of pharma section is the work we've been doing in circular RNA and in RNA therapeutics and vaccines. So we acquired a company called Circularis recently. We're really excited about circular RNA. In the middle there, I just have sort of some of the known challenges around RNA therapeutics—stability, durability, challenge of immunogenicity, length and size, expression level, and specificity. We see a lot of opportunity to work on these problems through circularizing the RNA that is delivered to the patient.

How do you circularize? There's actually a few different ways to do it, right? And so, one of the things, our approach here at Ginkgo is not to just bet on one thing. We want to kind of bring in a few different options and try them out in combination. So I'll talk about some of those methods. And then, how do you dial in the expression strength? How do you get the expression of the thing you want? Code on usage structure, modified nucleotides, translation of the elements—we've been working on all those. And then we're actually—obviously, we do a lot of work in manufacturing. So we think we can be pretty immediately helpful there as well.

So, to just show you a little bit of data, this is on the lower left part of this triangle, the circularize. So using two different methods of circularization, catalytic introns, hairpin ribozymes. What you see here on the red dotted line is sort of your traditional capped modified poly-A mRNA. So, you take that Moderna shot, that's what you're seeing. And you see this declines on a five-day experiment. The greener lines are some of our different circular RNA constructs using both of these two approaches. And again, this is early. It's not in animals and so on. But we like this data. Expect us to do more here. And we're getting a lot of interest from folks in the space on this.

The top of the triangle was around expression. And so, I just want to highlight, we've designed and tested a 500-member library of internal ribosome entry sites, right? So if you have a circular RNA, the RNA ribosome has to show up somewhere. So you use these IRES to bind and get started. We've tried a library there. We get different expression levels. Importantly, it also helps

for the sort of specificity challenge. So, does it express in what cell types? As you can see, some of our data there, two different cell lines where we get preferred expression, and then some where it's expressed in both. And so, we can do this with many more cell types. We can do this with many more IRES. This, we think, is really exciting.

Okay. So that was my quick dive of what we're doing in pharma, as much as we could get through today. And I'm just going to end real quickly on where I see synthetic biology as a technology becoming more and more important from a sort of national security and just government level. So, there was a really good interview from Senator Mark Warner on CNBC maybe now two months ago, and he was sort of asked about—he chairs the Intel Committee in the US, the Intelligence Committee on the Senate. And they're sort of responsible for looking at strategic competition geopolitically.

And they asked about what technologies you might have seen—for example, the CHIPS Bill was a consequence of the US feeling like, in the area of electronics and AI, we needed to make sure we were being strategically competitive, in particular with China. What other areas he was asked, do we need to be strategically competitive, and he said synthetic biology and advanced energy. So in other words, batteries and solar, and then synthetic biology, right? And I'm gonna touch on in a minute why I think that is. But you also see this reflected in President Biden putting out an executive order, also near the end of last year, on strengthening the bioeconomy in the US.

And I went to this event at the White House. Jake Sullivan was running it, the head of the National Security Council. You had DepSecDef, you had the heads of USDA, heads of DOE, heads of NSF. And they're all there basically being told, "You need to come back with what your plans are to make sure we're winning in the bioeconomy," okay? And so, I think you should expect—I've been in the field of synthetic biology for 20 years, since it sort of got named back at MIT in the early 2000s. This is by far the most momentum I have seen in terms of the US government taking the technology seriously. And I think part of that is strategic economic competition. And part of that is COVID. It is a consequence, it is an awareness of biosecurity and the impact of infectious disease on our national security being obvious. And so, those are sort of the two halves of this. We're happy to be sort of basically participating in both.

So, on the biosecurity side, I just want to highlight this. We had a great year with this as well in 2022. We're running a program with the CDC called Traveler-based Genomic Surveillance, where we basically—you might've read about this in the news recently with all the flights in from China that are being—with basically voluntary monitoring from nasal swabs, as well as wastewater collected from the planes in order to look for new variants of COVID, right?

So there's a big experiment being run in China right now, given the scale of the outbreak going on, that's very likely to generate new variants. But we're not getting much data out of the country. That's why it's important to have these more global surveillance and monitoring efforts

like what we have in the airports here so we can at least start to see data as early as we can in airports. And with this program, for example, we caught the first sequence cases of BA.2 and BA.3 back during the Omicron wave last year.

We are expanding this globally. We're quite proud of that. And we have MOUs, or we're rolling out airport programs and other things in these places, Africa Union, Qatar, Victoria, Rwanda, Botswana, Saudi Arabia, all publicly announced MOUs or programs.

