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DELTA REPORT

10-K

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10-K - DECEMBER 31, 2023 COMPARED TO 10-K - DECEMBER 31, 2022

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TOTAL DELTAS	3655
CHANGES	272
DELETIONS	1711
ADDITIONS	1672

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-K

(Mark One)

☒ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended **December 31, 2022**


December 31, 2023

Or

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from to

Commission File Number 001-34899

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 **Graphic 3**

Pacific Biosciences of California, Inc.

(Exact name of registrant as specified in its charter)

Delaware

16-

1590339

Delaware

16-

1590339

(State or other jurisdiction of

(I.R.S. Employer

incorporation or organization)

Identification No.)

1305 O'Brien Drive

Menlo Park, CA 94025

94025

(Zip

Code)

(Address of principal executive offices)

(Registrant's telephone number, including area code)

(650) 521-8000

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, par value \$0.001 per share	PACB	The NASDAQ Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act:

None

None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes x No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes o No x

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes x No o

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes x No o

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	<input checked="" type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. o

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. Yes x No o

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. o

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). o

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes o No x

Aggregate market value of registrant's common stock held by non-affiliates of the registrant on June 30, 2022 June 30, 2023, based upon the closing price of Common Stock on such date as reported by NASDAQ Global Select Market, was approximately \$91,868,509; \$3,323,701,933. Shares of voting stock held by each officer and director have been excluded in that such persons may be deemed to be affiliates. This assumption regarding affiliate status is not necessarily a conclusive determination for other purposes.

Number of shares outstanding of the registrant's common stock as of January 31, 2023 January 31, 2024: 247,079,374

267,951,880

DOCUMENTS INCORPORATED BY REFERENCE:

Portions of the registrant's definitive Proxy Statement relating to its 2023 2024 Annual Meeting of Stockholders are incorporated by reference into Part III of this Annual Report on Form 10-K where indicated. Such Proxy Statement will be filed with the U.S. Securities and Exchange Commission within 120 days after the end of the fiscal year to which this report relates.

Pacific Biosciences of California, Inc.

Annual Report on Form 10-K

For the Fiscal Year Ended December 31, 2022

December 31, 2023

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K, including the sections titled “Business,” “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” contain or may contain forward-looking statements that are based on the beliefs and assumptions of the management of Pacific Biosciences of California, Inc. (the “Company,” “we,” “us,” or “our”) and on information currently available to our management. The statements contained in this Annual Report on Form 10-K that are not purely historical are forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and include, but are not limited to:

- the availability, uses, accuracy, sensitivity, advantages, compatibility, pricing, specifications, quality, or performance of, or benefits or expected benefits or using, our products or technologies, including the Revio™ and Onso™ systems;
- our current and future products;
- our strategic and commercial plans, including our expectations and plans for the commercial launches of the Revio and Onso systems systems;
- our market opportunity, including market size and expected market growth;
- our expectations regarding the conversion of backlog to revenue and the pricing and gross margin for products;
- our manufacturing plans including developing and scaling of manufacturing and delivery of our products;
- our research and development plans;
- the anticipated impact of the COVID-19 pandemic catastrophic events, including health epidemics or pandemics and military or other armed conflicts, on our business, business plans and results of operations;
- our product development plans, roadmaps, and objectives, including, among other things, statements relating to future uses, quality, or performance of, or benefits of using, products or technologies, updates, or improvements of our products;
- our intentions regarding seeking regulatory approval for our products;
- our competitive landscape, including competition in the short- and long-read sequencing technologies markets;
- our expectations regarding collaborations and partnerships;
- our expectations regarding unrecognized income tax benefits;
- our expectations regarding market risk, including interest rate changes and general macroeconomic conditions;
- the sufficiency of cash, cash equivalents, and investments to fund projected operating requirements;
- the effects of recent accounting pronouncements on our financial statements; and
- other future events.

Forward-looking statements can be identified by words such as: “anticipates,” “believes,” “could,” “estimates,” “expects,” “intends,” “may,” “plans,” “potential,” “predicts,” “projects,” “seeks,” “should,” “target,” “will,” “would,” or similar expressions and the negatives of those terms. Forward-looking statements involve known and unknown risks, uncertainties, and other factors that may cause our actual results, performance, or achievements to be materially different from any future results, performance, or achievements expressed or implied by the forward-looking statements.

Factors that could cause or contribute to such differences include, but are not limited to, those discussed under the heading “Risk Factors” in this report and in other documents we file with the Securities and Exchange Commission (SEC). Given these risks and uncertainties, you should not place undue reliance on forward-looking statements. Also, forward-looking statements represent management’s beliefs and assumptions as of the date of this report. Except as required by law, we assume no obligation to update forward-looking

statements publicly, or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future.

This Annual Report on Form 10-K also contains estimates, projections, and other information concerning our industry, our business, and the markets for our products, including data regarding the estimated size and estimated growth for those markets. Information that is based on estimates, forecasts, projections, market research, or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances reflected in this information. Unless otherwise expressly stated, we obtained this industry, business, market, and other data from reports, research surveys, studies, and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data, and similar sources.

PART I

ITEM 1. BUSINESS

Overview

We are a premier life science technology company that is designing, developing, and manufacturing advanced sequencing solutions that enable scientists and clinical researchers to improve their understanding of the genome and ultimately, resolve genetically complex problems.

Our products and technology under development stem from two highly differentiated core technologies focused on accuracy, quality, and completeness, which include our **existing** HiFi long-read sequencing technology and our **emerging** Sequencing by Binding (SBB®) short-read sequencing technology. Our products address solutions across a broad set of applications including human **genomics sequencing, genetics**, plant and animal sciences, infectious disease and microbiology, oncology, and other emerging applications. Long-read sequencing was recognized by the journal *Nature Methods* as its “method of the year” for 2022 for its contributions to biological understanding and future potential.

Our focus is on **providing creating some of the world’s most advanced sequencing systems to provide** our customers **with advanced sequencing technologies with higher throughput the most complete and improved workflows that we believe will enable dramatic advancements in routine healthcare.**

accurate view of genomes, transcriptomes, and epigenomes.

Our customers include academic and governmental research institutions, commercial testing and service laboratories, genome centers, public health labs, hospitals and clinical research institutes, contract research organizations (CROs), pharmaceutical companies, and agricultural companies.

Recent Developments

On October 25, 2022, In 2023, we announced commercially released two new sequencing platforms, Revio™ and Onso™.

Revio is a new long-read sequencing system designed to enable the use of HiFi sequencing for large studies in human genetics, cancer research, and agricultural genomics. **We began taking orders Commercial shipments for Revio commenced in the fourth first quarter of 2022 2023, and expect 173 systems have since been shipped to commence commercial more than twenty countries as of December 31, 2023. We released SMRT Link 13.0 software on the Revio shipments in March 2023.**

system which includes the adaptive loading feature for consistent run performance, run preview for improved lab efficiency, and expanded application support with functionality to sequence shorter and longer fragments of DNA.

Onso, a short-read DNA sequencing system, is designed to deliver industry-leading sensitivity and specificity for novel insights in oncology, disease research, and other applications. We commenced **the beta program for customer shipments of Onso in the third quarter of 2023.**

In August 2023, we acquired Apton Biosystems to accelerate the development of a high-throughput platform based on the SBB chemistry utilized by Onso. Through acquiring Apton, we obtained expertise in state-of-the-art optics and image processing and a novel clustering method and chemistry designed to enable the sequencing of billions of clusters of DNA on one flow cell.

We also develop products used to prepare molecules for sequencing on our platforms. In the fourth quarter of 2022. We began taking 2023, we commenced commercial shipments for a new Kinnex™ line of products used to concatenate small molecules into larger fragments to optimize the output on HiFi sequencing systems like Revio. The Kinnex products are designed for various applications in RNA and amplicon sequencing. As of December 31, 2023, we received orders for Onso during the first quarter of 2023 and remain on track for commercial shipment in the second quarter of 2023. from over 70 customers.

Our Mission and Impact

Our mission is to enable the promise of genomics to better human health. Genomics is core to all biological processes, and our advanced genomics tools provide scientists and clinical researchers with the insights to better understand biology and health. The “promise of genomics” postulates that medicine, agriculture, public health, drug development, and other disciplines will be fundamentally transformed with the incorporation of by incorporating routine genomic information over the coming decades. We see early progress toward this transformation in the applied use of genomics in areas such as genetic disease, oncology, and sustainable food production. However, legacy genomics technologies have fundamental limitations in progressing these fields toward the promise of genomics. We believe that unleashing the full potential of genomics will require a level of accuracy and completeness that is inaccessible to legacy technologies. Accuracy and completeness are central to our product development strategy, and strategy; thus, we have created some of the most innovative and high-quality genomics solutions on the market. Our products also have enhanced multi-omic capabilities to look beyond the genome to the transcriptome and epigenome, which we believe is key to deep understanding.

understanding a full picture of biology.

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The Underlying Science

Genetic inheritance in living systems organisms is conveyed through a naturally occurring information storage system known as deoxyribonucleic acid, or DNA. DNA stores information in linear chains of the chemical bases adenine, cytosine, guanine, and thymine, represented by the symbols A, C, G, and T respectively.

In humans, the genome is comprised of approximately three billion DNA base-pairs, base pairs, which are divided into 23 chromosomes ranging in size from 50 million 50 million to 250 million 250 million bases. A human carries two copies of the chromosomes, one inherited from each parent. There are approximately Approximately 23,000 smaller regions within these chromosomes, called genes, which contain the blueprints for protein production. The proteins synthesized from these blueprints essentially underlie the operation of all biological systems.

Genome sequencing reads the bases of long fragments of nucleic acids. Initial genome sequencing studies have shown that mutations in these DNA base-pairs base pairs play a critical role in human disease, contributing to the burgeoning field of genomics. Since then, recent discoveries have highlighted additional complexities of DNA and ribonucleic acid, or RNA. These discoveries include the presence of chemical modifications to the bases, such as methylation, and post-translational modification, or the processing of RNA molecules after they are transcribed from the genome, both of which can affect protein synthesis.

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Our Principal Markets

Researchers utilize our solutions in human genomics, plant and animal sciences, infectious disease and microbiology, oncology, and other emerging applications.

Human Genomics: Improving rare disease research and understanding

According to a World Health Organization publication, it is estimated that 400 million people worldwide are affected by up to 8,000 distinct rare diseases, with 80% of these believed to be genetic in nature. These genetic diseases are DNA differences, called variants, in the affected individuals. Variants range in size from single nucleotide substitutions to large losses or gains of entire chromosomes. Other sequencing technologies applied to rare disease diagnosis are technologically limited to interrogating small variants, representing only a subset of possible genomic variation. Consequently, most genetic disease cases are undiagnosed, leaving families on multi-year diagnostic odysseys. Sequencing the human genome with long and accurate reads enables the potential detection of all known classes of disease-causing variation. In addition, the ability of PacBio's long-read sequencing technology to detect 5-Methylcytosine DNA methylation, an epigenetic modification shown to alter gene behavior, may enable further advances in research and development in genetic disease diagnosis.

