GINKGO BIOWORKS

Grow with Ginkgo
Q4 and FY 2024 Update & Business Review

February 25, 2025

Disclaimer

FORWARD-LOOKING STATEMENTS

This presentation, the conference call and webcast contain certain forward-looking statements within the meaning of the federal securities laws, including statements regarding our plans, strategies, including with respect to our current expectations, operations and anticipated results of operations, both business and financial, including the timing for attaining Adjusted EBITDA breakeven and profitability, impacts of our restructuring, the potential financial impact of our facilities consolidation, potential customer success, including successful application of our offerings by our customers, and expectations with regard to revenue, expenses, including our stock-based compensation expenses, our full year 2025 outlook, and the market environment, all of which are subject to known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements, market trends, or industry results to differ materially from those expressed or implied by such forward-looking statements. These forward-looking statements generally are identified by the words "believe," "can," "project," "potential," "expect," "anticipate," "estimate," "intend," "strategy," "future," "opportunity," "plan," "may," "should," "will," "would," "will be," "will continue," "will likely result," and similar expressions. Forward-looking statements are predictions, projections and other statements about future events that are based on current expectations and assumptions and, as a result, are subject to risks and uncertainties. Many factors could cause actual future events to differ materially from the forward-looking statements in this document, including but not limited to: (i) our ability to realize near-term and long-term cost savings associated with our site consolidation plans, including the ability to terminate leases or find sub-lease tenants for unused facilities, (ii) volatility in the price of Ginkgo's securities due to a variety of factors, including changes in the competitive and highly regulated industries in which Ginkgo operates and plans to operate, variations in performance across competitors, and changes in laws and regulations affecting Ginkgo's business, (iii) the ability to implement business plans, forecasts, and other expectations, and to identify and realize additional business opportunities, including with respect to our solutions and tools offerings, (iv) the risk of downturns in demand for products using synthetic biology, (v) the uncertainty regarding the demand for passive monitoring programs and biosecurity services, (vi) changes to the biosecurity industry, including due to advancements in technology, emerging competition and evolution in industry demands, standards and regulations, (vii) the outcome of any pending or potential legal proceedings against Ginkgo, (viii) our ability to realize the expected benefits from and the success of our Foundry platform programs and Codebase assets, (ix) our ability to successfully develop engineered cells, bioprocesses, data packages or other deliverables, (x) the product development, production or manufacturing success of our customers, (xi) our exposure to the volatility and liquidity risks inherent in holding equity interests in other operating companies and other non-cash consideration we may receive for our services, (xii) the potential negative impact on our business of our restructuring or the failure to realize the anticipated savings associated therewith and (xiii) the uncertainty regarding government budgetary priorities and funding allocated to government agencies. The foregoing list of factors is not exhaustive. You should carefully consider the foregoing factors and the other risks and uncertainties described in the "Risk Factors" section of Ginkgo's annual report on Form 10-K filed with the U.S. Securities and Exchange Commission (the "SEC") on February 25, 2025 and other documents filed by Ginkgo from time to time with the SEC. These filings identify and address other important risks and uncertainties that could cause actual events and results to differ materially from those contained in the forward-looking statements. Forward-looking statements speak only as of the date they are made. Readers are cautioned not to put undue reliance on forward-looking statements, and Ginkgo assumes no obligation and does not intend to update or revise these forward-looking statements, whether as a result of new information, future events, or otherwise. Ginkgo does not give any assurance that it will achieve its expectations.

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Certain of the financial measures included in this presentation, including Adjusted EBITDA, have not been prepared in accordance with generally accepted accounting principles (“GAAP”), and constitute “non-GAAP financial measures” as defined by the SEC. Ginkgo has included these non-GAAP financial measures because it believes they provide an additional tool for investors to use in evaluating Ginkgo’s financial performance and prospects. Due to the nature and/or size of the items being excluded, such items do not reflect future gains, losses, expenses or benefits and are not indicative of our future operating performance. These non-GAAP financial measures are supplemental to, and should not be considered in isolation from, or as an alternative to, financial measures determined in accordance with GAAP. In addition, these non-GAAP financial measures may differ from non-GAAP financial measures with comparable names used by other companies. See the reconciliation included in this presentation for additional information regarding certain of the non-GAAP financial measures included in this presentation, including a description of these non-GAAP financial measures and a reconciliation of the historic measures to Ginkgo’s most comparable GAAP financial measures.

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Agenda

Introduction
Jason Kelly, Co-Founder and CEO

Q4 and FY 2024 Financial Update
Mark Dmytruk, CFO

Strategic Review
Jason Kelly, Co-Founder and CEO

Q&A Session
Moderated by Joseph Fridman, Director of Communications and Corporate Affairs

OUR MISSION

Make biology easier to engineer

OBJECTIVES

Reaching Adjusted EBITDA breakeven by the end of 2026 while maintaining a cash margin of safety

Cutting costs while serving current customers

Expanding from our Solutions business into tools

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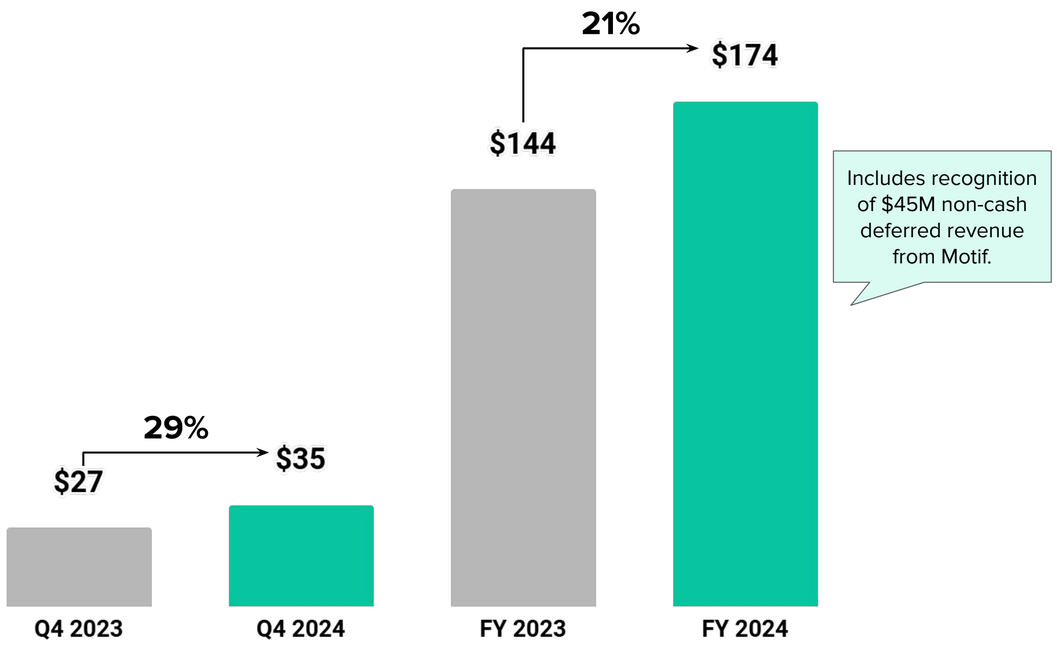
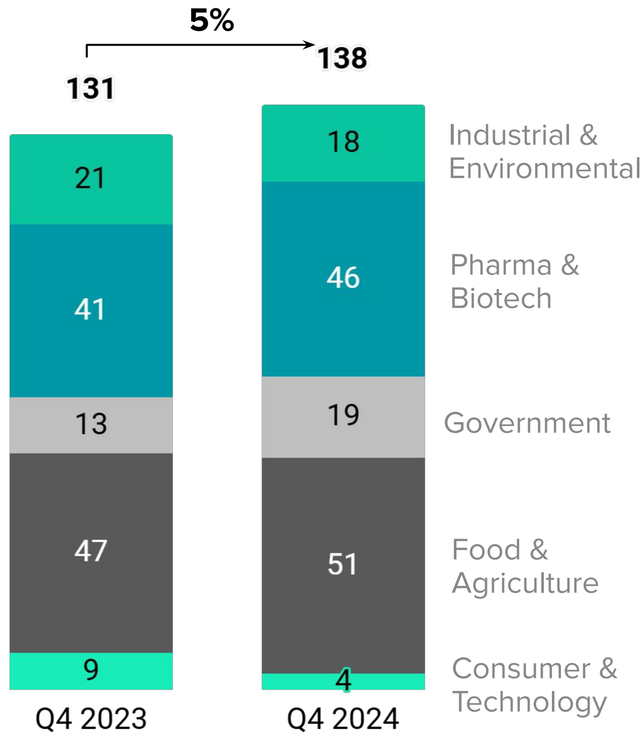
Cell Engineering Highlights

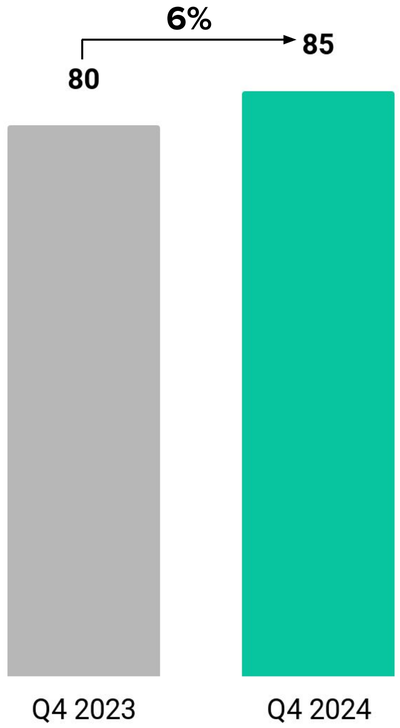
CELL ENGINEERING REVENUE ($M)



CURRENT ACTIVE PROGRAMS

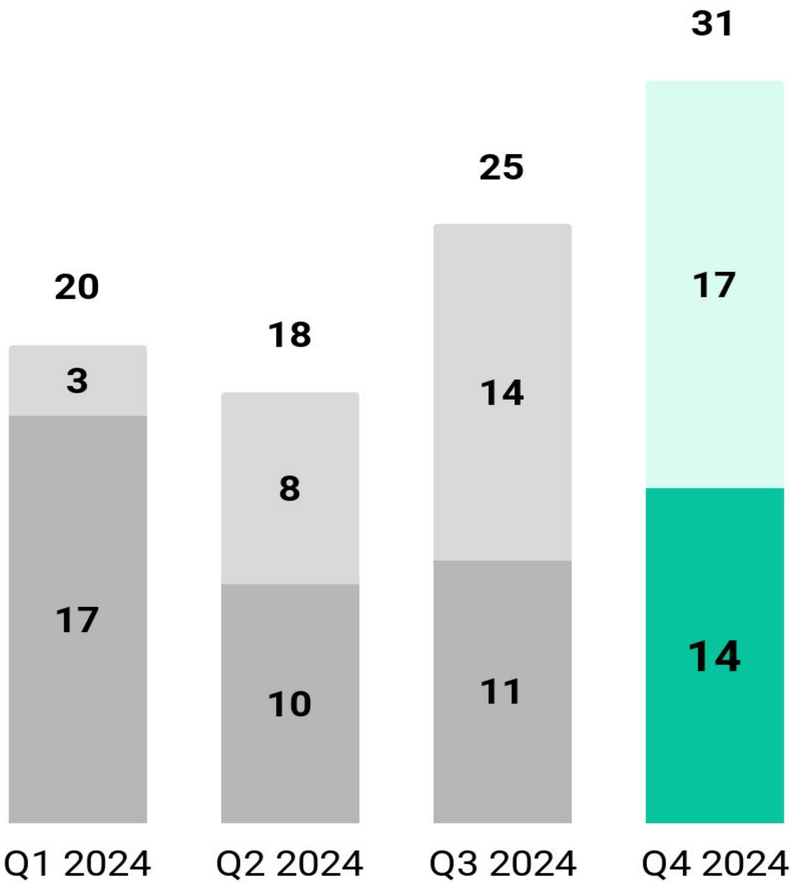


TOTAL ACTIVE CUSTOMERS



New programs in the quarter showed continued strong execution in the biopharma industry

NEW PROGRAMS IN 2024



Other Customer Contracts[1]