I'll just also mention that we had a program with IARPA. This is the Intelligence Agency's version of DARPA, called ENDAR, that we've been doing the last three or four years, where the goal was, look at a sequence of DNA and identify, was it engineered or not, okay? And so, this is something that is really not—this is where I think there's an interesting interface between sort of public health and national security. Why would you want to know if something is engineered? Well, that's because you're looking to see if there was a deliberate misuse of biology versus something accidental or emerging from nature. And so, I think those types of programs, we can run the ENDAR, that's like radar for engineered biology, we can run that on these genomic sequences at these sort of radar sites globally. That's part of the idea.

And the theory here is this should ultimately look like satellites, right? We all dealt with some pretty inclement weather this week. I bet you brought a raincoat and an umbrella because you had warning before you showed up here in San Francisco that we should expect some bad weather. We don't have that for infectious disease right now, right? We find out three weeks after it's blowing up New York City, right? That's completely unacceptable. So I think we will see the build-out of global biosecurity, and I'm confident the United States will be the leader in bringing that out.

The last point I want to make, I mostly talked about biopharma here today, because this is J.P. Morgan. But if you look at our active programs in Q3, we had 85 of them. 28 were in biopharma. So we're actually doing a lot of work at Ginkgo in food and agriculture, industrial, consumer goods, with large companies in those sectors, chemical industry, ag industry, so on. Biotech is not just about drugs, right? Biology can impact really any physical goods market. But we hear a lot about drugs. And then honestly, if you look at a bigger level, if you look at sort of capital markets in general, we hear a lot about information technology, right? Just a lot of value.

You might have seen, for example, ChatGPT from OpenAI. If you've had a chance to use this, you can sort of type in and give a query to ChatGPT, and it'll answer you. Sam Altman, the CEO of OpenAI, is a friend of mine. I think it's amazing what they've done, right? But so, I went and I asked it a question. I was like, "ChatGPT, what is more important to society, atoms or bits," right? Is it all the physical stuff that we do in the economy, or is it the information technology, right? What is it? And, okay, I got this long-winded answer. "Atoms and bits are both important,

but they play different roles and different implications," dodging the question. ChatGPT is dodging the question.

So then I was like, "Okay, ChatGPT, but if you had to pick one, what is more important to society, atoms or bits?" "If I had to pick one, I would say that atoms are more important to society. This is because atoms are the building blocks of the physical world, and they are essential for our survival and well-being. They make up the food we eat, the water we drink, the air we breathe, the materials we build our infrastructure with, homes, roads, bridges, and power plants. Without atoms, society would not be able to function." That's right, ChatGPT.

And so, if you look at what we're trying to do in synthetic biology, biology is the only programmable substrate. It runs on DNA code. But what it does, it doesn't move information around. It moves atoms around. It builds things. It makes our medicines, it makes our food. It cleans our water. It will be more important in the future. We're really proud that we're playing a role in building that technology here at Ginkgo. I'm happy all of you are participating in this as well in the biotech sector. We should grow the world we want to see. My email's up there. If you're interested in any part of this, we'd love to talk to you. Thanks so much for your time.

Rachel Vatnsdal: Great. Thank you. And as a reminder, if you do have a question, feel free to raise your hand, and we can get a mic to you. Awesome.So, just to start off with the pre-announcement this morning. So you noted that you expect the total revenue to be in the expected range that you guided to earlier this year.

Jason Kelly: I insist you start by asking Anna Marie so I can take a breath.

Rachel Vatsndal: Perfect. So, the press release also noted that Foundry revenues are expected to be below that range. So can you just walk us through what happened there? It sounds like some of it was timing-related. So, how much of a slip from a timing perspective, and any details you can give us on that front?

Anna Marie Wagner (Senior Vice President, Corporate Development): Yeah, absolutely. So, as Jason alluded, business model, we take upfront revenues as we provide services to customers, and then we also earn downstream value as we deliver on those programs. The kind of core service revenue side of the business performed as expected. We did have some discrete milestones that we talked about in our last earnings call. And the range of guidance we provided assumed that a certain set of those milestones were achieved. We did achieve some milestones in the quarter, but the mix was different. And so, while we're still working towards those and remain confident that we'll achieve them, they did not land in the quarter as expected. And so, that contributed to the announcement today.

Rachel Vatsndal: Got it.

Jason Kelly: And I would just say, this is sort of a general challenge with—as I mentioned, when we sign up a new program, we get those three sources of value. We get the near-term fees, we get long-term downstream value share, and we get the IP data growth value. And the downstream value share is great. It's high margin. I believe the milestones we talked about were—well, I'll make sure we don't say what we weren't supposed to say. But in any case, they come in as high margin. And so, they're really great from the standpoint of the business, but they are often unpredictable exactly when they're going to happen, because at the end of the day, they're typically out of our complete control. In other words, we don't run every part of the process that would trigger a milestone. Often, the customer would need to either show a commercial demonstration. For the ones we're currently working on, it tends to be a manufacturing demonstration that would really trigger it. And so, it makes it a little harder for us to predict.