Infectious Disease and Microbiology: Understanding and tracking microbes and pathogens in support of global public health

Our technology has increased the scientific community's understanding of microorganisms and viruses and their malignancy, transmission, and potential resistance to antibiotics or vaccines. Our sequencing technology delivers highly comprehensive and complete genomes, enabling federal agencies, public health organizations, and healthcare providers to conduct wide-ranging research and surveillance activities to:

- generate high quality, complete genome assemblies, revealing variants of all known types, to gain a deeper understanding of community-acquired and hospital-associated infections and transmissions;
- identify and characterize pathogens to inform regional, national, and global public health agencies for preparation and response to rapidly evolving microorganisms; and
- characterize complex microbial communities to understand their role in human, animal, and environmental health.

Oncology: Enable the discoveries of underlying causes of cancer, progression, and relapse

Understanding the tumor cells' cellular and molecular complexity of tumor cells is critical in developing more effective targeted cancer therapies. Single-cell transcriptomics is particularly impactful in defining cellular identity and function; however, other technologies miss critical information by only sequencing a portion of RNA. Our long-read RNA sequencing method, single-cell Iso-Seq (scIso-Seq), accurately detects molecular events such as RNA isoforms and expressed mutations and provides gene expression information at the single-cell level. We believe scIso-Seq is uniquely positioned to enable discoveries by researchers of the underlying causes of cancer initiation, progression, and relapse, as well as the discovery by researchers of novel diagnostic, prognostic, and predictive biomarkers that may inform future clinical tests.

As novel discoveries continue to be made using our long-read sequencing technology, we believe our SBB short-read sequencing technology will enable us to meet the customers' demands of customers in the expanding non-invasive testing market in oncology. Due to the small amounts of circulating tumor DNA (ctDNA) present in the blood of early-stage cancer patients and those with minimal residual disease (MRD), the presence of cancer often goes undetected, and a more sensitive assay will be required. Based on testing internally and at beta customer sites, we believe our SBB technology has the potential to offer higher accuracy than competitor sequencing technologies, which may in the future support our customers' development of more sensitive tests for the purpose of earlier detection and more robust monitoring of cancer.

Plant and Animal Sciences: Helping scientists answer biological questions across for a broad range healthier world

In Plant and Animal Sciences, academic, government and corporate researchers are using our technology to explore and catalog the genetic and biological diversity of plant organisms for the breeding, propagation, and animal sciences

There are hundreds production of thousands of distinct plant crops and animal species. Our technology is used livestock while conserving the planet's natural resources. PacBio HiFi sequencing enables researchers to build high quality de novo reference genomes for these organisms and transcriptomes to study variations across several species enabling improvements to global conservation initiatives which are dedicated and support the breeding and production of resilient and higher yielding crops to preserving, monitoring, meet the world's growing population and cataloging biodiversity with actionable and accurate genomic data.

Our Technology, Products, and Solutions

We have developed HiFi long-read sequencing based on Single-Molecule Real-Time (SMRT) technology, which accurately detects the nucleotide sequence and epigenetic status of individual DNA molecules. We are also expanding our genomic solutions with our short-read SBB chemistry, which offers sensitive sequencing for short-read applications. Upon launch of the SBB platform, we believe we will be the only company offering both native long-read and native short-read technologies into the market.

Our sales consist of sequencing instruments, nanofluidic chips (SMRT Cells), and reagents for preparing DNA and performing sequencing based on our SMRT technology; flow cells and reagents for preparing DNA and performing sequencing based on our SBB technology; reagents for DNA extraction based on our nanobind Nanobind technology; and the services we perform for customers.

HiFi Long-Read Sequencing

Our HiFi long-read sequencing protocol was built upon our SMRT sequencing systems, including consumables and software, and offers customized end-to-end workflows for different sequencing applications. Highly accurate, long sequence reads simplify and accelerate data analysis algorithms, reducing the needs need for error correction steps and/or assembly aspects, depending on the application.

Customers use our HiFi long-read sequencing platforms in a wide range of sequencing applications, including whole genome sequencing and de novo genome assembly, long-range phasing, targeted sequencing, full-length RNA and single-cell sequencing, characterization of metagenomic communities and other mixed DNA samples, viral genome sequencing, and others. Our technology is also capable of detecting epigenetic markers simultaneously by analyzing the kinetics of DNA polymerization that is affected, and thereby detectable, by epigenetic markers such as 5-methylcytosine or N⁶-methyladenine.

SMRT Technology

Our proprietary SMRT Technology enables the observation of DNA synthesis as it occurs in real time real-time by harnessing the natural process of DNA replication, which in nature is a highly efficient and accurate process actuated by DNA polymerases. DNA polymerases attach to a strand of DNA to be replicated, examine the individual base at the point it is attached, and then determine which of the four building blocks, or nucleotides (A, C, G, or T), is required to complement that individual base. After determining which nucleotide is required, the polymerases incorporate that nucleotide into the growing strand being produced.

SMRT Sequencing is based on following the activity of DNA polymerase on individual DNA molecules in real time that occurs on our SMRT Cells that are monitored and analyzed within our HiFi long-read sequencing systems: the Revio system, Sequel II system, Sequel IIe system, and Sequel system. Carried out on SMRTbell® templates, which attach hairpin adapters to the ends of double-stranded DNA molecules to be sequenced, SMRT sequencing allows for the successive sequencing of both the forward and reverse strands of the individual DNA molecule occurring multiple times, thereby allowing for the same base of the same molecule to be sequenced more than once in a sequencing run. The base calls from the serial observation of the molecule can be processed to generate the final base call in an analytical procedure called circular consensus sequencing, leading to what

we have defined as our HiFi sequence reads, which have high accuracy typically being defined as having greater than 99% read accuracy, but often exceeding greater than 99.9% accuracy, according to research we performed in collaboration with other researchers, subsequently published in *Nature Biotechnology* in 2019. HiFi reads typically are 15-20 kilobases in size, depending on the input fragments, providing sufficient read length with our accuracy to support a multitude of applications across human health, plant and animal, and microbiology, according to research we performed in collaboration with other researchers, subsequently published in *Scientific Data* in 2020. The ability to generate single-DNA molecule sequence reads that are both long and highly accurate allows researchers to obtain more contiguous, complete, and accurate genomic data, thereby allowing for greater insights into the complexity of biological systems.

HiFi Long-Read Sequencing Instruments: Revio system + Sequel systems

Our Revio, Sequel, Sequel II, and Sequel IIe instruments conduct, monitor, and analyze single-molecule biochemical reactions in real time. The instruments use extremely sensitive imaging systems to collect the light pulses emitted by fluorescent reagents allowing the observation of biological processes. Computer algorithms are used to translate the information that is captured by the optics system. Using the recorded information, light pulses are converted into either an A, C, G, or T base call with associated quality metrics. Once sequencing is started, the real-time data is delivered to the system's primary analysis pipeline, which outputs base identity and quality values.

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HiFi Consumables

Customers purchase proprietary consumable products to run their PacBio systems, including our SMRT Cells and reagent kits. One SMRT Cell is consumed per sequencing reaction, and scientists can choose the number of SMRT Cells they use per experiment.

We offer several reagent kits, each designed to address a specific step in the core sequencing workflow. A library preparation kit is used to convert DNA into SMRTbell double-stranded DNA library formats and includes typical molecular biology reagents, such as ligase, buffers, and exonucleases. Our **binding binding/polymerase** kits include our modified DNA polymerase and are used to bind SMRTbell libraries to the polymerase in preparation for sequencing. Our core sequencing kits contain reagents required for on-instrument, real-time sequencing, including phospholinked nucleotides.

We have **also** developed and **offer** offered a new line of Kinnex kits with companion SMRT Link software to enable high-throughput, scalable, cost-effective RNA applications including bulk RNA, single-cell RNA, and 16S rRNA sequencing. The Kinnex kits are built upon the Multiplexed Arrays Array Sequencing (MAS-Seq) **3'** **kit** method for concatenating smaller amplicons into larger fragments to **enable cost-effective long-read single-cell** sequence on PacBio's long read sequencers, increasing the molecular yield by up to 16-fold. Throughput increase in these key RNA applications where the dynamic range of different RNA isoforms (bulk and single-cell) or microbial species (16S) can vary by orders of magnitude, enables characterization of these complex RNA samples while drastically reducing sequencing for a more complete interrogation of the transcriptome. The MAS-Seq kit takes single-cell cDNA as an input and outputs a sequencing-ready library, which enables researchers to move beyond gene counting to get full-length isoform information, characterize the full diversity of transcript isoforms at the single-cell level and ultimately reveal cell type-specific spliced isoforms and expressed variants.

In addition, we offer HiFiViral for SARS-CoV-2, our first fit-for-purpose, end-to-end solution for COVID-19 genome sequencing. This solution uses a differentiated molecular inversion probe (MIPs) design that is robust to the emergence of new variants in the COVID-19 genome and allows for detection of all known classes of variation across the entire viral genome. Both characteristics are required for efficient and effective public health surveillance programs battling the COVID-19 pandemic. The solution also includes fit-for-purpose software that enables automated variant calling and preparation of files for submission into public databases tracking the evolution of the COVID-19 genome.

need.

SBB Short-Read Sequencing

In contrast to SMRT sequencing, SBB reads short fragments of DNA (hundreds of bases instead of kilobases) in a massively parallel manner. Current short-read next generation sequencing technologies available in the market incur various rates of errors in results. Researchers deploy multiple tactics to try to mitigate these effects, including oversampling or implementing complex library preparation methods, yet still face challenges, including missing rare variants.

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We believe our proprietary SBB approach will enable researchers to address the gap in detecting rare variants, especially in complex heterogenous samples. Employing a two-phase sequencing chemistry, the SBB approach binds a dye-labeled nucleotide without incorporation into the DNA chain, then removes that base, then blocks and extends with a terminated nucleotide. Using nucleotides with single modifications, we incorporate more native bases, avoiding potential scarring due to fluorescent linker presence. This design helps avoid raw errors and we believe can help us develop a product with substantially greater accuracy than currently marketed short-read sequencing products. SBB enables simplified upfront library preparation, redefines coverage requirements, and reduces bioinformatic workload for downstream analysis. The accuracy of our novel sequencing approach has the potential to advance translational cancer research, drive higher fidelity single-cell applications, and broadly enable clinical sequencing—even in regions of the genome prone to sequencing errors with other short-read sequencing technologies.

SBB Short-Read Sequencing Instrument: Onso system

Our Onso instrument **currently under development**, conducts, monitors, and analyzes SBB biochemical reactions. The instrument uses extremely sensitive imaging systems to collect the light emitted by fluorescent reagents allowing the observation of biological processes. Computer algorithms are used to translate the information that is captured by the

optics system. Using the recorded information, light pulses are converted into either an A, C, G, or T base call with associated quality metrics. Once sequencing is started, the imaging data is delivered to the system's primary analysis pipeline, which outputs base identity and quality values.