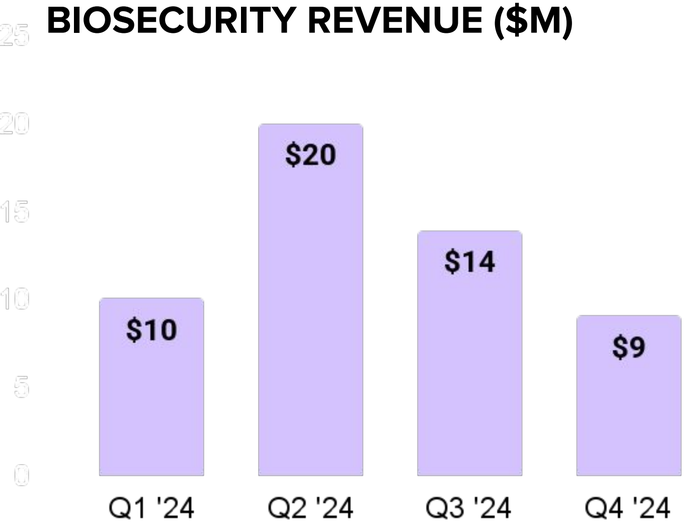
- 19 out of the 31 contracts are biopharma deals, including 13 deals with large pharma companies
  - 5 of the large pharma customers are new to Ginkgo
- 8 out of the 31 contracts are industrial biotech deals
- 7 out of the 31 contracts are Datapoints deals, all biopharma

New Programs

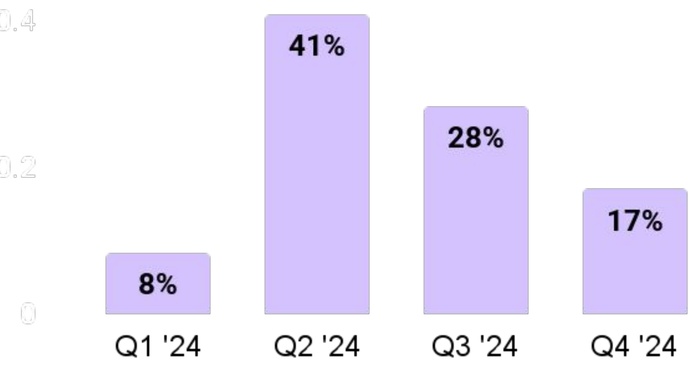
1) Year over year breakout of New Programs can be found in the Appendix

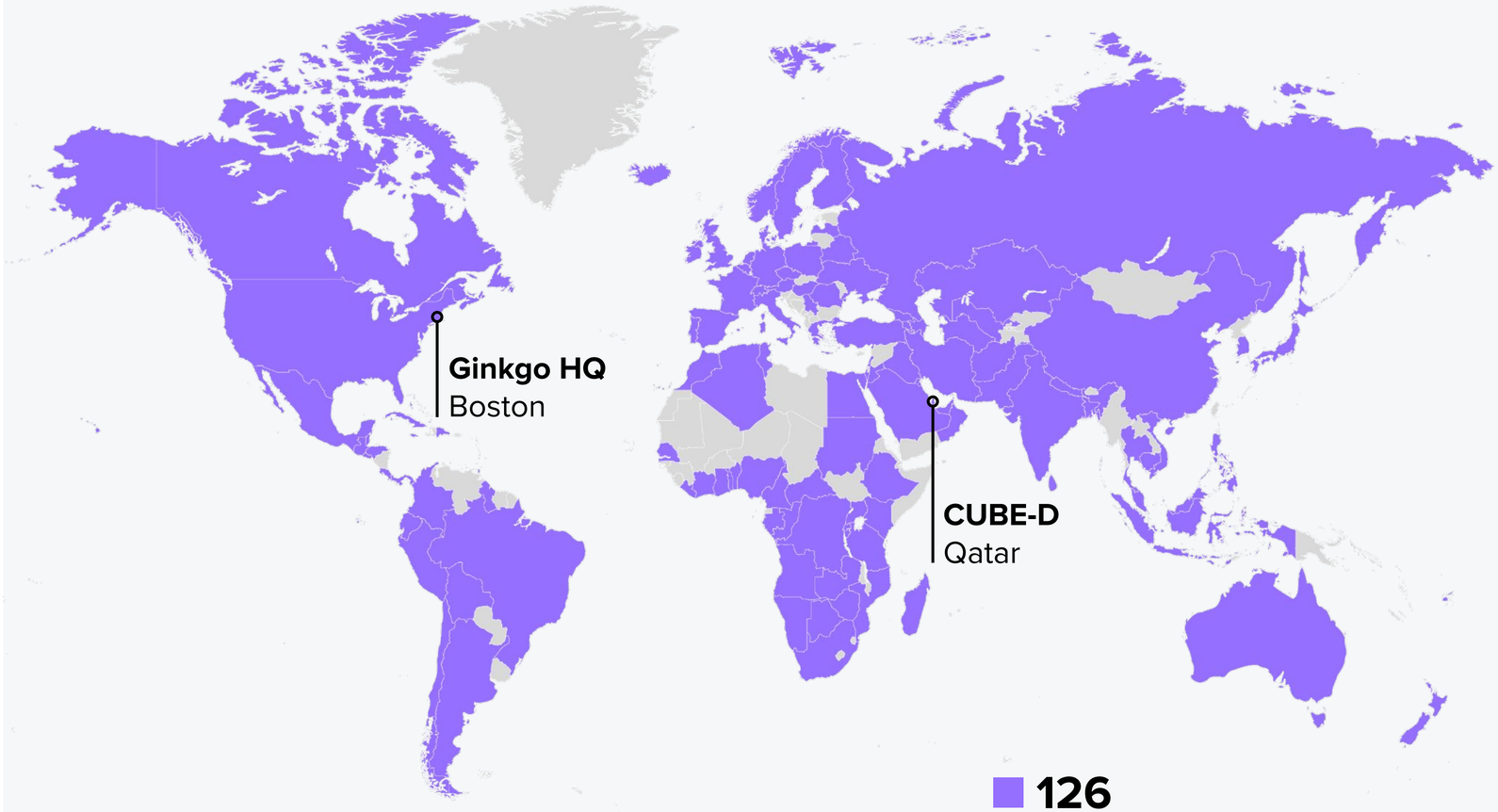
Biosecurity Highlights

BIOSECURITY REVENUE ($M)



BIOSECURITY GROSS PROFIT MARCH





126
Countries of origin of flights sampled
(65% OF NATIONS GLOBALLY)

KEY METRICS

15.3M+
Samples to date

96K+
Samples sequenced to date

24K+
Pathogen Genomes sequenced to date

11
Key international airports (incl. 4 outside US)

44
Collection nodes (cumulative 2025)

*Map is not exhaustive; some partnerships remain confidential.

Data updated 02/24/25

Q4 2024 Financial Summary

In millions of USD	Three Months Ended December 31, 2024	2023*	% YoY	Twelve Months Ended December 31, 2024	2023*	% YoY
Revenue:						
Cell Engineering [1]	$ 35	$ 27	29%	$ 174	$ 144	21%
Biosecurity	9	8	16%	53	108	(51%)
Total revenue	**44**	**35**	**26%**	**227**	**251**	**(10%)**
Biosecurity cost of sales	8	7	14%	39	54	(29%)
Biosecurity operating expenses	11	13	(12%)	45	57	(21%)
Cell Engineering cost of other revenue	2	0	NM	6	0	NM
Cell Engineering research and development	50	73	(31%)	272	336	(19%)
Cell Engineering general and administrative	21	40	(49%)	115	171	(33%)
Total segment operating expenses [2]	**92**	**133**	**(31%)**	**476**	**618**	**(23%)**
Biosecurity operating loss (Adjusted EBITDA)	(10)	(12)	17%	(31)	(3)	NM
Cell Engineering operating loss (Adjusted EBITDA)	(38)	(86)	56%	(219)	(364)	40%
Total segment operating loss (Adjusted EBITDA) [2]	**(48)**	**(98)**	**51%**	**(249)**	**(366)**	**32%**
Net loss (GAAP) [2]	**(108)**	**(212)**	**49%**	**(547)**	**(893)**	**39%**
Total Adjusted EBITDA [1][2]	**(57)**	**(101)**	**44%**	**(293)**	**(365)**	**20%**
Memo: inclusive of carrying cost of excess space (net of sublease income)	*9*	*0*		*26*	*0*	
Memo: inclusive of M&A related non-cash IP R&D	*0*	*6*		*20*	*10*	
Capital expenditures (net of tenant improvement allowance)	**9**	**3**	**150%**	**38**	**41**	**(6%)**

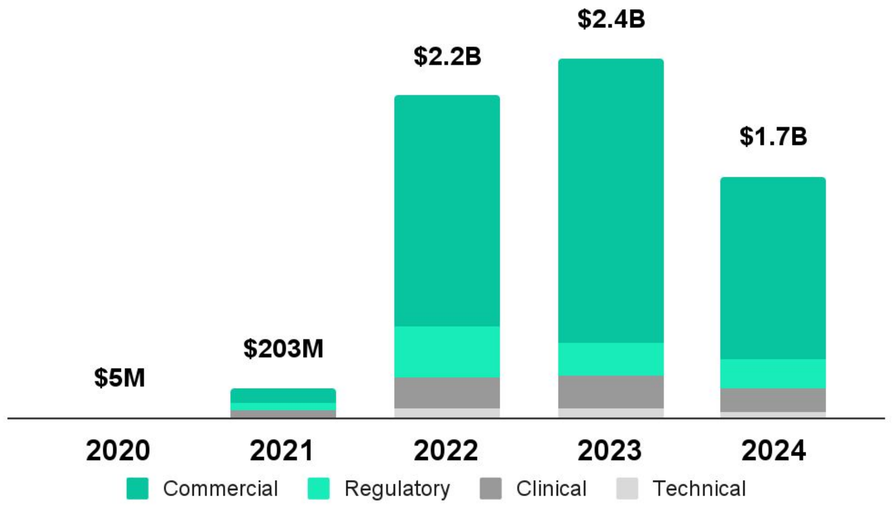
** As adjusted to reflect the impact of including in Adjusted EBITDA the one-time charges related to acquired in-process research and development, which totaled $5.6 million and $9.6 million for the three months and year ended December 31, 2023, respectively.*

1) Year ended December 31, 2024, includes $45.4 million of non-cash revenue from a release of deferred revenue relating to the mutual termination of a customer agreement with Motif FoodWorks.
2) For a reconciliation of segment operating expenses, segment operating loss, net loss and Adjusted EBITDA, see the Appendix.

While strategic priorities shifted away from downstream value share (DVS) in 2024, Ginkgo maintains a pool of ~$1.7B in potential downstream milestone revenue

Milestone Pool Opportunity as of Year End

As of the end of 2024, there was ~**$1.7 billion** in aggregate potential future cash revenue in the downstream milestone pool



Key events in 2024

- ~$50M in downstream milestone potential booked across industrial biotech, agriculture, and biopharma programs
- ~$0.7B in milestones removed from pool over the prior year due to certain program cancellations and customer decisions to not commercialize collaboration products primarily in biopharma

Total DVS Opportunities including Milestone Pool

# of Programs by DVS Type & Vertical [1]	Industrial Biotech	Pharma and Biotech	Agriculture	Total
Royalties	30	8	10	**48**
Milestones	7	14	2	**23**
Milestones + Royalties	5	7	2	**14**
Equity	8	2	1	**11**
Total	**50**	**31**	**15**	**96**

1) # of Programs by DVS Type & Vertical includes programs that are potentially eligible for DVS and are either currently active or previously completed and delivered to the customer.

2025 Full Year Outlook

In millions of USD	Historical	Outlook
	FY2024	**FY2025**
Revenue		
Cell Engineering	**$174**	**$110-130**
Services	*$129*	*$110-130*
Motif 3Q24 non-cash deferred revenue release	*$45*	-
Biosecurity	**$53**	**$50+**
Total revenue	**$227**	**$160-180**

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We believe...