Rachel Vatsndal: Perfect. And then obviously, it sounds like since you were able to hit that total revenue for the year, that then biosecurity performed better than expected. So can you just walk us through that biosecurity segment? And how are you thinking about this as COVID really becomes endemic?

Jason Kelly: Yeah. I touched on this a little bit in the talk. We don't really see biosecurity as a COVID-specific thing in the long-term. And I think you see this in the elevation of biology from a national security standpoint. And generally, it is, countries are now aware that infectious disease can be nationally disruptive, right? I mean, in my lifetime, I'd say COVID was more economically and socially disruptive than 9/11 was, right? And so, you have this awareness of that. And I think people in infectious disease, they now have this pandemic—it's called panic and neglect cycle, if you talk to these wonks from that area. And they're like, "Well, yeah, everybody got worried about SARS or Ebola. But then as soon as we beat it, you got over it." Well, we didn't beat COVID, right? We got annihilated by it, right?

So, that panic and neglect ain't there this time, right? So you are seeing these systems getting built. And people are aware, the next one's not COVID, right? It's obviously going to be something different. But I think you still have this reality of the variants driving enough interest to build infrastructure. And then you have, I think, the national security concerns and public health concerns at a country level driving the long-term persistent infrastructure. So I do think it'll happen, but you never know. It is getting built right now, though, in my opinion, with high likelihood.

Rachel Vatsndal**:** So how do you think that Ginkgo will continue to play a role in that biosecurity industry as it continues to evolve? Will you be partnering with governments? You mentioned the biomanufacturing event at the White House.

Jason Kelly: Sure.

Rachel Vatsndal**:** How should we think about that progression and Ginkgo being a part of it?

Jason Kelly: Yeah. So, for biosecurity, we see an opportunity both in the US and globally. So that's why you see us doing all this work trying to move this out internationally. That's actually not just—obviously, it's great to have more business. But you need it international, right? If you aren't monitoring outside of your borders, you're going to get surprised by biology, right? That's just the reality. Biology does not respect borders. We saw that with COVID. So, we do think there's an international business for us and a long-term US business. I think you'll see us play in the surveillance area, like I talked about, monitoring for infectious disease. We're not a diagnostics company. I don't think you'll see us making moves in diagnostics. We're not a therapeutics developer, but we'd love to enable therapeutics developers that want to develop things like more rapid vaccine or therapeutic development using our platform. That would be great. But we leave it to them to actually develop those assets. It's not our business.

Rachel Vatsndal**:** Helpful. Shifting over to cell programs, so what are you seeing in terms of demand for Ginkgo's cell programs as we head into 2023?

Jason Kelly: A lot. So, I would say we have spent—well, one of the things I was worried about going in at the start of 2022 was whether we could really ramp to add programs at the rate we were hoping to add them. I felt like the latent demand was out there, but even if we could do the sales, could we start them, right? Because it's not actually—it's not turnkey yet. That's one of the areas—to get Ginkgo nerdy for a minute, we launched Ginkgo Enzyme Services, which is meant to be actually an easier to launch programs internally at Ginkgo service. In other words, the programs look more the same, it's less custom for the customer, which makes it easier for us to start them.

But the majority of our programs aren't coming in like that right now. They're coming in different. Each customer kind of has their own subtleties. That makes it harder. You have to have a technical plan and all this stuff. So, one of the things that's really cool is if you look at just how many new programs we're starting, that actually means our internal muscles have gotten a heck of a lot better at launching programs. That's going to serve us very well this year coming up, because I still see the demand. And the sales team is working great, so that all feels fine. I'm more concerned with would be able to start them. And I feel like already, we have evidence. If we could get to the numbers we got this year, I feel like we have good room to grow.

Rachel Vatsndal**:** Helpful. I'm glad you brought up Ginkgo Enzyme Services. So, can you talk about the decision to kind of push into more of these end-to-end service workflows for customers? And then should we expect more of these types of offerings in the future?

Jason Kelly: Yeah, yeah. And again, you can take lessons from various stuff in, say, cloud computing, where you have microservices at Amazon and things like that. So, we would expect

that there will always be demand for some custom use of our platform, because people are very creative. There's a million and one things you can do with biology. And so, there'll be something that benefits from our DNA synthesis and our assays and duh, duh, duh, and put together in a unique way, it lets you get after a drug. That's always going to be there.

But what we're hoping is that certain types of activity actually become more reliable for the industry. People will just start requesting them, either as pieces of larger projects, or just feel like they're more likely to succeed, so they'll keep asking for the same thing. Slightly different for their different applications. But enzymes is a great example. That's why we started with it. I want an enzyme that has higher activity and better specificity. Boy, that is true across lots of different things. It can be true for biocatalysts for an API, it can be true for an enzyme that you're using as a therapeutic, but it also can be necessary for an enzyme that's part of a four-gene pathway in a metabolic engineering project to make some cosmetic, right? That's a very general thing.