SBB Consumables

After Onso's anticipated launch in the second quarter

To complement our Onso instrument, we also sell a range of 2023, our SBB consumable products will be available for purchase, including flow cells, clustering, and sequencing reagent kits. One flow cell and associated sequencing reagent pack is consumed per sequencing reaction. Each flow cell contains two lanes and scientists can choose to sequence different samples in each lane while additionally combining any number of flow cells needed per experiment.

We intend to offer several reagent kits, each designed to address a specific step in the core sequencing workflow. A library preparation kit is used to convert DNA into SBB compatible, double-stranded DNA library formats and includes typical molecular biology reagents, such as ligase, buffers, and exonucleases. Additionally for library preparation, our conversion kits include reagents to enable scientists to convert existing sequencing libraries into an SBB compatible format. Finally, our clustering and sequencing kits contain all reagents required for generating sequence ready clusters on flow cell and performing SBB sequencing reactions on instrument, respectively.

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Our Strategy for Growth

To enable the promise of genomics, our strategy includes the following key elements:

- drive rapid Increase technology adoption of by increasing market share via new customer acquisition, continue Sequel II conversions to Revio, by converting existing Sequel II/Ile customers and attracting new PacBio customers scale Onso production;
- demonstrate Onso's extraordinary level of accuracy in the field and show how it can transform research in needle-in-haystack applications
 - progress Leverage innovation to complete development of ultra-high-throughput new sequencing platforms and bench top long-read sequencers launch on-market system improvements;
- Build upon clinical momentum by expanding HiFi usage in large-scale programs and next generation SBB short-read sequencer translational research projects; and
- leverage current infrastructure to drive toward Drive towards positive cash flow
 - expand partnerships across ecosystem through gross margin expansion, disciplined operating expense management, and workflow to drive customer adoption of SBB short-read sequencing and HiFi long-read sequencing a focus on working capital.

Marketing, Sales, Service, and Support

We market our products through a global sales force and through distribution partners in Asia and Australia, certain parts of Europe, the Middle East and Africa, and Latin America. We plan to continue to invest in growing our marketing, sales, service, and support resources as we drive continued adoption of products, launch new products, and expand our customer base.

Our business is subject to seasonal trends. See the [Risk Factors](#) section, specifically the risk factor titled [Our operating results fluctuate from quarter to quarter and year over year, which makes our future results difficult to predict and could negatively impact the market price of our common stock](#), for additional information.

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Customers

Our customers include academic and governmental research institutions, commercial testing and service laboratories, genome centers, public health labs, hospitals and clinical research institutes, contract research organizations (CROs), pharmaceutical companies, and agricultural companies. In general, our customers will isolate, prepare, and analyze genetic samples using PacBio sequencing systems in their own laboratories, or they will send their genetic samples to third-party service providers who in turn will sequence the samples with PacBio systems and provide the sequence data back to the customer for further analysis. For example, customers in academic research institutions may have bacteria, animal, or human DNA samples isolated from various sources while agricultural biology companies may have DNA samples isolated from different strains of rice, corn, or other crops. For the year ended December 31, 2023, no single customer accounted for 10% or more of our total revenue. For the years ended December 31, 2022, 2021, and 2020, one customer accounted for approximately 12%, and 13%, and 14% of our total revenue, respectively.

We believe that the majority of our current customers are early adopters of sequencing technology. By focusing our efforts on high-value applications, and developing whole product solutions around these applications, we seek to drive the adoption of our products across a broader customer base and into numerous large-scale projects. In general, the broader adoption of new technologies by mainstream customers can take a number of years.

Backlog

As of **December 31, 2022** **December 31, 2023**, our **instrument product** backlog was approximately **\$45.4 million** **\$18.7 million**, compared to **\$2.0 million** **\$51.5 million** as of **December 31, 2021** **December 31, 2022**. We define backlog as purchase orders or signed contracts from our customers, which we believe are firm and for which we have not yet recognized revenue. We expect to convert **the majority of** this backlog to revenue during **2023** **2024**; however, our ability to do so is subject to customers who may seek to cancel or delay their orders even if we are prepared to fulfill them.

Manufacturing

We manufacture sequencing instruments, SMRT **cells** **Cells**, and reagents. Our key manufacturing and service facility in Menlo Park, California has received ISO 13485 and ISO 9001 certifications for the design, development, manufacture, distribution, installation, and servicing of its nucleic acid sequencing platforms. We utilize subcontract manufacturers for components of the manufacturing process. We purchase both custom and off-the-shelf components from a large number of suppliers and subject them to significant quality specifications. We periodically conduct quality audits of most of our critical suppliers and have established a supplier **certification** **qualification** program. Some of the components required in our products are currently either sole sourced or single sourced.

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Research and Development

We have historically made and plan to continue to make significant investments in research and development. Our research and development efforts focus on programs to develop new and existing platforms, as well as increasing throughput and decreasing costs on behalf of our customers. We are currently developing higher throughput platforms that **encompass** **utilize** our HiFi long-read **sequencing**. Our mid-throughput **sequencing** and SBB short-read **Sequencing by Binding** **sequencing technologies**. We also are developing a benchtop HiFi platform **Onso**, **is currently under development**, **intended to improve accessibility for smaller laboratories**, and we continue to extend our on-market platforms, **Revio** **and Onso**. In addition to platform development, we also innovate across end-to-end workflows to improve usability, as well as develop new applications for the advancement of human health.

Intellectual Property

Developing and maintaining a strong intellectual property portfolio is an important element of our business. We have sought, and will continue to seek, patent protection for our SMRT and SBB technology, for improvements to our SMRT **kit** and SBB technology, as well as for any of our other technologies where we believe such protection will be advantageous.

Our current patent portfolio, including patents exclusively licensed to us, is directed to various technologies, including SMRT nucleic acid sequencing and other methods for analyzing biological samples, **ZMW zero-mode waveguide (ZMW)** arrays, surface treatments, phospholinked nucleotides and other reagents for use in nucleic acid sequencing, optical short-read nucleic acid sequencing, nucleic acid preparation, and purification components and systems, processes for identifying nucleotides within nucleic acid sequences, and processes for analysis and comparison of nucleic acid sequence data. Some of the patents and applications that we own, as well as some of the patents and applications that we have licensed from other parties, are subject to U.S.

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government march-in rights, whereby the U.S. government may disregard our exclusive patent rights on its own behalf or on behalf of third parties by imposing licenses in certain circumstances, such as if we fail to achieve practical application of the U.S. government funded technology, because action is necessary to alleviate health or safety needs, to meet requirements of federal regulations, or to give preference to U.S. industry. In addition, U.S. government funded inventions must be reported to the government and U.S. government funding must be disclosed in any resulting patent applications.

As of **December 31, 2022** **December 31, 2023**, we own or hold exclusive licenses to **406** **437** issued U.S. patents, **100** **89** pending U.S. patent applications, **396** **granted** **6** **pending** **Patent Cooperation Treaty ("PCT")** patent applications, **441** **issued** foreign patents, and **158** **166** pending foreign **patent applications, including foreign counterparts of U.S. patent** **and** patent applications. The full term of the issued U.S. patents will expire between **2023** **2024** and 2041. We also have non-exclusive patent licenses with various third parties to supplement our own large and robust patent portfolio.

Of our exclusively licensed patent applications, two issued U.S. patents are licensed to us by the Cornell Research Foundation, which manages technology transfers on behalf of Cornell University.

Other Sequencing Solutions

There are a significant number of companies offering nucleic acid sequencing equipment or consumables. These include, but are not limited to, Illumina, Inc. ("Illumina"), BGI Genomics (also known as MGI or Complete Genomics), Thermo Fisher Scientific Inc. ("Thermo"), Oxford Nanopore Technologies Ltd. ("ONT Ltd."), Roche Holding AG ("Roche"), Qiagen N.V. ("Qiagen"), Element Biosciences, Inc. ("Element"), Bionano Genomics, Inc. ("Bionano"), Ultima Genomics, Inc. ("Ultima") and Singular Genomics Systems, Inc. ("Singular"). These companies may have different levels of financial, technical, manufacturing, administrative, and support resources available to them. We expect the competition to intensify within the overall nucleic acid sequencing market as there are also several companies developing new sequencing technologies, products and/or services. Increased competition may result in pricing pressures, which could harm our sales, profitability, or share of supply.

In order for us to maintain and increase our sales, we will need to demonstrate that our products deliver superior performance and value as a result of our key differentiators. Our HiFi long-read sequencing will need to continue to deliver very high consensus accuracy and long-read lengths and include single-molecule, real-time resolution, with the ability to detect real-time kinetic information, fast **time to result** **time-to-result** and flexibility, as well as support the breadth and depth of current and future applications.

Government Regulation

The development, testing, manufacturing, marketing, post-market surveillance, distribution, advertising, and labeling of certain medical devices, including in vitro diagnostic products and laboratory-developed tests, are subject to regulation in the United States by the Center for Devices and Radiological Health of the U.S. Food and Drug Administration (FDA) under the Federal Food, Drug, and Cosmetic Act (FDCA) and comparable state and foreign regulatory agencies. FDA defines a medical device as an instrument, apparatus, implement, machine, contrivance, implant, in vitro reagent, or other similar or related article, including any component part or accessory, which is (i) intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of disease, in man or other animals, or (ii) intended to affect the structure or any function of the body of man or other animals and which does not achieve any of its primary intended purposes through chemical action within or on the body of man or other animals and which is not dependent upon being

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metabolized for the achievement of any of its primary intended purposes. Medical devices to be commercially distributed in the United States must receive from the FDA either clearance of a pre-market notification, known as 510(k), or pre-market approval pursuant to the FDC Act prior to marketing, unless subject to an exemption.

We intend to label and sell our products for research use only ("RUO") and expect to sell them to research customers in various settings, including academic institutions, life sciences and research laboratories that conduct research, and biopharmaceutical and biotechnology companies for non-diagnostic and non-clinical purposes. Our current RUO products are not intended or promoted for use in clinical practice in the diagnosis of disease or other conditions, and they are labeled for research use only, not for use in diagnostic procedures. Accordingly, we believe our products, as we intend to market them, are not subject to regulation by the FDA. Rather, while FDA regulations require that RUO products be labeled for research use only and to market and distribute RUO products in accordance with the FDA RUO guidance, the regulations do not subject RUO products to the FDA's jurisdiction or the broader pre- and post-market controls for medical devices, devices. However, in the future, certain of our products or related applications, such as those that may be developed for clinical uses, could be subject to FDA regulation, or the FDA's regulatory jurisdiction could be expanded to include our products. If we wish to label and expand product lines to address the diagnosis of disease, regulation by governmental authorities in the United States and other countries will become an increasingly significant factor in development, testing, production, and marketing. In the future, products that we may develop in the molecular

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diagnostic markets, depending on their intended use, may be regulated as medical devices or in vitro diagnostic products ("IVDs") by the FDA and comparable agencies in other countries. In the U.S., if we market our products for use in performing clinical diagnostics, such products would be subject to regulation by the FDA under pre-market and post-market control as medical devices, unless an exemption applies, and we would be required to obtain either prior 510(k) clearance or prior pre-market approval from the FDA before commercializing the product. Obtaining the requisite regulatory approvals can be expensive and may involve considerable delay. Some countries have regulatory review processes that are substantially longer than U.S. processes. Failure to obtain regulatory approval in a timely manner and meet all of the local regulatory requirements including language and specific safety standards in any foreign country in which we plan to market our products could prevent us from marketing products in such countries or subject us to sanctions and fines. Changes to the current regulatory framework, including the imposition of additional or new regulations, could arise at any time during the development or marketing of our products.