1

Ginkgo’s successful restructuring execution drove significant cash flow improvement in Q4 2024

2

Ginkgo’s expansion into direct sales of life science tools & services is opening new markets for our transformational tech

3

Ginkgo’s Datapoints and Automation offerings are seeing strong positive market reaction and demand momentum

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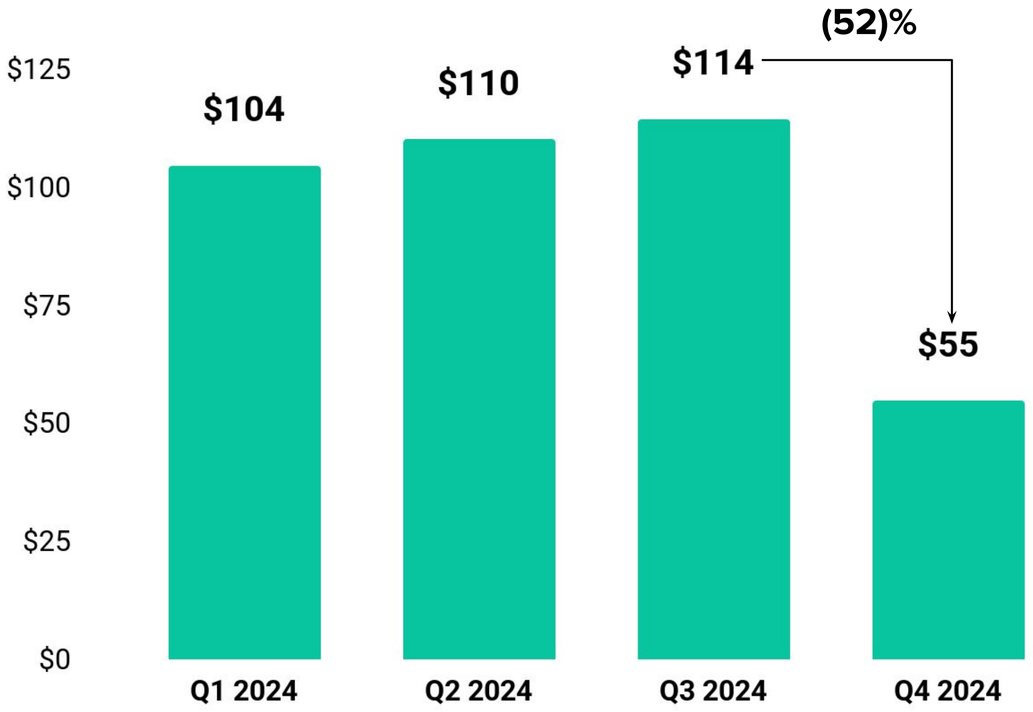
Significant improvement in cash flow from ($114M) Q3 to ($55M) in Q4

QUARTERLY CASH BURN[(1)] IN 2024 ($M)



$562M in cash and cash equivalents with no bank debt as of December 31, 2024

(1) Cash flow for each quarter is defined as change in GAAP cash & cash equivalents over such quarter compared to the prior quarter.

2024 RESTRUCTURING ACCOMPLISHMENTS

People

- >40% workforce reduction

Other Expenses

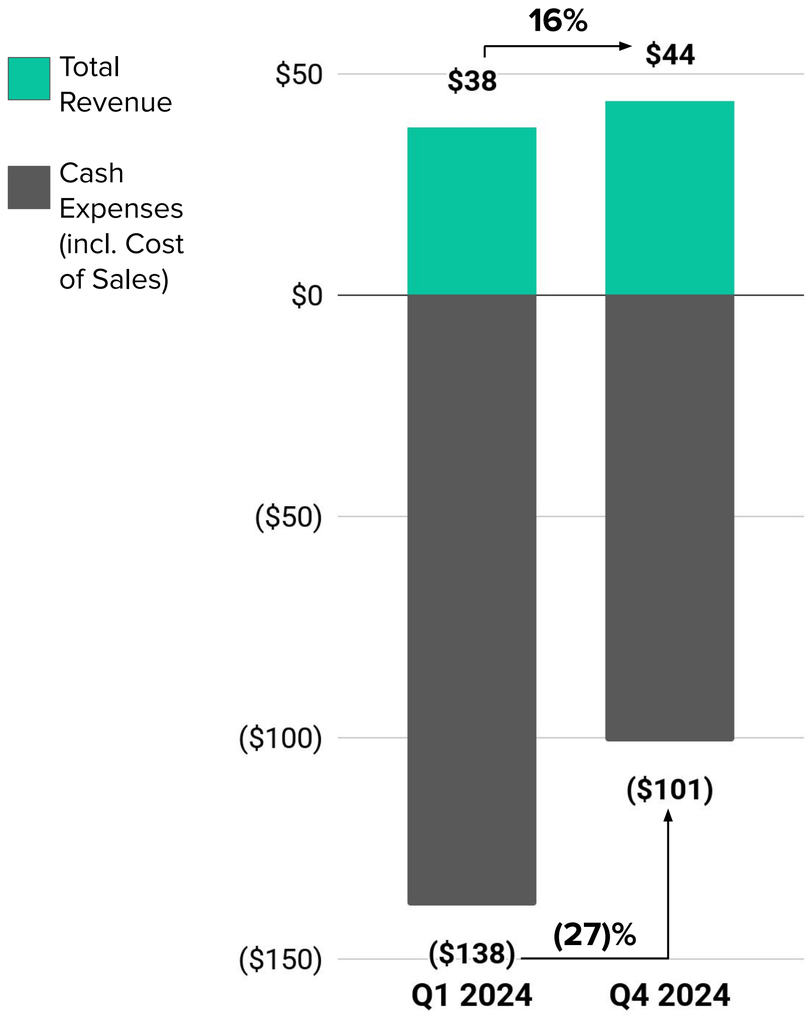
- Rationalization of professional fees, contractor spend, software and lab supplies

Space

- Site consolidation complete ahead of schedule
- ~$65M rent/facilities cost associated with excess leased space - available for sublease

$190M annual run rate cost savings achieved from Q1 to Q4

TOTAL ADJUSTED EBITDA ($M)



Total Adjusted EBITDA	($100M)[2]	($57M)
Total Cash Flow	($104M)	($55M)

2024 RESULTS

- $129M in Cell Engineering revenue[(1)]
- $53M in Biosecurity revenue

- **$190M of annualized run-rate cost take-out achieved**
  - Savings partially offset by Biofab1 increasing rent costs

- **Completion of site consolidation** creates sublease opportunity

2025 TARGETS

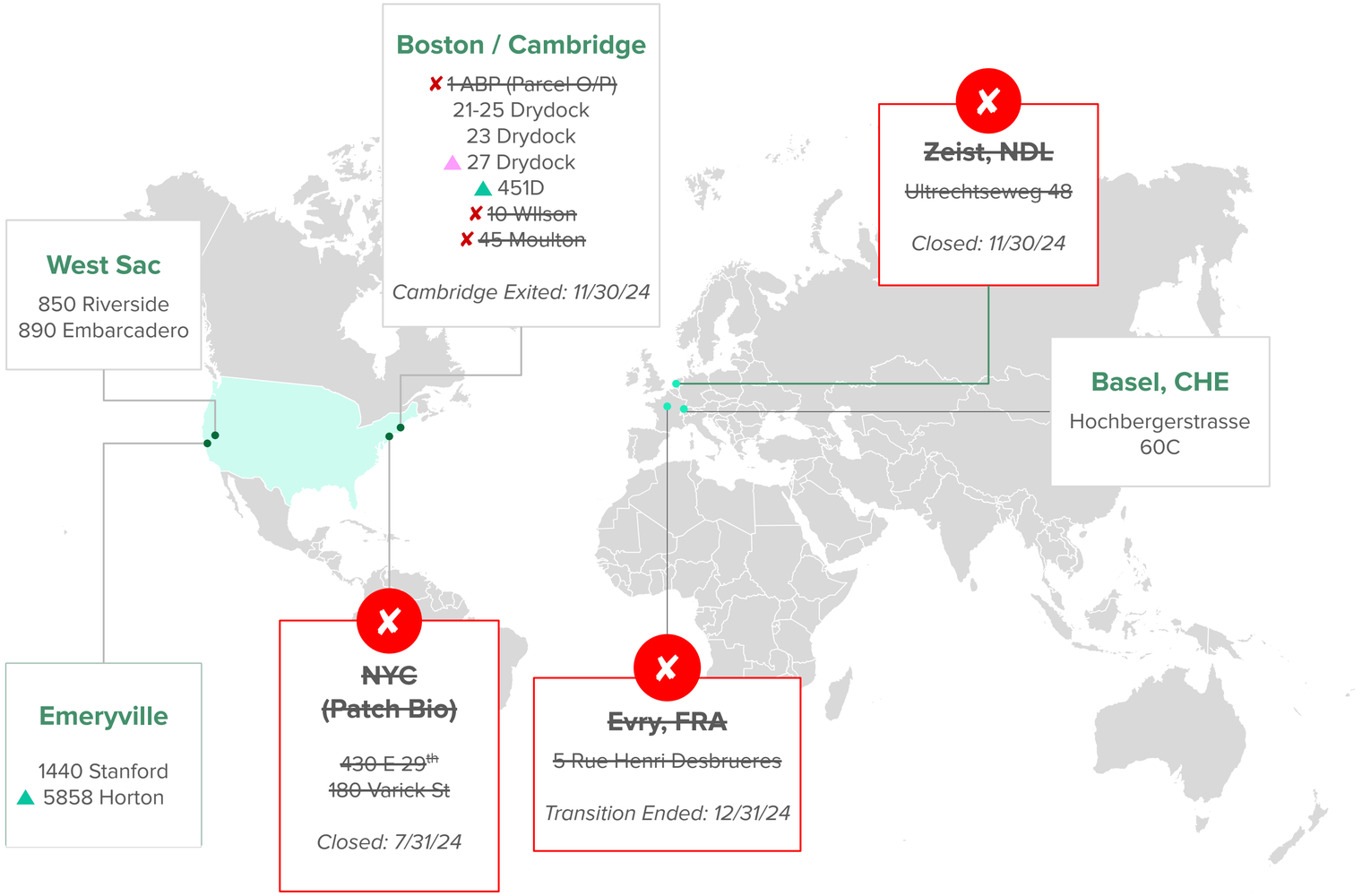
- $110-130M in Cell Engineering revenue (guidance)
- $50M+ in Biosecurity revenue (guidance)

- **Increase to $250M of annualized run-rate savings target** by end of 3Q25 ($15M/quarter improvement)

- Address $65M of excess space ($17M/quarter opportunity).

(1) Excludes $45M of non-cash deferred revenue related to Motif
(2) Excludes non-cash IPR&D charge for comparison purposes to Q4

Site consolidation is substantially complete



Legend

✘ Exit Planned or Completed
▲ Subleased
▲ Partially subleased

Evry

Sold Altar SAS to Lesaffre including ALE entity in France. **Transaction closed 9/30/2024.**

Zeist

Site closure activities are complete and **site closed 11/30/2024**.

Boston / Cambridge

Move out of Cambridge sites (10 Wilson & 45 Moulton) **completed as of 11/30/2024.** Further consolidation in Drydock sites occurring in Q1 2025.