And so, we're kind of hopeful that as we make these services, it'll also drive the ideas people have about developing products to make use of those services, because they're cheaper, they're faster, they're more standard. So, yes, we want to do more of them. But I don't want to pretend our whole business is standard, right? Because then someone'll come to me with this great idea for a project, and I'll be like, "Well, no, it doesn't fit into blah, blah, blah services, and we're not going to do that." We'll still sign those projects up. But we do expect to launch more judiciously, as we think the market actually wants more of the same.

Rachel Vatsndal: And then you talked a lot about biopharma today. So can you talk about what technologies or what capabilities are really driving some of the growth and that traction that you're having in the biopharma vertical?

Jason Kelly: Data. So, what we learned two or three years ago when we started to engage with biopharma companies very seriously, and we did get a couple deals out of this, was there was a lot of "Show me the data," right? Because unlike some of the other industries that we interact with, like, say, fragrances, right—fragrance is an amazing industry. They're very smart. They're largely chemists, okay? And so, when we were coming in with biotech, it was a little less about—it was more convincing them to use biotech at all in that industry. This industry uses biotech. It's got armies of scientists who—so they're like, "Well, fine, Ginkgo. I see your robots. But show me some data that this is relevant to my biological problem." And we were like, "Oh, we don't have that data yet."

And so, some of the things, for example, the CAR data, we generated that in-house, not because we wanted to make—I'm not trying to make a CAR therapy. I just wanted to show people. That's hugely helpful, right? So, I think that's probably the biggest. You'll see us continuing to push in-house in certain areas as demonstrations. But now that we have more programs, we also get data that falls out of our customer projects that we can show people. But that's the biggest driver.

Across all modalities, the more demonstration we have of our infrastructure, just moving the needle even a bit on a project, huge difference. Because otherwise, it's great to work with us. You don't have to build your own infrastructure. You get huge scale. We have good scientists who run it for you. It's variable cost.

When you don't want to do—if you're a small to mid-size biotech company and you're worried that you're going to have a huge R&D team hit a good animal study milestone or something and need to cut back on R&D spending, that's just spending less at Ginkgo now, right? So you can just dial that down without layoffs or anything else. It's a much nicer way to do things. So I think there's a lot of reasons for people to want to work with us if we can show them that it's relevant in biopharma. It's the market I'm most excited about.

Rachel Vatnsdal**:** And then obviously, you've done a decent amount of M&A recently. So, Zymergen and then the Bayer ag. Can you talk about how those integrations are going, and then how are the—

Jason Kelly: It's Anna Marie's fault. I just want to say that.

Rachel Vatnsdal: So talk about how integrations and then how the teams and capabilities are enabling the cell programming growth?

Anna Marie Wagner: Sure. So, as you mentioned, Rachel, we did eight acquisitions last year. Most of the acquisitions we've done throughout our history have been relatively small emerging technologies that can plug and play directly into our Foundry and Codebase. And so, that was six of our deals last year. We also did a couple in biosecurity. And then as you mentioned, we did two larger, more transformative transactions. We carved out the ag biologicals team and R&D facility in West Sacramento. And that's now been stood up as its own portion of our program team, focusing on ag biologicals and really giving us a platform to go after that market, which is, it's a very large, established market where lots of R&D is being done. But like biopharma, being done in-house by major companies that don't have access today to a significant kind of CRO network that can provide end-to-end services and translational research in ag biologicals. So, it's a pretty unique asset that is both really complementary to what we've done internally, but also gives us lots of new capabilities. So that team has largely been kind of intact in their own site, and is off to the races, both working on programs for Bayer, a very significant set of programs there, as well as going after new business.

On the Zymergen side, really interesting technology. Very strong and complementary technology base to what Ginkgo had built, particularly on the software and automation side, where they really thought about the world and the potential of automation to go transform the way that we do biological engineering, in much the same way we did. And so, those teams and the technology they'd built over the last 10 years was the core thesis of that transaction, and those

teams have been fully integrated into Ginkgo. We've been deploying already several of their software tools across our systems, so that's been really exciting to see.

And then, as we've talked about publicly, Zymergen took a very different business strategy than we did, focusing on developing their own products in recent years. And as Jason said multiple times today, that is not our business model. And so, we've been exploring different alternatives for that product portfolio, either partnering them with potential customers who could then advance those assets into their own product pipelines, or, in some cases, and in particular for their lead asset, considering other strategic alternatives, including potentially setting it up as its own company, where there's real commercial interest.

Rachel Vatnsdal: Perfect. With that, we are out of time. So thank you so much for joining us today.

Jason Kelly: Thanks a lot.