In November 2013, the FDA issued a final guidance on products labeled for research use only, which, among other things, reaffirmed that a company may not make any clinical or diagnostic claims about an RUO product, stating that merely including a labeling statement that the product is for research purposes only will not necessarily render the device exempt from the FDA's clearance, approval, or other regulatory requirements if the totality of circumstances surrounding the distribution of the product indicates that the manufacturer knows its product is being used by customers for diagnostic uses or the manufacturer intends such a use. These circumstances may include, among other things, written or verbal marketing claims regarding a product's performance in clinical diagnostic applications and a manufacturer's provision of technical support for such activities. If FDA were to determine, based on the totality of circumstances, that our products labeled and marketed for RUO are intended for diagnostic purposes, they would be considered medical devices that will require clearance or approval prior to commercialization. Further, sales of devices for diagnostic purposes may subject us to additional healthcare regulation. We continue to monitor the changing legal and regulatory landscape to ensure our compliance with any applicable rules, laws and regulations.

The FDA classifies medical devices into one of three classes. Devices deemed to pose lower risk to the patient are placed in either class I or II, which, unless an exemption applies, requires the manufacturer to submit a pre-market notification requesting FDA clearance for commercial distribution pursuant to Section 510(k) of the FDCA. This process, known as 510(k) clearance, requires that the manufacturer demonstrate that the device is substantially equivalent to a previously cleared and legally marketed 510(k) device or a "pre-amendment" class III device for which pre-market approval applications ("PMAs") have not been required by the FDA. This FDA review process typically takes from four to twelve months, although it can take longer. Most Class I devices are exempted from this 510(k) pre-market submission requirement. If no legally marketed predicate can be identified for a new device to enable the use of the 510(k) pathway, the device is automatically classified under the FDCA as Class III, which generally requires pre-market approval, or PMA approval. However, the FDA can reclassify or use "de novo classification" for a device that meets the FDCA standards for a Class II device, permitting the device to be marketed without PMA approval. To grant such a reclassification, FDA must determine that the FDCA's general controls alone, or general controls and special controls together, are sufficient to provide a reasonable assurance of the device's safety and effectiveness. The de novo classification route is generally less burdensome than the PMA approval process.

Devices deemed by the FDA to pose the greatest risk, such as life-sustaining, life-supporting, or implantable devices, or those deemed not substantially equivalent to a legally marketed predicate device, are placed in class III. Class III devices typically require PMA approval. To obtain PMA approval, an applicant must demonstrate the reasonable safety and effectiveness of the device based, in part, on data obtained in clinical studies. All clinical studies of investigational medical devices to determine safety and effectiveness must be conducted in accordance with FDA's investigational device exemption ("IDE") regulations, including the requirement for the study sponsor to submit an IDE application to FDA, unless exempt, which must become effective prior to commencing human clinical studies. PMA reviews generally last between one and two years,

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although they can take longer. Both the 510(k) and the PMA processes can be expensive and lengthy and may not result in clearance or approval. If we are required to submit our products for pre-market review by the FDA, we may be required to delay marketing and commercialization while we obtain pre-market clearance or approval from the FDA. There would be no assurance that we could ever obtain such clearance or approval.

All medical devices, including IVDs, that are regulated by the FDA are also subject to the quality system regulation. Obtaining the requisite regulatory approvals, including the FDA quality system inspections that are required for PMA approval, can be expensive and may involve considerable delay. The regulatory approval process for such products may be significantly delayed, may be significantly more expensive than anticipated,

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and may conclude without such products being approved by the FDA. Without timely regulatory approval, we will not be able to launch or successfully commercialize such diagnostic products. Changes to the current regulatory framework, including the imposition of additional or new regulations, could arise at any time during the development or marketing of our products. This may negatively affect our ability to obtain or maintain FDA or comparable regulatory clearance or approval of our products in the future. In addition, regulatory agencies may introduce new requirements that may change the regulatory requirements for us or our customers, or both.

As noted above, although our products are currently labeled and sold for research purposes only, the regulatory requirements related to marketing, selling, and supporting such products could be uncertain and depend on the totality of circumstances. This uncertainty exists even if such use by our customers occurs without our consent. If the FDA or other regulatory authorities assert that any of our RUO products are subject to regulatory clearance or approval, our business, financial condition, or results of operations could be adversely affected.

For example, in some cases, our customers, including laboratories that offer services as part of our certified service provider program, may use our RUO products in their own laboratory-developed tests ("LDTs") or in other FDA-regulated products for clinical diagnostic use. The FDA has historically exercised enforcement discretion in not enforcing the medical device regulations against LDTs and LDT manufacturers. However, on October 3, 2014, the FDA issued two draft guidance documents that set forth the FDA's proposed risk-based framework for regulating LDTs, which are designed, manufactured, and used within a single laboratory. In January 2017, the FDA announced that it would not issue final guidance on the oversight of LDTs and LDT manufacturers but would seek further public discussion on an appropriate oversight approach and give Congress an opportunity to develop a legislative solution. The FDA has issued warning letters to genomics labs for illegally marketing genetic tests that claim to predict patients' responses to specific medications, noting that the FDA has not created a legal "carve-out" for LDTs and retains discretion to take action when appropriate, such as when certain genomic tests raise significant public health concerns. As laboratories and manufacturers develop more complex genetic tests and diagnostic software, the FDA may increase its regulation of LDTs. Legislative and administrative proposals to amend the FDA's oversight of LDTs have been introduced in recent years, including the Verifying Accurate Leading-edge IVCT Development Act of 2021 (the "VALID Act"). In September 2022, Congress passed the FDA user fee reauthorization legislation without substantive FDA policy riders, including the VALID Act, but Congress may revisit the policy riders and enact other FDA programmatic reforms in the future. **In October 2023, through rulemaking, the FDA proposed to amend the definition of "in vitro diagnostic products" in FDA regulations to include laboratories that manufacture such products and to phase out the FDA's general enforcement discretion approach for LDTs so that IVDs manufactured by a laboratory would be regulated similarly to IVDs. It is unclear when the FDA will finalize and begin enforcing such rule.** Any future legislative or administrative rule making or oversight of LDTs and LDT manufacturers, if and when finalized, may impact the sales of our products and how customers use our products, and may require us to change our business model in order to maintain compliance with these laws. We would become subject to additional FDA requirements if our products are determined to be medical devices or if we elect to seek 510(k) clearance or pre-market approval. If our products become subject to FDA regulation as medical devices, we would need to invest significant time and resources to ensure ongoing compliance with FDA quality system regulations and other post-market regulatory requirements.

If our products become subject to FDA regulation as medical devices, the regulatory clearance or approval and the maintenance of continued and post-market regulatory compliance for such products will be expensive, time-consuming, and uncertain both in timing and in outcome. Commercialization of such regulated medical devices can increase our exposure under additional laws. For example, medical device companies are subject to additional healthcare regulation and enforcement by the federal government and by authorities in the states and foreign jurisdictions in which they conduct their business and may constrain the financial arrangements and relationships through which we research, as well as sell, market and distribute any medical products for which we obtain marketing authorization. Such laws include, without limitation, state and federal anti-kickback, fraud and abuse, false claims, data privacy and security, and transparency laws and regulations related to payments and other transfers of value made to physicians and other healthcare providers. If our operations are found to be in violation of any of such laws or any other governmental regulations that apply, we may be subject to penalties, including, without limitation, administrative, civil, and criminal penalties, damages, fines, disgorgement, the curtailment or restructuring of operations, integrity oversight and reporting obligations, exclusion from participation in federal and state healthcare programs and imprisonment.

In the future, to the extent we develop any clinical diagnostic assays, we may pursue payment for such products through a diverse and broad range of channels and seek coverage and reimbursement by government health insurance programs and commercial third-party payors for such products. In the United States, there is no

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uniform coverage for clinical laboratory tests. The extent of coverage and rate of payment for covered services or items vary from payor to payor. Obtaining coverage

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and reimbursement for such products can be uncertain, time-consuming, and expensive, and, even if favorable coverage and reimbursement status were attained for our tests, to the extent applicable, less favorable coverage policies and reimbursement rates may be implemented in the future. Changes in healthcare regulatory policies could also increase our costs and subject us to additional regulatory requirements that may interrupt commercialization of our products, decrease our revenue and adversely impact sales of, and pricing of and reimbursement for, our products.

International sales of medical devices are subject to foreign government regulations, which vary substantially from country to country. In the future, if we decide to distribute or market our diagnostic products as IVDs in Europe, such products are subject to regulation under the European Union ("EU") IVD Medical Device Regulation ("IVDR") EU 2017/746. Outside of the EU, regulatory approval needs to be sought on a country-by-country basis in order to market medical devices. Although there is a trend towards harmonization of a quality system, standards and regulations in each country may vary substantially, which can affect timelines of introduction.

We are committed to the protection of our employees and the environment. Our operations require the use of hazardous materials that subject us to various federal, state, and local environmental and safety laws and regulations. We believe that we are in material compliance with current applicable laws and regulations. However, we could be held liable for damages and fines should contamination of the environment or individual exposures to hazardous substances occur. In addition, we cannot predict how changes in these laws and regulations, or the development of new laws and regulations, will affect our business operations or the cost of compliance.

Additionally, we must comply with complex foreign and U.S. laws and regulations, such as the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act, and other local laws prohibiting corrupt payments to governmental officials, anti-competition regulations and sanctions imposed by the U.S. Office of Foreign Assets Control, and other similar laws and regulations. Violations of these laws and regulations could result in fines and penalties, criminal sanctions, restrictions on our business conduct, and on our ability to offer our products in one or more countries, and could also materially affect our brand, our ability to attract and retain employees, our international operations, our business, and our operating results. Although we have implemented policies and procedures designed to ensure compliance with these laws and regulations, there can be no assurance that our employees, contractors, or agents will not violate our policies.