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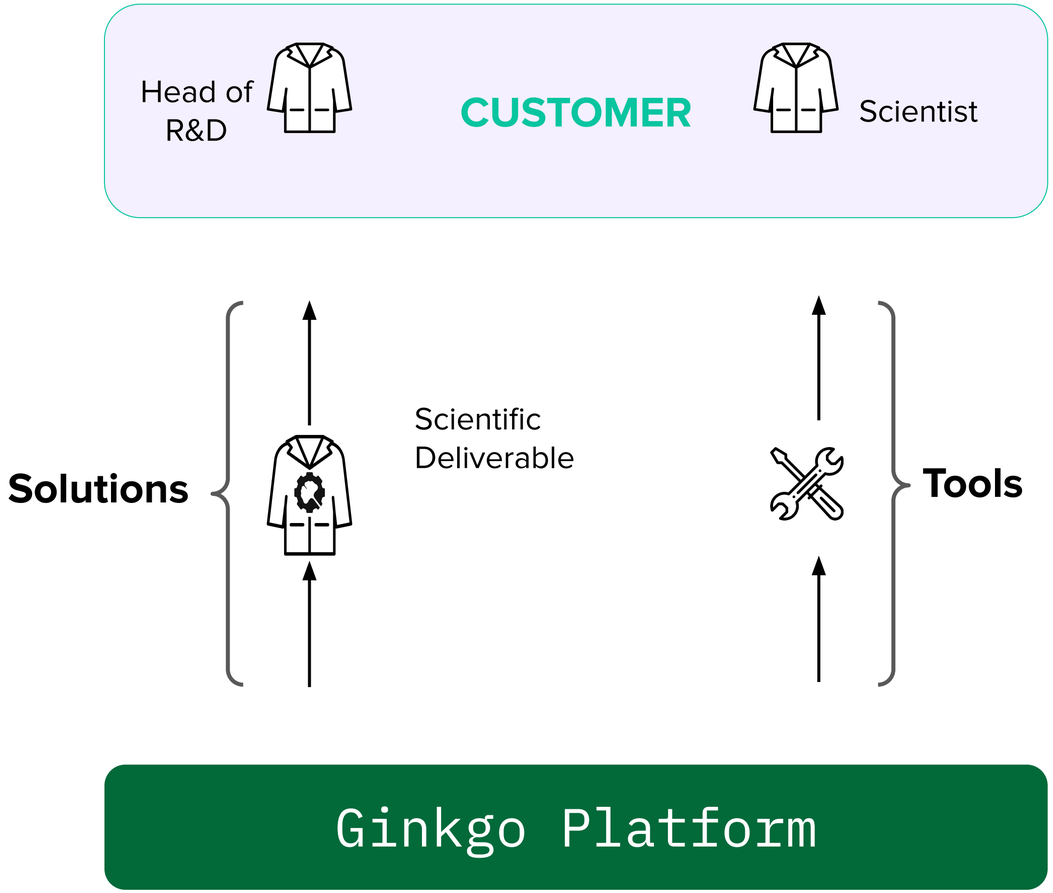
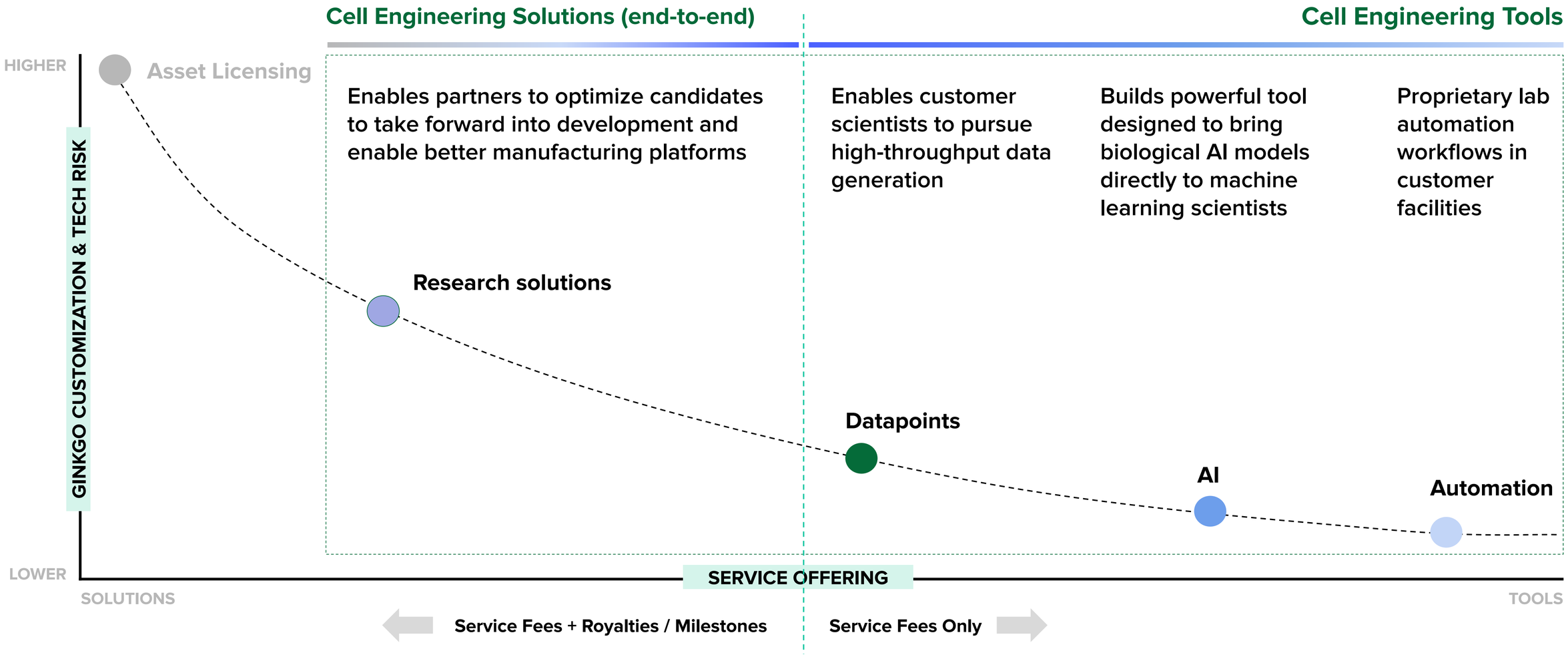
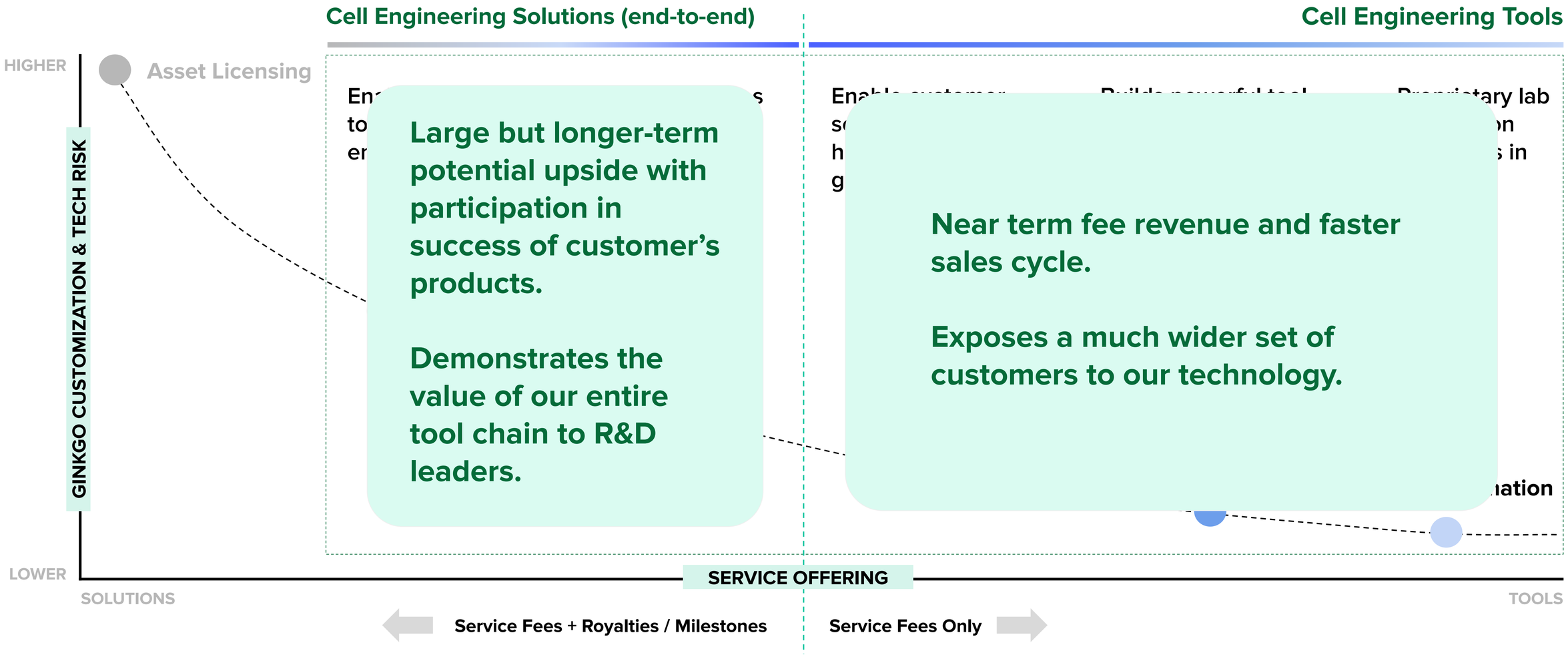
In 2024, we began offering our platform directly to customer scientists as tools, with IP owned by customer & simple customer-friendly business model.



Ginkgo expanded our cell engineering offerings into the life science tools and services space



Solutions and Tools are very complementary



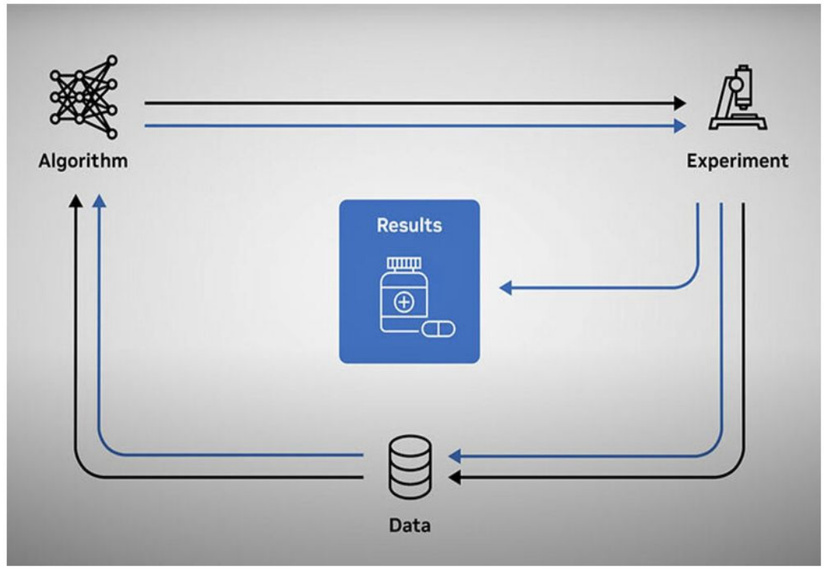
Customer interest driven need for large data assets to enable AI in biotechnology

Genentech's lab in the loop aims to tap the power of quantity for quality drug discovery

DRUG DISCOVERY & DEVELOPMENT©

By Brian Buntz | March 20, 2024

We can design chips that power self-driving cars and create physically-realistic video footage based on text descriptions. Yet, as Genentech's Aviv Regev pointed out in a session about the company's lab in the loop at NVIDIA's GTC conference, the humble cells within us operate with a complexity that still eludes our full understanding.



[NVIDIA]

It turns out that a cell is itself like a computational device with circuits and code, Regev said. These molecular "circuits" interact with each other, receive information, make decisions, and execute them. "These molecular circuits — they're hard to reverse engineer," she said. That hasn't stopped scientists from spending decades trying to model and predict their behavior. "Mostly unsuccessfully, I can tell you," Regev added.

The alliance will bring "AI, the lab, and the clinic together **to uncover otherwise inaccessible patterns in vast quantities of data**, and to design experiments to test those patterns."

AVIV REGEV
Head of Genentech Research & Early Development (gRED), Global Research Technologies

Genentech
A Member of the Roche Group

"With AI in the loop today, we can get 80% of the value with 40% of the wet lab work, **and that ratio will improve going forward**."

Recursion

BEN MABEY
Chief Technology Officer

LEARN MORE

Kit-based, small batch vs Automation-based, large batch approach to generating lab data provide different advantages

ADVANTAGE
Maximal flexibility to scientists, rapid onboarding of new techniques, PhDs receive needed training

DISADVANTAGE
No improvements due to scale

ADVANTAGE
Improvement with scale
Can scale data generation up or down quickly with spending

DISADVANTAGE
Reduced flexibility, slower onboarding of new techniques, in-house training required

The Data Foundry model **complements (does not replace!)** a classic research approach

	Classic Research Approach	Foundry Research Approach
Flexibility	Infinite	Limited
Data density	Low	High
Approach	Hypothesis-driven / focused	Inductive / broad
Experiments	By-hand	Robots, software, by-hand
Team	Do-it-all scientists	Collaborating specialized teams
Use cases	• Hypothesis testing • Proof of concept work • De-risking experiments	• AI/ML model generation • Determining global maxima • Novel hypothesis generation

Complementary approaches that feed innovation

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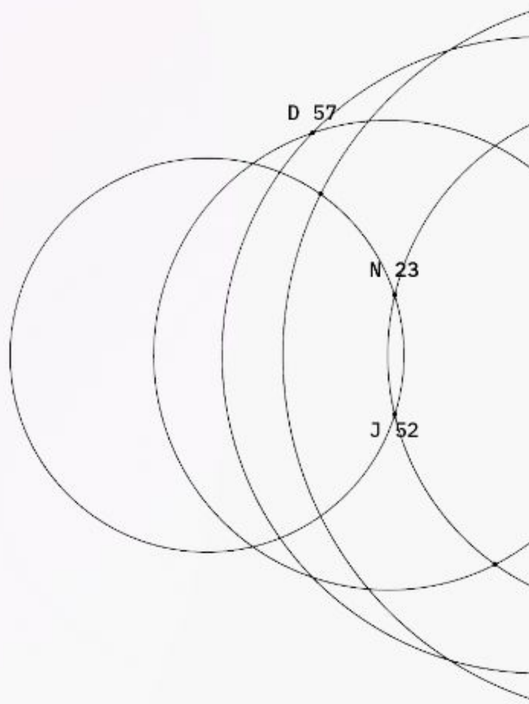
GINKGO DATAPOINTS



We built Ginkgo Datapoints to generate the data that underpins AI models in biotech. We provide data in a low-friction manner with customer needs in mind.

[DEAL TERMS]

Pricing
Benefit from the economies of scale our automation offers with volume-based discounts.

Deals are fee-for-service with no milestones or royalties.

Ownership
Customers own the data.

Pilots
We can do small, nimble pilot deals to start.