As we continue to expand our business into multiple international markets, our success will depend, in large part, on our ability to anticipate and effectively manage these and other risks associated with our international operations. Any of these risks could harm our international operations and negatively impact our sales, adversely affecting our business, results of operations, financial condition, and growth prospects.

Human Capital

As of **December 31, 2022** **December 31, 2023**, we had **769** **796** full-time employees. Of these employees, **352** **317** were in research and development, **64** **91** were in operations, **36** **45** were in service, **204** **226** were in marketing, sales, and customer support, and **113** **117** were in general and administration. With the exception of our field-based sales, marketing, and service teams, the majority of our employees are in California. None of our employees are represented by labor unions or are covered by a collective bargaining agreement with respect to their employment. We have not experienced any work stoppages, and we consider our relationship with our employees to be good.

Talent Acquisition and Retention

We recognize that our employees largely contribute to our success. To this end, we support business growth by seeking to attract and retain best-in-class talent. Our talent acquisition team uses internal and external resources to recruit highly skilled candidates globally.

Total Rewards

Our total rewards philosophy has been to invest in our workforce by offering competitive and fair compensation and benefits packages. We provide employees with compensation packages that include base salary, short-term incentives such as annual bonuses and commissions, and long-term equity awards. We also offer comprehensive employee benefits, which vary by country and region, such as life, disability, and health insurance, health savings and flexible spending accounts, **paid** time off **benefits**, paid parental leave, Employee Stock Purchase Program, and a 401(k) plan. It is our expressed intent to be an employer of choice in our industry by providing market-competitive compensation and benefits packages.

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Health, Safety, and Wellness

The health, safety, and wellness of our employees is a priority in which we have always invested and will continue to do so. We provide our employees and their families with access to a variety of innovative, flexible, and convenient health and wellness programs. Program benefits are intended to provide protection and security, so employees can have peace of mind concerning events that may require time away from work or that may impact their financial well-being. These programs are highlighted **and updated** regularly **in on** our **monthly human resources newsletters**.

internal benefits platform.

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We continue our investments in, and the prioritization of, employee health, safety, and wellness in light of the COVID-19 pandemic. To protect and support our essential team members, we have implemented health and safety measures that included a mandatory vaccination policy for our U.S.-based employees, maximizing personal workspaces, changing shift schedules, and providing personal protective equipment (PPE). We have also supported access to testing by holding on-site testing clinics available to employees and their family members. We continue to monitor this evolving situation and will continue to seek programs to educate and assist employees whenever possible.

Diversity, Equity, and Inclusion

We believe a diverse workforce is critical to our success. Our mission is to value differences in races, ethnicities, religions, nationalities, genders, ages, sexual orientations, as well as education, skill sets and experience. We offer training programs on diversity awareness to help employees understand, recognize, respond, and prevent bias throughout the employee lifecycle. We are focused on inclusive hiring practices, fair and equitable treatment, organizational flexibility, and training and resources.

Training and Development

We believe in encouraging employees to becoming lifelong learners by providing ongoing learning and leadership training opportunities. We provide a scaled learning platform of on-demand and virtual classroom learning focused on personal and professional development. While we strive to provide real-time recognition of employee performance, we have a formal annual review process not only to determine pay and equity adjustments tied to individual contributions, but to identify areas where training and development may be needed.

Available Information

Our website is located at www.pacb.com. The information posted on, or that can be accessed through, our website is not incorporated by reference into this Annual Report on Form 10-K, and the inclusion of our website address is an inactive textual reference only. Our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to reports filed or furnished pursuant to Sections 13(a) and 15(d) of the Securities Exchange Act of 1934, as amended, are available free of charge through the "Investor Relations" section of our website as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC. The SEC also maintains a website that contains our SEC filings. The address of the site is www.sec.gov.

Additionally, we use our website (including the blog section of our website) as well as our [Twitter X \(formerly Twitter\)](#) account ([@pacbio](#)) as a channel of distribution for important company information and to comply with our disclosure obligations under Regulation FD. Important information, including press releases, analyst presentations, and financial information regarding us, as well as corporate governance information, is routinely posted and accessible on the "Investor Relations" section of the website, which is accessible by clicking on the tab labeled "Company - Investors" on our website home page. In addition, important information is routinely posted and accessible on the blog section of our website, which is accessible through our website at www.pacb.com/blog, as well as our [Twitter X](#) account ([@pacbio](#)). The contents of our website and our [Twitter X](#) account are not incorporated by reference into this Annual Report on Form 10-K or in any other report or document we file with the SEC, and any references to our website or [Twitter X](#) account are intended to be inactive textual references only.

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ITEM

1A.RISK

FACTORS

You should carefully consider the risks and uncertainties described below, together with all of the other information in our public filings with the SEC, which could materially affect our business, financial condition, results of operations and prospects. The risks described below are not the only risks facing us. Risks and uncertainties not currently known to us or that we currently deem to be immaterial also may materially affect our business, financial condition, results of operations and prospects. In addition, any worsening of the economic environment and the ongoing COVID-19 pandemic may exacerbate the risks described below, any of which could have a material impact on us. This situation is changing rapidly, and additional impacts may arise that we are not aware of currently.

Summary Risk Factors

The following is a summary of the principal risks that could adversely affect our business, operations, and financial results. Such risks are discussed more fully below and include, but are not limited to, risks related to:

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our ability to successfully market, commercialize, and sell current and future products and related maintenance services;

- our ability to successfully market, commercialize, and sell current and future products and related maintenance services;
- our ability to achieve profitability for our business;
- our ability to successfully leverage and integrate our acquisitions and future acquisitions;
- our ability to successfully research, develop and timely manufacture our current and future products;
- management of new product introductions and transitions, resultant costs, and ability of new products to generate promised performance;
- recent significant changes to our leadership team and resultant disruptions to our business;

- retention, recruitment, and training of senior management, key personnel, scientists and engineers;
 - our ability to further penetrate nucleic acid sequencing applications, as well as grow product demand;
 - our reliance on outsourcing to other companies for manufacturing certain components and sub-assemblies, some of which are sole-sourced;
 - our ability to consistently manufacture our instruments and consumables to meet customers' specifications, quantity, cost, or performance requirements;
 - the high amount of competition we face in our industry;
 - our ability to attract customers and increase sales of current and future products;
 - reliance on a limited number of customers for a significant portion of our revenues, including academic, research and government institutions;
 - the complexity of our products giving rise to defects or errors;
 - our unpredictable and lengthy sales cycles;
 - our business, financial condition and results of operations could be adversely affected by political and economic tensions between the United States and other countries, including China and Russia;
 - securing and maintaining patent or other intellectual property protection for our products and related improvements;
 - current and future legal proceedings filed against us claiming intellectual property infringement;
 - the potential adverse impact of health epidemics, including the ongoing COVID-19 pandemic;
 - governmental regulations that burden operations or narrow the market for our products;
 - evolving ethical, legal, privacy, social, and regulatory concerns regarding genetic testing;
 - volatility of the price of our common stock; and
 - our stock price falling as a result of future offerings or sales of securities.
- our ability to repay our debt and fund our long-term operations;
 - our ability to successfully leverage and integrate our acquisitions and future acquisitions;
 - our ability to successfully research, develop and timely manufacture our current and future products;
 - management of new product introductions and transitions, resultant costs, and ability of new products to generate promised performance;
 - recent significant changes to our leadership team and resultant disruptions to our business;
 - retention, recruitment, and training of senior management, key personnel, scientists and engineers;
 - our ability to further penetrate nucleic acid sequencing applications, as well as grow product demand;
 - our reliance on outsourcing to other companies for manufacturing certain components and sub-assemblies, some of which are sole-sourced;
 - our ability to consistently manufacture our instruments and consumables to meet customers' specifications, quantity, cost, or performance requirements;
 - the high amount of competition we face in our industry;
 - our ability to attract customers and increase sales of current and future products;
 - reliance on a limited number of customers for a significant portion of our revenues, including academic, research and government institutions;
 - the complexity of our products giving rise to defects or errors;
 - our unpredictable and lengthy sales cycles;
 - adverse effects resulting from political and economic tensions between the United States and other countries, including China and Russia, and other geopolitical uncertainties;
 - securing and maintaining patent or other intellectual property protection for our products and related improvements;
 - current and future legal proceedings filed against us claiming intellectual property infringement;
 - the potential adverse impact of health epidemics, including any resurgence of COVID-19 cases or other similar outbreaks;
 - governmental regulations that burden operations or narrow the market for our products;
 - evolving ethical, legal, privacy, social, and regulatory concerns regarding genetic testing;
 - volatility of the price of our common stock; and
 - our stock price falling as a result of future offerings or sales of securities.

Our risk factors are not guarantees that no such conditions exist as of the date hereof and should not be interpreted as an affirmative statement that such risks or conditions have not materialized, in whole or in part.

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Risks Related to Our Business

The commercialization and sales of our current or future products may be unsuccessful or less successful than anticipated. While we plan to continue pursuing new products and expand into adjacent markets, we have limited experience in managing and selling multiple products and, as a result, may face challenges selling in new markets and fail to successfully carry out these initiatives, which may adversely impact our business, financial condition or results of operation.

We have made and expect to continue making substantial investments to develop new products and enhance our existing products through our acquisitions and research and development efforts. For example, we recently announced commenced commercial shipments of Revio, our new Revio™ long-read sequencing system in the fourth first quarter of 2022, and expect to commence commercial Revio shipments in March 2023, and we are also progressing development commenced commercial shipments of Onso,™, our new SBB short-read platform, and remain on track for commercial shipment in the second third quarter of 2023. Our future success is substantially dependent on our ability to successfully develop and commercialize our products, including Revio and Onso, as well as acquired technologies, which are anticipated to be used in demanding scientific research that requires substantial levels of accuracy and precision. In addition, we may not be successful in transitioning our Revio and Onso products from our prior generation products to our Revio product, or transitioning users of other third party short-read sequencing platforms to Onso, and could incur related obsolete inventory charges. charges and losses on firm purchase commitments. Customers may also be slower than we anticipate in making new capital equipment acquisitions, especially in the current economic environment. However, due Due to challenges we may experience in developing and marketing our existing products and launching new products, we may not be able to effectively:

manage the timeliness of our new product introductions and the rate at which sales of our new products may cannibalize sales of our older products or manage sales and marketing of multiple sequencing platforms;

- drive adoption of our manage the timeliness of our new product introductions and the rate at which sales of our new products may cannibalize sales of our older current and future products or manage sales and marketing of multiple sequencing platforms; products, including the Sequel II/IIe, Revio and Onso systems, and products under development;
- maintain our competitive position by continuing to attract and retain customers for our products;
- provide appropriate levels of customer training and support for our products;
- implement an effective marketing strategy to promote awareness of our products;
- develop and implement an effective sales and distribution strategy for our current and future products;