[WAYS OF WORKING]

Flexibility
We will carry out data generation campaigns to customer needs, incl.:

- Size of dataset
- Cell lines & libraries
- Assays & readouts
- Flexible & secure data access

Speed
We can return data in as little as 3 weeks.

Partnership
Our highly skilled scientific team wants to collaborate with our customers.

Functional Genomics

Flexibility & Customization	Choose from cell types, compound library, data readouts.
End-to-End	We handle both perturbation and readouts. Customers tell us what they need, and we will deliver the data.
Scale	10,000s of in vitro chemical and genetic perturbations in each cell type.
Speed	We deliver data in as little as 3 weeks.
Attractive Deal Terms	Fee-for-service only: no royalties, no milestones. And customers own the data, always. Our version of an easy button.

Functional genomics supports AI for target discovery

Scoping
Design the data generation campaign to your needs

High-throughput perturbations
Ginkgo executes perturbations at its Boston lab in high-throughput

Multi-omic readouts
Multi-omic readouts are captured via automated workflows

Data integration
Multimodal data is analyzed and integrated

Data transfer
Raw data & more in-depth analyses are transferred back to your teams

Sample Data

Download the sample dataset.

Submit the form to access the sample dataset (3MB) including a:

- Compressed dataset (metadata + raw UMI counts)
- Short report detailing the workflow and data and a link to the full dataset.

LEARN MORE

Signed deals in 2024 with **leading tech bio** companies and **top 10 biopharma companies**

We can work with the cell types of our customers' choosing

Cell types onboarded on drug-seq

Cell type	Source organism	Tissue / organ
A549	Human	Lung
HeLa	Human	Cervical
HEK293	Human	Kidney
U2 OS	Human	Osteosarcoma
Normal Skin Fibroblasts	Human	Skin
Skeletal Myoblasts	Human	Skeletal
Vascular smooth muscle	Human	Aorta
Melanocytes	Human	Skin
PBMCs	Human	Blood
THP-1	Human	Blood
CAR T cells	Human	Blood
Small Lung Airway Epithelial	Human	Lung
iPSC derived glutamatergic neurons	Human	Brain
Microglia	Human	Brain
HT-1197	Human	Bladder
5637	Human	Bladder
HT-1376	Human	Bladder

Roadmap - to be onboarded by EOY

Additional cell types onboarded on the Ginkgo platform

Cell line	Source organism	Tissue / organ
Caco-2	Human	Colorectal
HCT116	Human	Colorectal
HepG2	Human	Liver
HIEC-6	Human	Intestine
Huh7	Human	Liver
MCF7	Human	Breast
Sk-N-AS	Human	Brain
SW480	Human	Intestine
T24	Human	Bladder
Jurkat	Human	Blood
Raji	Human	Bone
K562	Human	Bone Marrow
ARPE-19	Human	Epithelial
Expi-293f	Human	Kidney
LentiX-293T	Human	Kidney

…and many more! We have worked with ~100 human cell types

Download sample datasets

We released sample perturbation datasets to the public

GDPx2

RELEASE DATE
- December 2024

DATA PACKAGE
- Metadata for a subset of 10 compounds and all controls
- PDF outlining the experimental set up

CELL TYPES
- Human melanocytes cells, aortic smooth muscle cells, dermal fibroblast, and skeletal muscle myoblasts

PERTURBATIONS
- 85 compounds, 6 concentrations, 4 replicates

SEQUENCING DEPTH
- 2M reads

READOUT
- Transcriptomic (Drug-seq)

PLATE DENSITY
- 384-well plate

AVAILABLE DATASET SIZE (FASTQ)
- ~200 GB / cell type

GDPx1

RELEASE DATE
- September 2024

DATA PACKAGE
- Metadata for the 1264 compounds screen
- Raw UMI counts for the subset of 20 compounds
- PDF outlining the experimental set up

CELL TYPES
- A459 cells (human non-small cell lung carcinoma, epithelial)

PERTURBATIONS
- 1,264 compounds, 2 concentrations, 4 replicates

SEQUENCING DEPTH
- 2M reads

READOUT
- Transcriptomic (Drug-seq)

PLATE DENSITY
- 384-well plate

AVAILABLE DATASET SIZE (FASTQ)
- 60 GB

Antibody Developability

Scale	• Screen over 2,400 antibody sequences in parallel • Enabled by our highly automated lab and over $1 billion of invested wet lab infrastructure
Breadth	Choose from 10+ developability assays across key biophysical antibody properties.
AI-Ready Data	Screen libraries including positive and negative sequences in standardized conditions and receive AI-ready data.
AI/ML Experience, Capabilities & Services	• Combines decades of protein biophysics expertise with AI/ML-powered biological engineering • Proprietary software accelerates automated data handling for faster insights • Supported by a dedicated AI team
Simple & Easy Terms	Fee-for-service only: no royalties, no milestones. And the customer own the data, always. Our version of an easy button.

Antibody developability supports AI for drug development

1. We take antibody sequences as input, perform wet lab workflows in high-throughput, and return AI-ready datasets as output
2. We synthesize, express, and purify the antibodies, perform broad biophysical characterization, analyze and integrate the data
3. Return an AI-ready dataset to the customer

Sample Data

Download the sample dataset.

Submit the form to access the sample dataset (~4KB) including a:

- Dataset with assay parameters + assay data for each antibody
- Column descriptions
- Short report detailing assay methods

LEARN MORE

Deal signed in Dec 2024 with a **top 25 biopharma company**

[GINKGO DATAPOINTS ANTIBODY DEVELOPABILITY]

Standard Product Offering Ready

Partners select assays from our set of standard products

Expanding to multiple antibody formats and assays to be responsive to customer needs

[DEVELOPABILITY CHARACTERIZATION] [DELIVERABLE]

Assays	Technology	Key Data Output
Core		
Titer	Valita	mg/L
Target Binding (BLI)	Octet	K_D
Fragmentation (CE-SDS)	LabChip	%Purity
Aggregation (SE-HPLC)	HPLC	%HMW, %Monomer, Chromatogram
Biological		
FcRn Binding	Lumit, BLI	K_D
Heparin Binding	HPLC	RT
Polyspecificity (PSP)	PSP or PAIA	PSP score or RFU
Biophysical		
Thermostability (nanoDSF)	nanoDSF	T_m , T_{onset}
Self-Association (AC-SINS)	AuNP-based	$\Delta\lambda_{max}$
Self-Interaction (DLS-kD)	DynaPro III	kD
Hydrophobicity (HI-HPLC)	HPLC or PAIA	RT or RFU
Colloidal Stability (SMAC-HPLC)	HPLC	RT

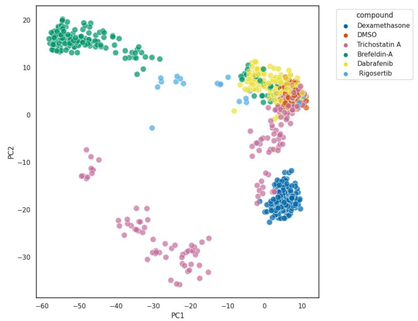
We tailor data generation campaigns according to customer R&D priorities and support cell types across multiple therapeutic areas

Example 1: Data for Oncology Target ID
[Arrayed chemical perturbations incl. Drug-Seq readout]

DETAILS
- Chemical Perturbations of 2,000 compounds in 5 different cancer cell types at 1 concentration*, incl. Drug-Seq Readout

EXAMPLE CELL TYPES
- A549, MCF-7, HCT116, HeLa, SK-MEL-28 and/or primary PBMCs

TIMELINE
- 10-11 weeks



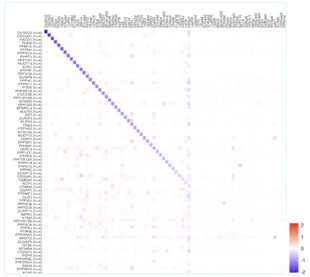
* Assumptions: assumes 1 concentration in this example. Ginkgo can support several concentrations incl. dose response curves

Example 2: Data for Alzheimer's Target ID
[Arrayed genetic perturbations (CRISPR-KO) incl. Drug-Seq + Imaging readout]

DETAILS
- Genetic Perturbations (CRISPR-KO) of 1,000 target genes across 3 cell types*, incl. Drug-Seq + Imaging readout

EXAMPLE CELL TYPES
- CRISPR-ready, iPSC-derived neurons, astrocytes, and/or microglia

TIMELINE
- 9-10 weeks inclusive of time to design and order CRISPR KO guides



* Assumptions: cells are Cas9-expressing and can be efficiently edited using Lipofectamine-based transduction

Illustrative Deliverables

<u>DRUG-SEQ:</u>
- Raw Fastq files
- QC plot: total sequenced reads
- QC plot: total reads mapped to reference
- QC plot: percent of reads mapped to reference
- QC plot: percent of rRNA removed before analysis
- QC plot: number of genes recovered at >=3 UMIs
- QC plot: PCA plot showing clustering between samples
- UMI counts for all detected genes

<u>HIGH-CONTENT IMAGING</u>
- All .tiff images
- QC plot: image quality
- QC plot: plot of plate-based controls
- QC plot: plot of all conditions tested

Data will be available via an AWS S3 bucket.

Reach out for pre-launch access to RNA data services!

Extended duration, more protein

Generate laboratory data to fine-tune and validate mRNA sequence design models

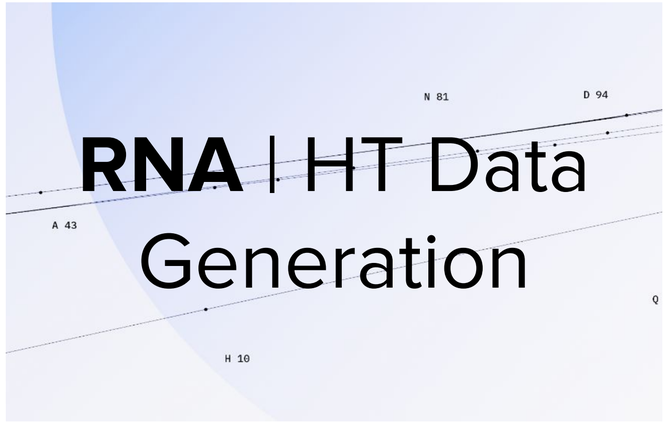
Data generation assays

	Throughput	TAT / Assay	Description	Included Options**
Stability	20,000 / assay	3 months	mRNA stability up to 72 hours	Huh7 or HEK293T cell lines 5’ UTR or 3’ UTR designs Up to 250 bp
Translation	20,000 / assay	3 months	Polysome fractionation profiling	Ginkgo standard payload
Protein	500 / week	2 months	Image-based protein quantification	Multiple cell line options Luciferase or fluorescent protein
Immune Response	500 / week	2 months	Cytokine panel	THP1 or PBMCs 10 targeted cytokines

** Additional optionality (cell lines, *in vivo* contexts, therapeutic protein measurements, custom sequence designs) available for a fee.

mRNA IVT specifications

Sequence Design	QC	Additional options for a fee
5’ Cap1, 120 nt poly-A tail Regular, m1Ψ nucleotides	Purification: SPRI beads Purity: 80-90% QC: UV-Vis + tape station	Custom cap, poly-A tailing, modified nucleotides LNP packaging Additional QC: Capping efficiency, dsRNA quantification, abortive transcription




GINKGO AI

Contact us today!

mDD-0: mRNA Discrete Diffusion for Generation of Stable mRNA Sequences

Authors: Alyssa Morrow, Michał Jastrzebski, Jake Wintermute

Contributors: Sigi Zhao, Justin Gardin, Lood van Niekerk, Valentin Zulkower, Elise Flynn, Joshua Moller, Porfirio Quintero Cadena, Hao Shen, Dana Merrick, Ankit Gupta, Seth Ritter

INTRODUCTION

Recent advances in AI have enabled remarkable progress in the design and optimization of messenger RNA (mRNA) for RNA vaccines and therapeutics. While recent work on mRNA design has largely focused on designing individual components of the mRNA sequence [1,2,3], designing end-to-end mRNA sequences presents a unique challenge. Specifically, designing functional mRNA requires joint optimization of the coding sequence (CDS) for a protein of interest in addition to the 3′ and 5′ untranslated regions (UTRs).

Recently, diffusion models have emerged as a powerful generative framework for protein

design [15,16] and sequence generation [17], for example, Ginkgo's recently released antibody discrete diffusion model. Building on these advances, we introduce mRNA discrete diffusion (mDD-0), a discrete diffusion model for the generation of mRNA sequences. The mDD-0 model is trained using genomic sequence data from hundreds of species as well as proprietary synthetic data. We show that mDD-0 can unconditionally generate mRNA sequences with similar sequence traits and predicted function to genomic sequences. We further demonstrate that, when paired with custom data generation, mDD-0 can optimize key functional features of an mRNA sequence, such as mRNA stability. The mDD-0 model outperforms conventional design strategies, such as genetic algorithms on a variety of metrics including predicted function, diverse candidate generation, and diversity from the training set.