- develop, manufacture and commercialize new products or achieve an acceptable return on our manufacturing or research and development efforts and expenses;
- comply with regulatory requirements applicable to our products;
- anticipate and adapt to changes in our market;
- accommodate customer expectations and demands with respect to our products, increase product adoption by our existing customers or develop new customer relationships;
- deliver our beta systems to our external beta testing sites or complete our external beta testing program on our currently expected timelines;
- overcome unexpected challenges discovered during beta testing;
- complete the scientific and technical validation of new products on our currently expected timeline or at all;
- deliver our future products in a timely manner to our customers;

- grow our market share by marketing and selling our products for new and additional applications;
- manage the significant burdens that expanding our existing or future products into current and new markets may impose on marketing, compliance, and other administrative and managerial resources;

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- drive adoption of our current and future products, including the Sequel II/Ile Systems, the Revio system and products under development related to our emerging SBB technology, including the Onso system;
- maintain our competitive position by continuing to attract and retain customers for our products;
- provide appropriate levels of customer training and support for our products;
- implement an effective marketing strategy to promote awareness of our products;
- develop and implement an effective sales and distribution strategy for our current and future products;
- develop, manufacture and commercialize new products or achieve an acceptable return on our manufacturing or research and development efforts and expenses;
- comply with regulatory requirements applicable to our products;
- anticipate and adapt to changes in our market;
- accommodate customer expectations and demands with respect to our products, increase product adoption by our existing customers or develop new customer relationships;
- deliver our beta systems to our external beta testing sites or complete our external beta testing program on our currently expected timelines;
- overcome unexpected challenges discovered during beta testing;
- complete the scientific and technical validation of new products, such as Onso, on our currently expected timeline or at all;
- deliver our future products in a timely manner to our customers;
- grow our share by marketing and selling our products for new and additional applications;
- manage the significant burdens that expanding our existing or future products into current and new markets may impose on marketing, compliance, and other administrative and managerial resources;
- maintain and develop strategic relationships with vendors, manufacturers, and other industry partners to acquire necessary materials for the production of, and to develop, manufacture and commercialize, our existing or future products;
- adapt or scale our manufacturing activities to meet performance specifications and potential demand at a reasonable cost;
- avoid infringement and misappropriation of third-party intellectual property;
- obtain and maintain any necessary licenses to third-party intellectual property on commercially reasonable terms;
- obtain valid and enforceable patents that give us a competitive advantage or enforce existing patents;
- protect our proprietary technology; and
- attract, retain, and motivate qualified personnel.

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The risks noted above, especially with respect to the marketing, sales, and commercialization of our products, may be heightened by the impact of current uncertain market and other conditions. In addition, a high percentage of our expenses is and will continue to be fixed. Accordingly, if we do not generate revenue as and when anticipated, we could suffer a material adverse effect on our business, financial conditions, results of operations and prospects.

We have incurred losses to date, and we expect to continue to incur significant losses as we develop our business and may never achieve profitability.

We have generally incurred net losses each quarter since inception, and we cannot be certain if or when we will produce sufficient revenue from our operations to support our costs. Even if profitability is achieved in the future, we may not be able to sustain profitability on a consistent basis. We expect to continue to incur substantial losses and negative cash flow from operations for the foreseeable future.

Our net losses since inception and our expectation of incurring substantial losses and negative cash flow for the foreseeable future could:

- make it more difficult for us to satisfy our obligations;
- make it more difficult for us to satisfy our obligations;
- increase our vulnerability to general adverse economic and industry conditions;
- limit our ability to fund future working capital, capital expenditures, research and development and other business opportunities;
- increase the volatility of the price of our common stock;
- limit our flexibility to react to changes in our business and the industry in which we operate;
- place us at a disadvantage to other companies that offer nucleic acid sequencing equipment or consumables; and
- limit our ability to borrow additional funds.
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- place us at a disadvantage to other companies that offer nucleic acid sequencing equipment or consumables; and
- limit our ability to borrow additional funds.

In addition, inflationary pressure, including as a result of supply shortages, has adversely impacted and could continue to adversely impact our financial results, and our operating costs may increase. We may not fully offset these cost increases by raising prices for our products and services, which could result in downward pressure on our margins. Further, our customers may choose to reduce their business with us if we increase our pricing.

Any or all of the foregoing may have a material adverse effect on our business, operations, financial condition, and prospects. An impairment in value of our tangible or intangible assets could also be recorded as a result of weaker economic conditions.

We are not cash flow positive and may not have sufficient cash to make required payments under the terms of our debt or fund our long-term planned operations.

Our operations have consumed substantial amounts of cash since inception, and we expect to continue to incur substantial losses and negative cash flow from operations for the foreseeable future. Additional funds may not be available on terms acceptable to us or at all. We have incurred significant debt, and we may further incur additional debt, including in the debt incurred through issuance future. As of \$900.0 million in December 31, 2023, we had outstanding approximately \$459.0 million aggregate principal amount of 1.50% Convertible Senior convertible senior notes due 2028 (the "2028 Notes") and \$441.0 million aggregate principal amount of our 1.375% convertible senior notes due 2030 (the "2030

Notes" and, together with the 2028 Notes, due 2028, the "Notes"). We may not have sufficient cash to make required payments under the terms of this debt, and should this occur, debt holders have rights senior to common stockholders to make claims on our assets. We may not be able to issue equity securities due to unacceptable terms and conditions to us in the capital markets. To the extent that we intend to raise additional funds through the sale of our common stock, downward fluctuations in our stock price could adversely affect such fundraising efforts. Furthermore, equity financings normally involve shares sold at a discount to the current market price and fundraising through sales of additional shares of common stock or other equity securities will have a dilutive effect on our existing investors. The shares We may also be sold required to seek equity financing at a time when the market price for our common stock is low, because we are in need of the funds, which will further dilute contribute to dilution for existing holders more than if the market price for our common stock was higher.

holders.

We believe that our growth will depend, in part, on our ability to fund our commercialization efforts and our efforts to develop new products, including any improvements to our existing products and the continued development and anticipated launch of the Revio HiFi long-read system and the Onso SBB short-read system, products. To the extent our existing resources are not sufficient, it may require us to delay, or even not allow us to conduct any or all of these activities that we believe would be beneficial for our future growth. We may need to raise additional funds through public or private debt or equity financing or alternative financing arrangements, which may include collaborations or licensing arrangements. If we are unable to raise funds on favorable terms, or at all, we may have to reduce our cash burn rate and may not be able to support our commercialization efforts, launching of new products, or operations, or to increase or maintain the level of our research and development activities.

If we are unable to generate sufficient cash flows or to raise adequate funds to finance our forecasted expenditures, we may have to make significant changes to our operations, including delaying or reducing the scope of, or eliminating some or all of, our development programs. We also may have to reduce sales, marketing, engineering, customer support or other resources devoted to our existing or new products, or we may need to cease operations. Any of these actions could materially

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impede our ability to achieve our business objectives and could materially harm our operating results. If our cash, cash equivalents and investments are insufficient to fund our projected operating requirements and we are unable to raise capital, it could have a material adverse effect on our business, financial condition and results of operations and prospects.

We have made acquisitions and, in the future, may continue to acquire businesses, technologies or assets, form joint ventures or make other strategic investments with companies that could adversely affect our operating results, dilute our stockholders' ownership, or cause us to incur debt or significant expense.

As part of our business strategy, we have acquired and expect to continue to pursue acquisitions of complementary businesses, technologies, or assets. We may also pursue technology license arrangements, strategic alliances or investments that complement our business. In business as we have previously with our acquisitions of Circulomics, Omniome and Apton in July 2021, we acquired Circulomics, and in September 2021 we acquired Omniome. As of December 31, 2022, we recorded goodwill of \$410.0 million and intangible assets of \$410.2 million. See [Note 2. Business Acquisitions](#), in Part II, Item 8 of this Annual Report on Form 10-K.

August 2023, respectively.

Acquisitions and strategic transactions involve numerous risks, any of which could harm our business and negatively affect our financial condition and results of operations, including:

intense competition for suitable acquisition targets, which could increase prices and adversely affect our ability to consummate deals on favorable or acceptable terms;

- intense competition for suitable acquisition targets, which could increase prices and adversely affect our ability to consummate deals on favorable or acceptable terms;
- failure or material delay in closing a transaction;
- transaction-related lawsuits or claims;
- difficulties in integrating the technologies, operations, existing contracts, and personnel of an acquired company;
- difficulties in retaining key employees or business partners of an acquired company;
- difficulties in retaining suppliers, partners, or customers of an acquired company;
- challenges with integrating the brand identity of an acquired company with our own;
- diversion of financial and management resources from existing operations or alternative acquisition opportunities;
- failure to realize the anticipated benefits or synergies of a transaction;
- difficulties in developing technology post-acquisition;
- failure to identify the problems, liabilities, or other shortcomings or challenges of an acquired company or technology, including issues related to intellectual property, regulatory compliance practices, litigation, revenue recognition or other accounting practices, or employee or user issues;
- risks that regulatory bodies may enact new laws or promulgate new regulations that are adverse to an acquired company or business;
- risks that regulatory bodies do not approve our acquisitions or business combinations or delay such approvals;
- theft of our trade secrets or confidential information that we share with potential acquisition candidates or other potential strategic partners;

- risk that an acquired company or investment in new services cannibalizes a portion of our existing business; and
- adverse market reaction to an acquisition or other strategic transaction.

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- difficulties in retaining suppliers, partners, or customers of an acquired company;
- challenges with integrating the brand identity of an acquired company with our own;

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- difficulties in developing technology post-acquisition;
- failure to identify the problems, liabilities, or other shortcomings or challenges of an acquired company or technology, including issues related to intellectual property, regulatory compliance practices, litigation, revenue recognition or other accounting practices, or employee or user issues;
- risks that regulatory bodies may enact new laws or promulgate new regulations that are adverse to an acquired company or business;
- risks that regulatory bodies do not approve our acquisitions or business combinations or delay such approvals;
- theft of our trade secrets or confidential information that we share with potential acquisition candidates or other potential strategic partners;
- risk that an acquired company or investment in new services cannibalizes a portion of our existing business; and
- adverse market reaction to an acquisition or other strategic transaction.

To finance any acquisitions or other strategic investments, we may raise additional funds, which could adversely affect our existing stockholders and our business. If the price of our common stock is low or volatile, we may not be able to acquire other companies for stock. In addition, our stockholders may experience substantial dilution as a result of additional securities we may issue for acquisitions. Open market sales of substantial amounts of our common stock issued to stockholders of companies we acquire could also depress our stock price. Additional funds may not be available on terms that are favorable to us, or at all.

If we fail to address the foregoing risks or other problems encountered in connection with past or future acquisitions of businesses, new technologies, services, and other assets and strategic investments, or if we fail to successfully integrate such acquisitions or investments, our business, financial condition, and results of operations could be adversely affected, including potential impairments of goodwill and intangible assets.

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If we are unable to successfully develop and timely manufacture our current and future products, including with respect to SMRT Cells, Sequel II/Ile Systems, Revio, Onso, and other SMRT Cell, HiFi, and SBB products under development, and related products, our business may be adversely affected.

In light of the highly complex technologies involved in our products, there can be no assurance that we will be able to manufacture and commercialize our current and future products on a timely basis or continue providing adequate support for our existing products. The commercial success of our products, including the Sequel, and Sequel II/Ile, Revio and Onso Systems, and the Revio and Onso products under development, including acquired technologies, depends on a number of factors, including performance and reliability of the systems, our anticipating and effectively addressing customer preferences and demands, the success of our sales and marketing efforts, effective forecasting and management of product demand, purchase commitments and inventory levels, effective management of manufacturing and supply costs, and the quality of our products, including consumables such as SMRT Cells and reagents. Should we face delays in or discover unexpected defects during the further development or manufacturing process of instruments or consumables related to our products, including with respect to SMRT Cells, reagents, Sequel II/Ile Systems, Revio, Onso, and other SMRT Cell, HiFi, and SBB products under development, including acquired technologies, and including any delays or defects in software development or product functionality, the timing and success of the continued rollout and scaling of our products may be significantly impacted, which may materially and negatively impact our revenue and gross margin. The ability of our customers to successfully utilize our products will also depend on our ability to deliver high quality SMRT Cells and reagents. We have designed SMRT Cells and other consumables specifically for the Sequel, Sequel II/Ile, and Revio Systems, and may need to develop in the future, other customized SMRT Cells and consumables for our future products. Our production of the SMRT Cells for the Sequel and Sequel II/Ile Systems has been and may in the future, including with respect to the Revio system, be below desired levels and yields, and we have experienced and may experience in the future manufacturing delays, product or quality defects, SMRT Cell variability, and other issues. For example, the COVID-19 pandemic outbreak has impacted and, any resurgence of COVID-19, or the outbreak of other similar health epidemics could result in more pronounced impacts to our manufacturing and our ability to supply products. The performance of our consumables is critical to our customers' successful utilization of our products, and any defects or performance issues with our

consumables would adversely affect our business. All of the foregoing could materially negatively impact have a material adverse effect on our ability to sell our products or result in other material adverse effects on our business, operations, financial condition, operations and prospects.

The development of our products is complex and costly. Problems in the design or quality of our products may have a material and adverse effect on our brand, business, financial condition, and operating results, and could result in us losing our certifications from the International Organization for Standardization ("ISO"). If we were to lose ISO certification, then our customers might choose not to purchase products from us and this could adversely impact our ability to develop products approved for clinical uses. Unanticipated problems with our products could divert substantial resources, which may impair our ability to support our new and existing products and could substantially increase our costs. If we encounter development challenges or discover errors in our products late in our development cycle, including during external beta testing, we may be forced to undertake design and/or production changes, delay product shipments or the scaling of manufacturing or supply. The completion of the production and external testing of our beta systems may also take longer than currently planned, cost more than currently expected and the scientific and technical validation may not be completed on our currently expected timelines or at all. Such testing may also expose fundamental flaws in our products that may cause us to abandon the further development of such products.

If the continued rollout of our current and future products, including with respect to the SMRT Cell, the Sequel II/Ile, Revio, and Onso Systems, is delayed or is not successful or less successful than anticipated, then we may not be able to achieve an acceptable return, if any, on our substantial research and development efforts, and our business may be materially and adversely affected. The expenses or losses associated with delayed or unsuccessful product development or lack of market acceptance of our existing and new products, including the SMRT Cell, Sequel II/Ile Systems, Revio, and Onso, could materially and adversely affect our business, operations, financial condition, and prospects.

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Our research and development efforts may not result in the benefits that we anticipate, and our failure to successfully market, sell, and commercialize our current and future products could have a material adverse effect on our business, financial condition and results of operations.

We have dedicated significant resources to developing our current products, including sequencing systems and consumables based on our proprietary SMRT sequencing technology and our Sequel and Sequel II/Ile Systems. We are also engaged in substantial and complex research and development efforts, which, if successful, may result in the introduction of new products in the future, including in connection with the SMRT Cell, the Sequel II/Ile Systems, Revio and Revio, Onso, in addition to Onso and other SBB products currently under development, development, including acquired technologies. Our research and development efforts are complex and require us to incur substantial expenses. We expenses and we may not be able to develop, manufacture and commercialize new products or obtain regulatory approval if necessary, necessary. We may divert significant resources to research and development initiatives that do not result in commercialized products, and even if these efforts do result in commercialized products, there can be no assurance that such products will compete successfully in the market or achieve an acceptable return, if any, on our research and development efforts and expenses or joint research and development efforts with partners. Our expenses. Moreover, our joint research and development efforts with partners require significant management attention and operational resources. If we are unable to successfully manage such joint research and development efforts, our future results may be adversely impacted. For example, in January 2021, we entered into a

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development agreement with Invitae, which was amended and restated on June 24, 2022 (the "Invitae Development Agreement"), regarding a multi-year collaboration for the development of a production-scale high-throughput sequencing platform. While we anticipate that in connection with the Invitae Development Agreement, we will continue to receive feedback, input and insight from Invitae in connection with our intended development of new high-throughput sequencing systems, such feedback is not contractually required and Invitae has no contractual right to participate in decisions regarding the development program for such new sequencing systems. Invitae is not contractually obligated to reimburse us for development costs under the Invitae Development Agreement. We do not expect to receive any additional revenue under the Invitae Development Agreement apart from potential purchases by Invitae of our instruments and consumables. In consideration of non-refundable Development Costs (as defined in the Invitae Development Agreement) paid by Invitae to us pursuant to the Invitae Development Agreement, we have provided Invitae with credits in connection with Invitae's anticipated purchase of currently available and in-development sequencing systems (instruments and consumables). In addition, subject to certain conditions, Invitae will be entitled to most favored pricing for our Sequel Ile systems and certain in-development systems, including the Revio system and we may be required to sell instruments to Invitae at below-market prices. Furthermore, we will need to continue to expand our internal capabilities or seek new partnerships or collaborations, or both, in order to successfully develop, market, sell and commercialize our products for and in the markets we seek to reach. If we are unable to do so or are delayed, then this could materially and adversely affect our business, operations, financial condition, and prospects.

We must successfully manage new product introductions and transitions, including with respect to the SMRT Cell, the Sequel II/Ile Revio and Onso Systems and each of their related consumables, and the development of the Revio HiFi long-read sequencing system and the Onso SBB short-read sequencing system, acquired technologies, and we may incur significant costs during these transitions and development, and these efforts may not result in the benefits we anticipate.

If our products and services fail to deliver the performance, scalability or results expected by our current and future customers, or are not delivered on a timely basis, our reputation and credibility may suffer, our current and future sales and revenue may be materially harmed and our business may not succeed. For instance, if we are not able to realize successfully execute on the benefits we anticipate from the development and commercialization of the SMRT Cell, Sequel II/Ile Systems, the Revio HiFi long-read sequencing system, and the Onso SBB short-read sequencing system, and each of their related consumables, and any future products that may be developed for research, medical and clinical uses, including acquired technologies, it could have a material adverse effect on our business, financial condition and results of operations. In addition, the introduction of future products, including with respect to future long-read and short-read products, and related consumables, has and may in the future lead to our limiting or ceasing development of further enhancements to our existing products as we focus our resources on new products, and has resulted and could in the future result in reduced marketplace acceptance and loss of sales of our existing products, materially adversely affecting our revenue and operating results. The introduction of new products, including the recent announcement commercialization of our Revio system, and Onso systems, has had and may in the future also have a negative impact on our revenue in the near-term as our

current and future customers have delayed or cancelled and may in the future delay or cancel orders of existing products in anticipation of new products and we may also be pressured to decrease prices for our existing products. Our experience in managing product transitions is limited, and we have experienced, and may in the future experience, difficulty in managing or forecasting customer reactions, purchasing decisions or transition requirements with respect to newly launched products. We have incurred and may continue to incur significant costs in completing these transitions, including costs of write-downs of our products, as current or future customers transition to new products. If we do not successfully manage these product transitions, including with respect to the SMRT Cell, Sequel II/IIe Systems, the Revio and Onso Systems and each of their related consumables, and any future long-read and short-read products, our business, operations, financial condition, and prospects may be materially and adversely affected.

Our business may be adversely affected by health epidemics, including the ongoing any resurgence of COVID-19 pandemic.

cases or other similar outbreaks.

Our business has been and could be further adversely impacted by the effects of COVID-19 or other epidemics or pandemics. Although it is not possible at this time to estimate the impact that health epidemics, including the ongoing results of the COVID-19 pandemic and any future resurgence of COVID-19 cases or other similar outbreaks, could have on our business, the continued spread of pandemics any pandemic or public health outbreaks or related disruptions and the measures taken by the governments of countries affected could disrupt the supply chain and the manufacture of our products.

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Our manufacturing partners and suppliers have been and could continue to be disrupted by conditions related to COVID-19 or other epidemics or pandemics, possibly resulting in disruption to the production of our products. If our manufacturing partners or suppliers are unable or fail to fulfill their obligations to us for any reason, we may not be able to manufacture our products and satisfy customer demand or our obligations under sales agreements in a timely manner, and our business could be harmed as a result. There is significant uncertainty relating to the long-term effect of COVID-19 or other epidemics or pandemics on our business. Infections may resurge or become more widespread and any ensuing disruptions to business activities or supply chains could have a negative impact on our business, financial condition, and operating results. Because our semiconductor manufacturers are located in a region where immunization rates in certain communities may be low, new and emerging variants of COVID-19 or other epidemics or pandemics could impact workforce availability at those locations and disrupt supply. For example, the Chinese government may re-impose lockdowns or similar measures to combat the spread of health epidemics such as COVID-19 or other similar outbreaks and such measures have had, and may continue to have in the future, a negative impact on manufacturing and/or supply chains, as well as customer demand for our products and demand through certain distributors.

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For example, the COVID-19 pandemic has caused us to modify our business practices, including limiting certain of our commercial operations and limiting certain employees from working in the office. We have offered, and if there is a resurgence of COVID-19 or other similar outbreaks, we may plan to continue to again offer a significant percentage of our employees flexibility in the amount of time they work in an office, which could adversely impact the productivity of certain employees and harm our business, including our future operating results. This may also present risks for our strategy and may present operational, cybersecurity, and workplace culture challenges that may adversely affect our business.

Even after the COVID-19 pandemic has further subsided, we may continue to experience an adverse impact to our business as a result of its global economic impact, including recessionary effects and inflationary pressures. Specifically, difficult macroeconomic conditions, such as decreases in discretionary capital expenditure spending, changes to the government funding environment, a reduction in or the lapsing of COVID-19-related governmental stimulus measures, increased and prolonged unemployment or a decline in consumer confidence as a result of the COVID-19 pandemic or other epidemics or pandemics, as well as limited or significantly reduced points of access of our products, could have a continuing adverse effect on the demand for some of our products and, consequently, related maintenance and support services. The degree of impact of COVID-19 or other epidemics or pandemics on our business will depend on several factors, such as the duration and the extent of the pandemic, the risk of waning immunity among persons already vaccinated and an increase in fatigue or skepticism with respect to initial or booster vaccinations, as well as actions taken by governments, businesses, and consumers in response to the pandemic, all of which continue to evolve and remain uncertain at this time.