A version of mDD-0 trained on genomic data only is accessible through Ginkgo's Model API and additional documentation is available. Ginkgo offers enhanced versions of this model and high-throughput data generation capabilities to fine-tune mDD-0 for your therapeutic payload of interest: contact us today.

OVERVIEW OF MRNA DISCRETE DIFFUSION (MDD-0)

Learn more about Ginkgo AI

mDD-0: mRNA Discrete Diffusion for Generation of Stable mRNA Sequences

Recent advances in AI have enabled remarkable progress in the design and optimization of messenger RNA (mRNA) for RNA vaccines and therapeutics. While recent work on mRNA design has largely focused on designing individual components of the mRNA sequence, designing end-to-end mRNA sequences presents a unique challenge. Specifically, designing functional mRNA requires joint optimization of the coding sequence (CDS) for a protein of interest in addition to the 3′ and 5′ untranslated regions (UTRs).

Recently, diffusion models have emerged as a powerful generative framework for protein design and sequence generation, for example, Ginkgo's recently released **antibody discrete diffusion model**. Building on these advances, we introduce mRNA discrete diffusion (mDD-0), a discrete diffusion model for the generation of mRNA sequences.

Download the White Paper

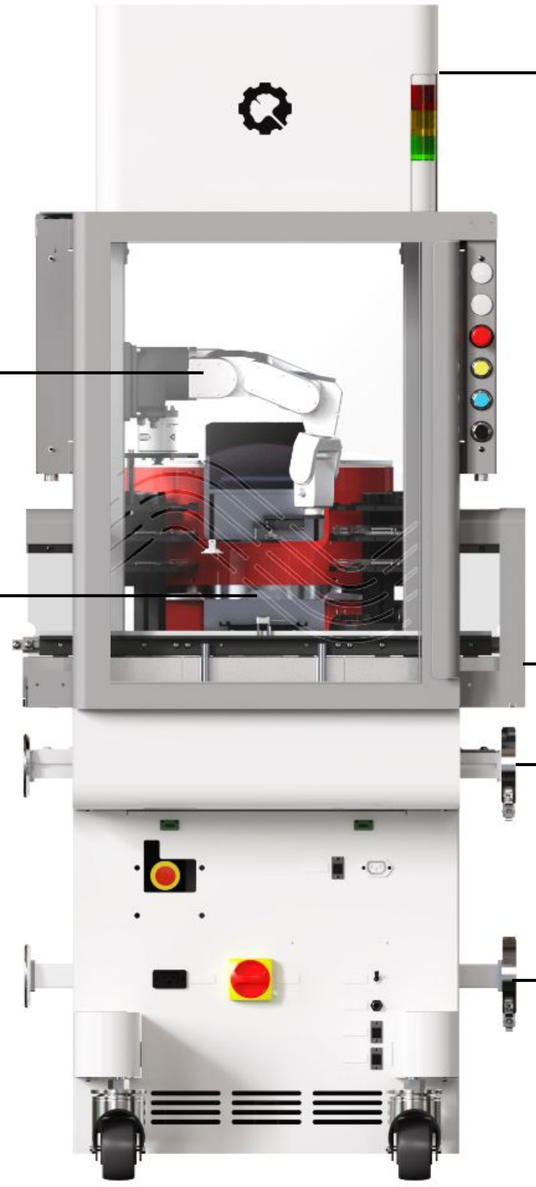

GINKGO
AUTOMATION

Reconfigurable Automation Carts (RACs)

Building blocks for the automated lab

A RAC is a standardized enclosure for integrating scientific instrumentation.

Rigorously engineered hardware designed with industrial components improves the reliability of integrated lab equipment and allows for **massive scalability and flexibility**.



Optional **HEPA Filter**

Dedicated **robotic arm** improves reliability and throughput

Lab device of choice, from any application or vendor

Plate **transport track**

Quick connection points enable system reassembly in minutes, not days

Utility routing (electrical, air, and data)

Rapidly adding new off-the-shelf hardware integrations

Liquid Handlers
- Beckman Echo 5xx/6xx
- Agilent Bravo
- Formulatrix Floi8
- Formulatrix Tempest

Bulk Dispensers
- Biotek MultifloFX
- Biotek EL406
- BlueCat Bluewasher

Centrifuges
- Bionex HiG3/4
- HighRes Microspin

Plate Sealers
- Agilent Plateloc
- Azenta a4S

Plate Peelers
- Azenta Plate Peeler (XPeel)

Shakers
- Q-Instruments Bioshake

Barcode Printer
- Agilent VCode

Capper/Decapper
- Azenta IntellixCap96

Transfection
- Lonza Nucleofector96

Colony Picker
- Singer PIXL

Analytics
- Waters ACQUITY HPLC
- Thermo Attune Cytpix Flow Cytometer

Storage and Incubation
- HighRes Ambistore D
- HighRes Steristore D
- HighRes Tundrastore D
- HighRes Microserve
- Thermo Cytomat 2
- Liconic LPX110
- Inheco Single Plate Shaker

Thermocycling
- Thermo ATC
- BioRAD Opus qPCR

Spectrophotometers
- Tecan Spark
- Molecular Devices i3x
- BMG Pherastar

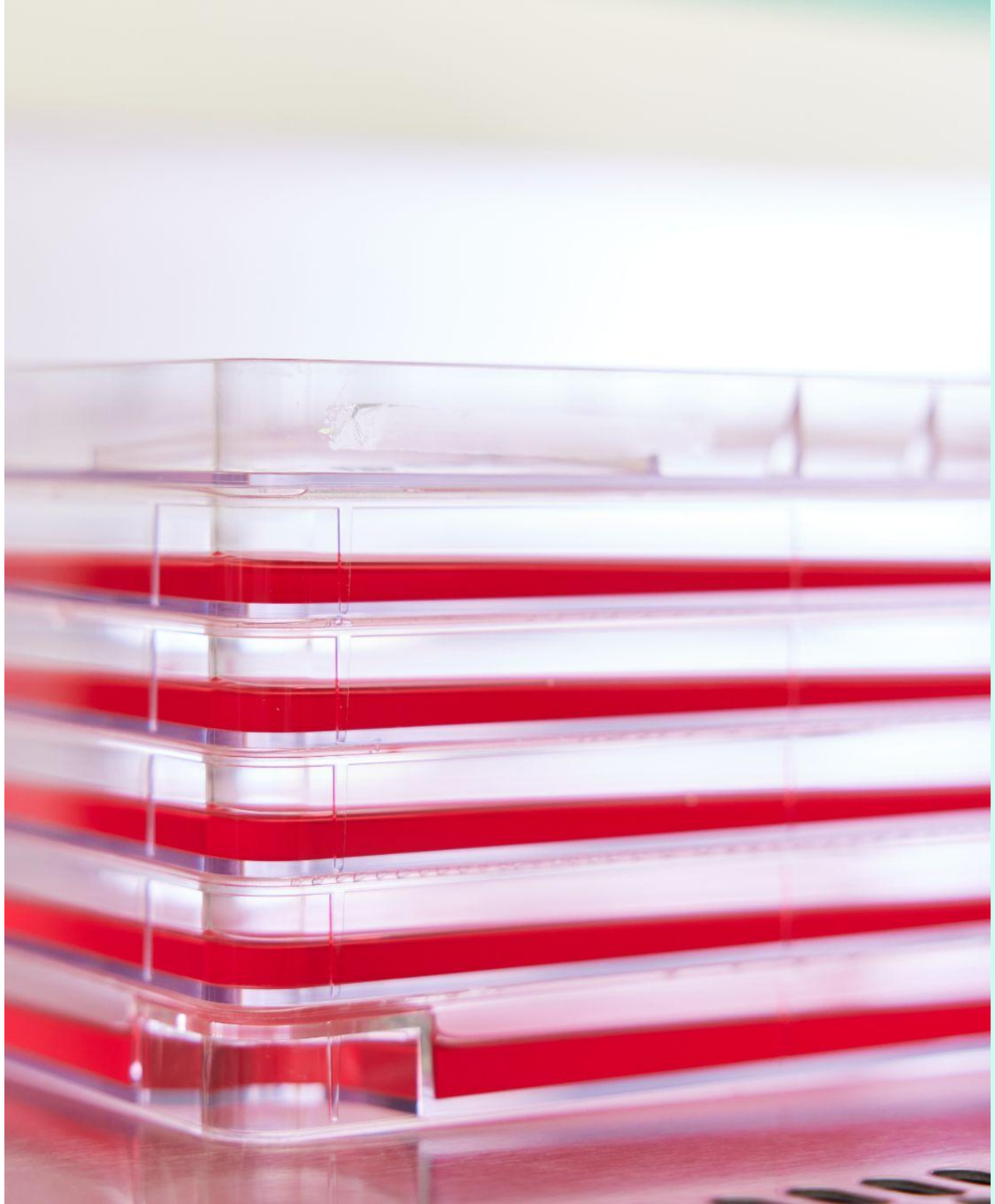
High Content Screening
- Araceli Endeavor

Accelerated Drug Discovery on RACs at Octant

Octant is a platform drug discovery company focused on building small molecule correctors. They adopted RACs in June 2022 to scale from a single indication to advancing multiple programs at once.

As reported to us by the Octant team, over the past 12 months alone, Octant's lean team has run 4 programs and 10 different assays on RACs, with a most recent throughput of over 400K samples/month, with recent throughput hitting 150,000 samples/week - with RACs, Octant reports they achieve:

- 7x **throughput increase** over manual process
- 88% *reduction* in **hands-on time**

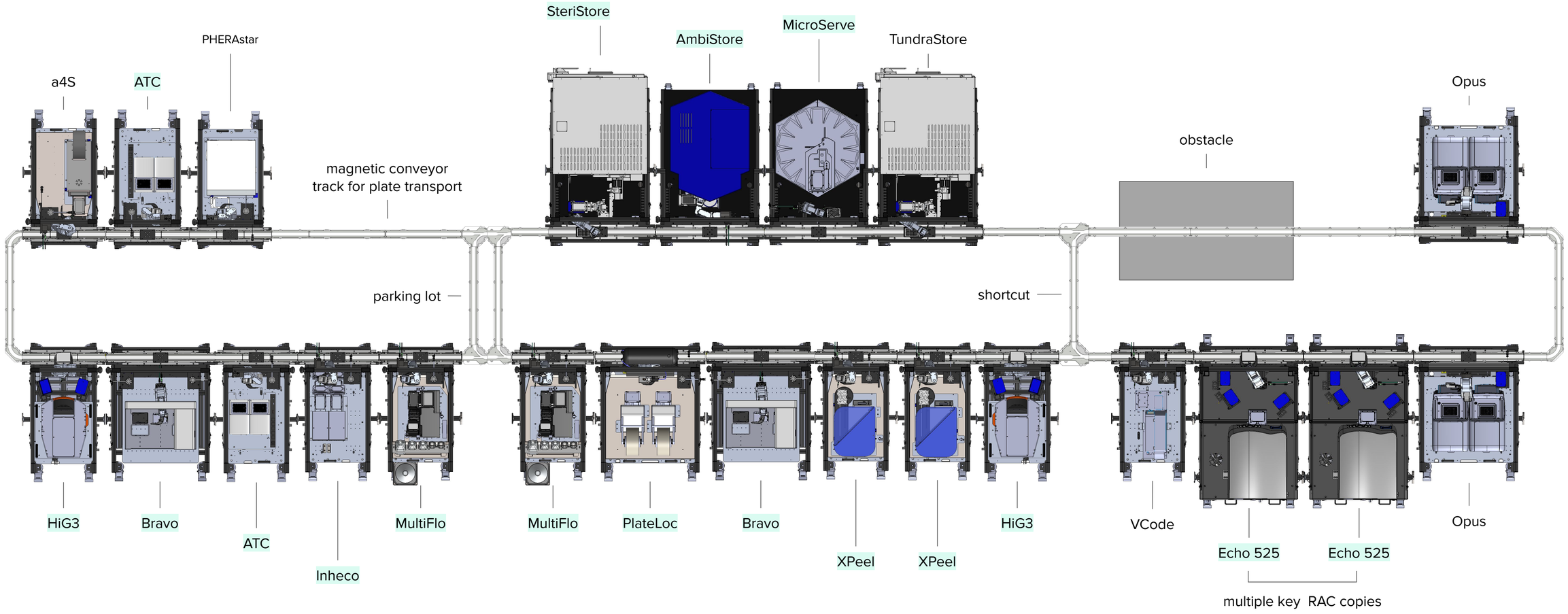


Unique among automation vendors, Ginkgo is a user of our own automation to conduct biotechnology R&D

Customers save money as RAC systems are designed to be expanded, unlike traditional integrated automation systems that are one-off, custom designs

A RAC system originally aimed at one application (here NGS library prep) can serve many other applications (e.g. DNA assembly or PCR prep)

Single RAC additions can unlock even more versatility (e.g. additional plate reading RAC can unlock misc HTS assays).



*RACs relevant to this application

Modularity built directly into automation hardware is a unique selling proposition appreciated by customers

JANUARY 23, 2025

Ginkgo Automation to Deploy Flexible Laboratory Automation System for Cutting-Edge Biofuels and Bioproducts Research at Great Lakes Bioenergy Research Center (GLBRC)

"We're excited to incorporate this advanced automation system into our workflows. Our researchers tackle a wide range of scientific challenges, from optimizing microbial conversion processes to exploring new feedstocks. **Having a single, flexible platform** that can manage both anaerobic and aerobic conditions—and can run multiple experiments simultaneously—**will be a game-changer**. It frees our scientists to focus on innovation and analysis, rather than routine lab tasks, ultimately helping us advance our mission more efficiently."

MICHAEL BOTTS
Laboratory Automation Coordinator

Our Integrated Offering

HARDWARE

Reconfigurable Automation Carts (RACs)
Modular hardware building blocks that allow for (re)assembly of work cells within days or hours, not months.

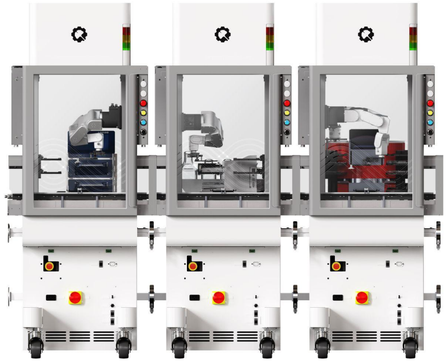
CATALYST SUBSCRIPTION

Catalyst ACS
Powerful, modular, web-based software to control interconnected instruments and RACs

Catalyst Flow
360-degree coverage, full-lifecycle, scalable support model that takes complete management responsibility for deployed automation systems. Enabled by our unique web-based architecture.

HARDWARE

Reconfigurable Automation Carts (RACs)



CATALYST SUBSCRIPTION

Catalyst ACS
Automation Control Software

Catalyst Flow
Managed Automation Solution

Reconfigurable Automation Carts are “Lego” building blocks for Lab Automation

We hope RACs can become a horizontal platform to standardize integrated lab automation across the industry.

GINKGO BIOSECURITY

FEBRUARY 20, 2025

Ginkgo Bioworks Partners with HaDEA in Up to €24 Million Consortium Project to Deliver Next-Generation 'Agnostic Diagnostics' for Respiratory Viruses at the Point of Care

"Diagnostics as decision making tools are a key component of our toolbox to rapidly respond to health emergencies. **The ability to quickly identify even previously unknown pathogens** will be a critical step in reinforcing the EU's collective health resilience."

HERA

LAURENT MUSCHEL
Acting Director-General

GINKGO BIOWORKS

Let’s grow the world we want to see

Agenda

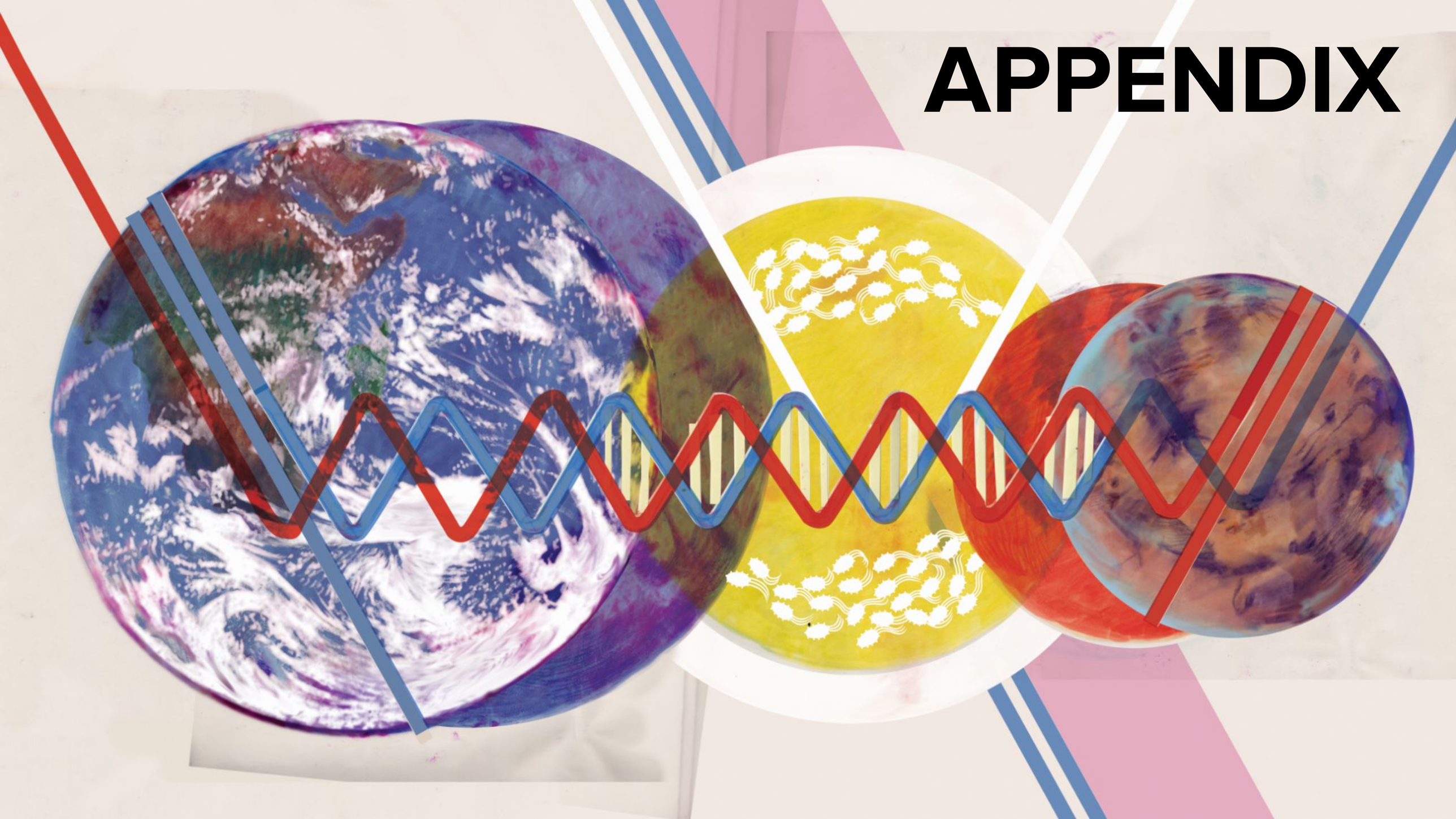
Introduction
Jason Kelly, Co-Founder and CEO

Q4 and FY 2024 Financial Update
Mark Dmytruk, CFO

Strategic Review
Jason Kelly, Co-Founder and CEO

Q&A Session
Moderated by Joseph Fridman, Director of Communications and Corporate Affairs

APPENDIX



Cell Program Counts

	Three Months Ended December 31,		Year Ended December 31,	
	2024	**2023**	**2024**	**2023**
New Programs	14	23	52	78
Current Active Programs	138	131	176	162
Cumulative Programs	294	242	294	242

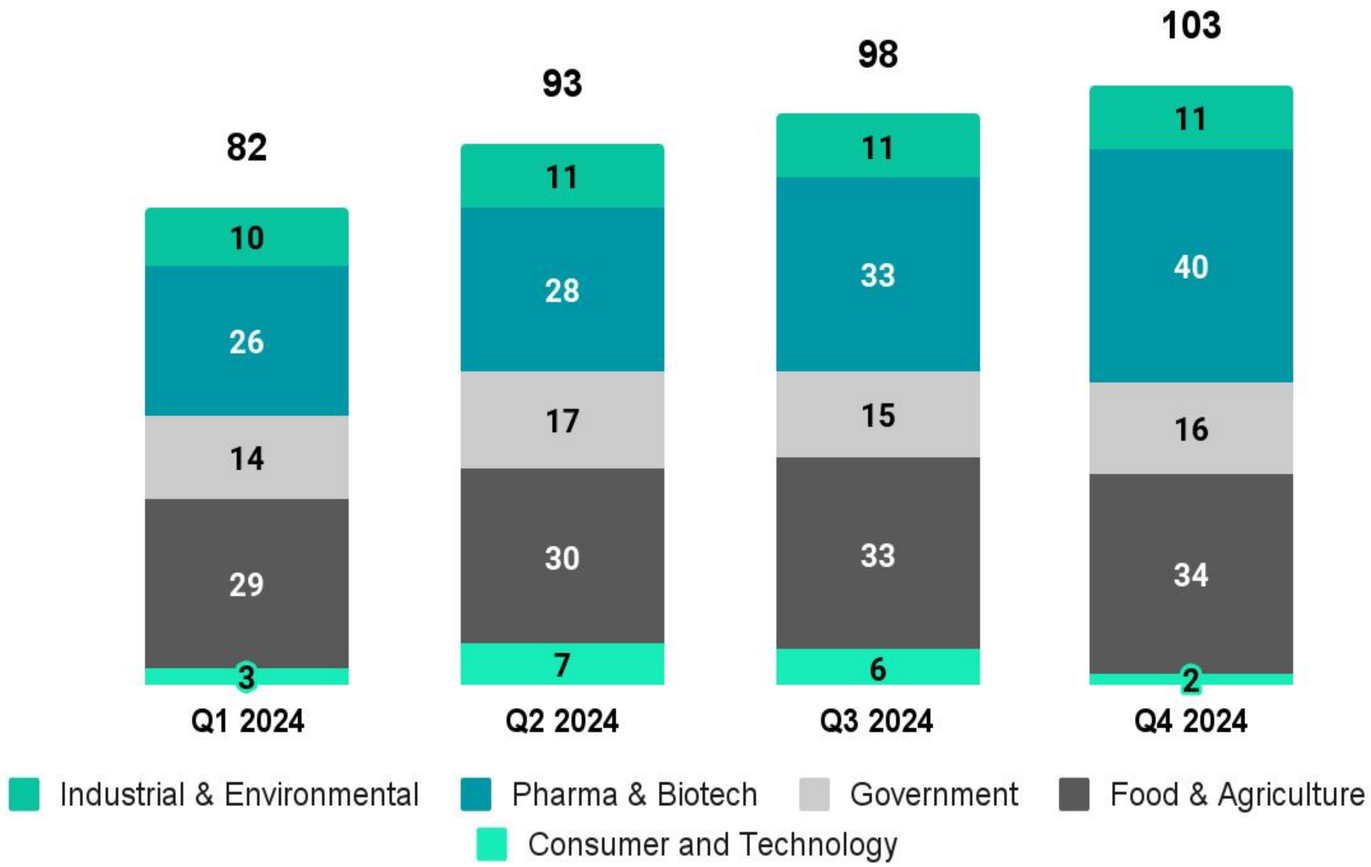
New Programs: New Programs represent the number of unique programs commenced within the reporting period, based on a technical development plan or objective. We generally exclude proof-of-concept projects and other exploratory work undertaken on a customer's behalf from the program count. As new programs typically have multi-year durations, we view this metric as an indication of future Cell Engineering revenue growth.

Current Active Programs: Current Active Programs represent the number of unique programs for which we performed R&D services in the reporting period. We view this metric as an indication of current period and future Cell Engineering revenue.

Cumulative Programs: Cumulative Programs represent the cumulative number of unique programs Ginkgo has commenced. We view this metric as an indication of our competitive advantage and as a leading indicator of the mid- to long-term potential economic value derived from downstream value share arrangements. The cumulative number of programs also contributes to Codebase, which accumulates with each additional program we conduct over time and drives better experimental direction and improves the odds of technical success in current and future programs.

Other Customer Contracts: Other Customer Contracts represent new projects commenced within the reporting period that represent a variety of small deal archetypes. These Other Customer Contracts are not reflected in the metrics outlined above.

Preliminary Look: Revenue-Generating Active Program Count[(1)]



(1) Chart depicts our historically reported Current Active Programs, expanded to include all programs including those previously referred to as “Other Contracts”, and further adjusted to include only those which were revenue-generating in the quarter. For example, programs which are just starting and/or are in the final stages of finishing and did not generate meaningful revenue in the quarter would be excluded in the relevant quarter in which the program did not generate revenue even though it was active. **The data presented on this slide represent preliminary estimates and are subject to change as this metric is further developed or otherwise.**

Cell Engineering Revenue

In millions of USD, except % of total	Three Months Ended December 31,				Year Ended December 31,			
	2024	**% of Total**	**2023**	**% of Total**	**2024**	**% of Total**	**2023**	**% of Total**
Related Parties	$ 1	3%	$ 2	9%	$ 53	30%	$ 22	15%
Third Parties	34	97%	25	91%	121	70%	122	85%
Cell Engineering Revenue	**$ 35**	**100%**	**$ 27**	**100%**	**$ 174**	**100%**	**$ 144**	**100%**
Cash consideration	$ 34	96%	$ 25	93%	$ 113	65%	$ 95	66%
Non-cash consideration	1	4%	2	7%	61	35%	49	34%
Cell Engineering Revenue	**$ 35**	**100%**	**$ 27**	**100%**	**$ 174**	**100%**	**$ 144**	**100%**

Related Parties: Related parties include Platform Ventures and certain Structured Partnerships. See notes to our consolidated financial statements in our Annual Report on Form 10-K for the year ended December 31, 2024 for additional information related to transactions with related parties.

Third Parties: Includes all other customers.

Non-Cash Consideration: Cell Engineering revenue recognized relating to contracts in which the underlying consideration is non-cash based, inclusive of downstream value share milestone payments received in the form of equity securities. See notes to our consolidated financial statements in our Annual Report on Form 10-K for the year ended December 31, 2024 for additional information related to revenue recognition.

Segment Information

In millions of USD, except % YoY

	Three Months Ended December 31,		Year Ended December 31,	
	2024	2023	2024	2023
Cell Engineering				
Revenue	$ 35	$ 27	$ 174	$ 144
Costs and operating expenses:				
Cost of other revenue	2	0	6	0
Research and development	50	73	272	336
General and administrative	20	40	115	171
Cell Engineering operating loss	**(38)**	**(86)**	**(219)**	**(364)**
Biosecurity				
Service revenue	9	8	53	79
Product revenue	0	0	0	29
Costs and operating expense:				
Cost of Biosecurity service revenue	8	7	39	47
Cost of Biosecurity product revenue	0	0	0	7
Research and development	0	0	1	2
General and administrative	11	13	44	56
Biosecurity operating (loss) income	**(10)**	**(12)**	**(31)**	**(3)**
Total segment operating loss	**(48)**	**(98)**	**(249)**	**(367)**
Reconciling items to reconcile total segment operating loss to loss before income taxes:				
Stock-based compensation [1]	21	44	115	235
Impairment expense [2]	6	0	54	121
Depreciation and amortization	16	13	63	71
Restructuring charges [3]	4	0	24	0
Carrying cost of excess space (net of sublease income) [4]	9	0	26	0
Merger and acquisition related expenses [5]	(2)	18	4	61
Acquired in-process research and development	0	6	20	10
Other (income) expense, net [6]	6	34	(8)	29
Loss before income taxes	**(108)**	**(212)**	**(548)**	**(893)**

Note: The accompanying footnotes are provided on the next slide

Segment Information Footnotes

1) For the three months ended December 31, 2024 and 2023, includes $0.1 million and $0.8 million, respectively, in related employer payroll taxes. For the years ended December 31, 2024 and 2023, includes $3.0 million and $5.0 million, respectively, in related employer payroll taxes.

2) For the three months ended December 31, 2024, includes $5.8 million related to lab equipment. For the year ended December 31, 2024, includes $47.9 million related to goodwill impairment and $5.8 million related to lab equipment. For the year ended December 31, 2023, includes a $25.2 million impairment loss on lab equipment and a $96.2 million impairment loss on lease assets associated with an exited Zymergen leased facility.

3) Includes $4.2 million and $19.3 million in employee termination and other costs for the three months and year ended December 31, 2024, respectively. Additionally, Restructuring charges include $4.8 million in impairment of an operating lease right-of-use asset relating to facilities consolidation for the year ended December 31, 2024.

4) The carrying cost of excess space includes base rent, common area maintenance charges, and real estate taxes associated with facilities that are not occupied, net of any sublease income from these spaces.

5) Represents transaction and integration costs directly related to mergers and acquisitions, including: (i) due diligence, legal, consulting and accounting fees associated with acquisitions, (ii) post-acquisition employee retention bonuses and severance payments, (iii) the fair value adjustments to contingent consideration liabilities resulting from acquisitions, and (iv) costs associated with the Zymergen Bankruptcy, as well as securities litigation costs, net of insurance recovery.

6) Includes interest income, interest expense, loss on investments, losses/gains on deconsolidation of subsidiaries, changes in fair value of certain assets and liabilities, and other gains or losses.

Adjusted EBITDA Reconciliation

In millions of USD	Three Months Ended December 31,		Year Ended December 31,	
	2024	2023*	2024	2023*
Net loss [1]	**$ (107.5)**	**$ (211.7)**	**$ (547.0)**	**$ (892.9)**
Interest income, net	(7.2)	(13.2)	(38.5)	(57.1)
Income tax benefit	(0.3)	(0.2)	(0.5)	(0.1)
Depreciation and amortization	15.7	12.8	63.0	70.5
EBITDA	**$ (99.5)**	**$ (212.3)**	**$ (523.0)**	**$ (879.6)**
Stock-based compensation [2]	20.7	43.6	115.3	234.9
Impairment expense [3]	5.8	0.0	53.7	121.4
Restructuring charges [4]	4.2	0.0	24.2	0.0
Merger and acquisition related expenses [5]	(1.7)	18.1	4.4	61.2
Loss on equity method investments	0.0	1.1	0.0	2.6
Loss on investments	12.5	10.0	28.8	54.8
Loss on deconsolidation of subsidiaries	0.0	42.5	7.0	42.5
Change in fair value of warrant liabilities	0.0	(6.6)	(5.7)	(5.2)
Change in fair value of convertible notes	0.9	2.2	2.0	2.3
Adjusted EBITDA Net loss [1]	**$ (57.1)**	**$ (101.4)**	**$ (293.3)**	**$ (365.0)**

** As adjusted to reflect the impact of including in Adjusted EBITDA the non-cash one-time charges related to acquired in-process research and development (see Footnote 5 below).*

1) All periods include non-cash revenue when earned, including $45.4 million in the year ended December 31, 2024, recognized pursuant to the termination of revenue contracts with Motif FoodWorks.

2) For the three months ended December 31, 2024 and 2023, includes $0.1 million and $0.8 million, respectively, in related employer payroll taxes. For the years ended December 31, 2024 and 2023, includes $3.0 million and $5.0 million, respectively, in related employer payroll taxes.

3) For the three months ended December 31, 2024, includes $5.8 million related to lab equipment. For the year ended December 31, 2024, includes $47.9 million related to goodwill impairment and $5.8 million related to lab equipment. For the year ended December 31, 2023, includes a $25.2 million impairment loss on lab equipment and a $96.2 million impairment loss on lease assets associated with an exited Zymergen leased facility.

4) Restructuring charges consist of employee termination costs from the reduction in force commenced in June 2024, as well as the impairment of a right-of-use asset relating to facilities consolidation.

5) Represents transaction and integration costs directly related to mergers and acquisitions, including: (i) due diligence, legal, consulting and accounting fees associated with acquisitions, (ii) post-acquisition employee retention bonuses and severance payments, (iii) the fair value adjustments to contingent consideration liabilities resulting from acquisitions, and (iv) costs associated with the Zymergen Bankruptcy, as well as securities litigation costs, net of insurance recovery. Not included in this adjustment are acquired in-process research and development expenses, which totaled zero and $5.6 million for the three months ended December 31, 2024 and 2023, respectively, and $19.8 million and $9.6 million for the years ended December 31, 2024 and 2023, respectively.

Stock-Based Compensation

In millions of USD, except % YoY	Three Months Ended December 31,			Year Ended December 31,		
	2024	2023	% YoY	2024	2023	% YoY
Total Stock-Based Compensation	**$ 20.7**	**$ 43.6**	**(53%)**	**$ 115.3**	**$ 234.9**	**(51%)**
Amount included in Research and Development expenses:	**9.7**	**26.8**	**(64%)**	**57.7**	**148.9**	**(61%)**
Stock-Based Compensation	9.6	26.2	(63%)	56.0	145.9	(62%)
Employer Payroll Taxes Related to Stock-Based Compensation	0.1	0.6	(90%)	1.7	3.0	(43%)
Amount included in General and Administrative expenses:	**11.0**	**16.8**	**(35%)**	**57.6**	**86.0**	**(33%)**
Stock-Based Compensation	10.9	16.6	(34%)	56.3	84.0	(33%)
Employer Payroll Taxes Related to Stock-Based Compensation	0.0	0.2	(73%)	1.3	2.0	(37%)

Modification of Equity Awards in Connection with Business Combination

Prior to becoming a public company in September 2021, Ginkgo granted restricted stock units (“RSUs”) with both a service-based vesting condition and a performance-based vesting condition, defined as a change in control or an initial public offering (both as defined in the underlying award agreement). Ginkgo historically did not recognize any stock-based compensation expense associated with these awards due to the performance-based vesting condition.

As previously disclosed, on November 17, 2021 the board of directors modified the vesting terms of RSUs, such that Ginkgo’s business combination with Soaring Eagle Acquisition Corp. was deemed to have met the performance condition for vesting. This was accounted for as a modification and resulted in a catch-up adjustment of approximately $1.5 billion of incremental stock-based compensation expense in the fourth quarter of 2021 (calculated based on the number of RSUs impacted, which had been granted since 2015, at the share price of $543.60 on November 17, 2021). Stock-based compensation expense also increased by $174 million in the fourth quarter of 2021 related to RSU earnout shares (“Earnout RSUs”) which were also subject to the same performance condition as the underlying RSUs.

During the fourth quarter of 2024 and 2023, we recognized $0.3 million and $17 million, respectively, in stock-based compensation expense related to the modified RSUs and Earnout RSUs. As of December 31, 2024, there was $2 million of unrecognized stock-based compensation expense related to those modified RSUs and Earnout RSUs that had not yet fully met the service-based vesting condition as of December 31, 2024. This amount will be recognized over a weighted-average period of 0.6 years.

Stock Based Compensation Expense Supplement

As disclosed in our SEC filings, the vast majority of Ginkgo's stock-based compensation expense since going public relates to the accounting treatment of RSUs granted prior to Ginkgo becoming a publicly traded company, which had already been included in Ginkgo's fully-diluted share count and thus does not reflect new dilution to shareholders after going public

- Prior to going public, following applicable accounting rules, Ginkgo did not book stock-based compensation expense related to RSU grants dating back to 2015
- After Ginkgo went public, GAAP accounting required a one-time catch-up adjustment for those historical RSUs

Per GAAP accounting, the one-time catch-up adjustment was calculated using the Fall 2021 stock price on the applicable date ($543.6, adjusted to reflect the reverse stock split effective August 20, 2024) rather than the much lower values of these shares when the historical RSUs were actually granted

Additionally, all "earnout" shares from Ginkgo's negotiated deSPAC transaction were accounted for, even those that have not yet been earned and are subject to forfeiture if Ginkgo's stock price does not exceed specified levels

Stock Based Compensation Summary

($ in millions)	**2021**	**2022**	**2023**	**2024**
Total GAAP stock-based compensation expense	$1,688	$1,941	$235	$112
(-) "Catch-up" stock-based compensation expense	$1,666	$1,872	$130	$12
Stock based compensation excl. pre-deSPAC grants	**$22**	**$69**	**$105**	**$100**

Total remaining "catch-up" SBC (estimated):

2025: $2M

Share Supplement

Illustrative Fully-Diluted Share Count

Shares in thousands	
Basic Shares [1]	54,239
RSUs [2]	3,327
Fully-Diluted Shares	**57,566**
Memo: Remaining Earnout Shares Outstanding [3]	*3,794*
Memo: Shares Underlying Warrants [4]	*51,825*

1) Common stock outstanding as of 2/17/2025 less outstanding earnout shares as of 12/31/2024 for which the service and/or price (between $600 and $800 per share) vesting conditions have not yet been met.
2) Unvested RSUs as of 12/31/2024.
3) Outstanding earnout shares as of 12/31/2024, includes shares for which the service and/or price (between $600 and $800 per share) vesting conditions have not yet been met.
4) Warrants to purchase Class A common stock outstanding as of 12/31/2024, with an exercise price of $11.50. Each Warrant equals one-fortieth (1/40) of one share of Class A common stock (40 Warrants must be exercised for one share of Class A common stock).

Note: Share counts have been adjusted to reflect the reverse stock split effective August 20, 2024.