Significant changes to our leadership team and the resulting management transitions might harm our future operating results.

We have experienced significant changes to our leadership team. Our team since 2020, including the appointment of our current President and Chief Executive Officer, Christian O. Henry was appointed effective September 14, 2020, succeeding Dr. Michael Hunkapiller who retired on December 31, 2020. Our Chief Financial Officer, Susan G. Kim was appointed effective September 28, 2020, succeeding Susan K. Barnes who retired on August 7, 2020. Our Chief Operating Officer, Mark Van Oene was appointed effective January 8, 2021. Jeff Eidel was appointed Chief Commercial Officer, effective August 16, 2022, succeeding Peter Fromen who resigned effective May 20, 2022. Also, our Vice President and Chief Accounting Officer, Michele Farmer was appointed effective May 17, 2021, and our Chair of the Board Dr. John F. Milligan was appointed effective September 14, 2020.

Board.

Although we believe these leadership transitions are in the best interest of our stakeholders, these transitions may result in the loss of personnel with deep institutional or technical knowledge. Further, the transition could potentially disrupt our operations and relationships with employees, suppliers, partners, and customers due to added costs, operational inefficiencies, decreased employee morale and productivity and increased turnover. We must successfully recruit and integrate our new leadership team members within our organization to achieve our operating objectives; as such, the leadership transition may temporarily affect our business performance and results of operations while the new members of our leadership team become familiar with our business. In addition, our competitors may seek to use this transition and the related potential disruptions to gain a competitive advantage over us. Furthermore, these changes may increase our dependency on the other members of our leadership team that remain with us, who are not contractually obligated to remain employed with us and may leave at any time. Any such departure could be particularly disruptive given that we are already experiencing leadership transitions and, to the extent we experience additional management turnover, competition for top management is high such that it may take some time to find a candidate that meets our requirements. Our future operating results depend substantially upon the continued service of our key personnel and in significant part upon our ability to attract and retain

qualified management personnel. If we are unable to mitigate these or other similar risks, our business, results of operations and financial condition may be materially and adversely affected.

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We depend on the continuing efforts of our senior management team and other key personnel. If we lose members of our senior management team or other key personnel or are unable to successfully retain, recruit and train qualified scientists, engineers, sales personnel and other employees, our ability to maintain, develop and commercialize our products could be harmed and we may be unable to achieve our goals.

Our success depends upon the continuing services of members of our senior management team and scientific and engineering personnel. In particular, our scientists and engineers are critical to our technological and product innovations, and we will need to hire additional qualified personnel. Our industry, particularly in the San Francisco Bay Area, is characterized by high demand and intense competition for talent, and the turnover rate has been and may continue to be high. We compete for qualified management and scientific personnel with other life science companies, academic institutions and research institutions, particularly those focusing on genomics. This competition has become had been exacerbated by the increase in employee resignations in 2021 and continued high rates of employee turnover continuing through 2022 that have had been experienced by us and reported by employers nationwide. In addition, we have experienced significant turnover in our senior management team in recent periods. To induce valuable employees to remain at our company, in addition to salary and cash incentives, we have issued stock options and restricted stock units that vest over time. The value to employees of stock options and restricted stock units that vest over time may be significantly affected by movements in our stock price that are beyond our control and may at any time be insufficient to counteract more lucrative offers from other companies. We may face challenges in retaining and recruiting such individuals due to sustained declines in our stock price that could reduce the retention value of equity awards. The loss of qualified employees, or an inability to attract, retain, and motivate employees, could prevent us from pursuing collaborations and materially and adversely affect our support of existing products, product development and launches, business growth prospects, results of operations and financial condition. In addition, we will need to continue to recruit, hire and retain sales personnel to support the commercialization of our existing and new products. Our employees could leave our company with little or no prior notice and would be free to work for a competitor. In addition, changes to U.S. immigration policies, particularly to H-1B and other visa programs, could restrain the flow of technical and professional talent into the U.S. and may inhibit our ability to hire qualified personnel. If one or more of our senior executives or other key personnel were unable or unwilling to continue in their present positions, we may not be able to replace them easily or at all, and other senior management may be required to divert attention from other aspects of the business. In addition, we do not have "key person" life insurance policies covering any member of our management team or other key personnel. Further, our vaccination and return to office protocols related to COVID-19 or other epidemics or pandemics may also impact the recruitment and retention of key employees. The loss of any of these individuals or any inability to attract or retain qualified personnel, including scientists, engineers, sales personnel and others, could prevent us from pursuing collaborations and materially and adversely affect our support of existing products, product development and introductions, business growth prospects, results of operations and financial condition.

Our success is highly dependent on our ability to further penetrate nucleic acid sequencing applications as well as on the growth and expansion of the demand for our products. If our products fail to achieve and sustain sufficient market acceptance, we will not generate expected revenue and our business may not succeed.

Although nucleic acid sequencing technology is well-established, our SMRT Sequencing technology is relatively new and evolving. We cannot be sure that our current or future products will gain acceptance in the marketplace at levels sufficient to support our costs. Our success depends, in part, on our ability to expand overall demand for nucleic acid sequencing to include new applications that are not practicable with other current technologies and to introduce new products that capture a larger share of growing overall demand for sequencing. To accomplish this, we must successfully commercialize, and continue development of, our proprietary SMRT Sequencing technology for use in a variety of life science and other research applications, including uses by academic, government and clinical laboratories, as well as pharmaceutical, diagnostic, biotechnology, and agriculture companies, among others. However, we may be unsuccessful in these efforts and the sale and commercialization of the SMRT Cell, Sequel II/IIe, Systems, and anticipated sale and commercialization of Revio and Onso Systems, and related products may not grow sufficiently to cover our costs.

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There can be no assurance that we will be successful in adding new products or securing additional customers for our current and future products, including with respect to the SMRT Cell, Sequel II/IIe Systems, Revio and Onso. If we are unable to successfully develop SBB technology acquired technologies and sell acquired technology products, we may fail to achieve our strategic commercial initiatives in connection with the planned release of new products and anticipated entry into new markets. Our ability to further penetrate existing applications and any new applications depends on a number of factors, including the cost, performance and perceived value associated with our products, as well as customers' willingness to adopt a different approach to nucleic acid sequencing. Potential customers may have already made significant investments in other sequencing technologies and may be unwilling to invest in new technologies. We are experiencing pricing pressures caused by industry competition and increased demand for lower-priced instruments and lower operational costs. We have limited experience commercializing and selling products outside of the academic and research settings, and we cannot guarantee success in acquiring additional customers. Furthermore, we cannot guarantee that our products will be satisfactory to potential customers or that our products will perform in accordance with customer expectations.

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Nucleic acid sequencing applications are new and dynamic, and there can be no assurance that they will develop as quickly as we anticipate, that they will reach their full potential or that our products will be appropriate or competitive for these applications. As a result, we may be required to refocus our marketing efforts, and we may have to make changes to the specifications of our products to enhance our ability to enter particular applications more quickly. We may also need to delay full-scale commercial deployment of new products as we develop them in order to perform quality control and early access user testing. We also need to maintain reliable supply chains for the various components in our new products and consumables to support large-scale commercial production. Even if we are able to implement our technology successfully, we and/or our sales and distribution partners may fail to achieve or sustain market acceptance of our current or future products across the full range of our intended life science and other applications. We need to continue to expand and update our internal capabilities or to collaborate with other partners, or both, in order to successfully expand sales of our products in the applications that we seek to reach, which we may be unable to do at the scale required to support our business.

If the demand for our products grows more slowly than anticipated, if we are unable to successfully scale or otherwise ensure sufficient manufacturing capacity for new products to meet demand, if we are not able to successfully market and sell our products, if competitors develop better or more cost-effective products, if our product launches and commercialization are not successful, or if we are unable to further grow our customer base or do not realize the growth with existing customers that we are expecting, our current and future sales and revenue may be materially and adversely harmed, or we may recognize an impairment loss, and our business may not succeed.

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We rely on other companies for the manufacture of certain components and sub-assemblies and intend to outsource additional sub-assemblies in the future, some of which are sole sources. We may not be able to successfully scale the manufacturing process necessary to build and test multiple products on a full commercial basis, which could materially harm our business.

Our products are complex and involve a large number of unique components, many of which require precise manufacturing. The nature of our products requires customized components that are currently available only from a limited number of sources, and in some cases, single sources. We have chosen to source certain critical components from a single source, including suppliers for our SMRT Cells, reagents, and instruments. We cannot assure you that product supplies will not be limited or interrupted, especially with respect to our sole source third-party manufacturing and supply collaborators, or that product supplies will be of satisfactory quality or continue to be available at acceptable prices. In particular, any replacement of our manufacturers could require significant effort and expertise because there may be a limited number of qualified replacements. We may be unable to negotiate binding agreements with our current and future sole source third-party manufacturing and supply collaborators or, in the event that such collaborators' services become interrupted for any reason, find replacement manufacturers to support our development and commercial activities at commercially reasonable terms. We do not always have arrangements in place for a redundant or second-source supply for our sole source vendors in the event they cease to provide their products or services to us or fail to provide sufficient quantities in a timely manner. If we are required to purchase these components from alternative sources, it could take several months or longer to qualify the alternative sources. If we are unable to source these product components from sole-source third-party manufacturing and supply collaborators for any reason, including in connection with acts of terrorism, hostilities, military conflict and acts of war, including between China and Taiwan, or secure a sufficient supply of these product components on a timely basis, or if these components do not meet our expectations or specifications for quality and functionality, our operations and manufacturing would be materially and adversely affected, we could be unable to meet customer demand and our business and results of operations may be materially and adversely affected.

The operations of our third-party manufacturing partners and suppliers have been had and could continue to may in the future be disrupted by conditions unrelated to our business or operations or that are beyond our control, including but not limited to international trade restrictions, inflation, supply chain disruptions, and conditions related to COVID-19 or other epidemics, epidemics or pandemics. If our manufacturing partners or suppliers are unable or fail to fulfill their obligations to us for any reason, we may not be able to manufacture our products and satisfy customer demand or our obligations under sales agreements in a timely manner, and our business could be harmed as a result. For example, the global shortage of semiconductors, which has been reported since early 2021, has caused challenges for us in our supply chain and resulted in some cost increases that have and may continue to adversely impact margins. During these periods of shortages or delays, the price of components may increase, or the components may not be available at all. Our suppliers have raised their prices and may continue to raise prices that we may not be able to pass on to our customers, which could adversely affect our business, including our competitive position, market share, revenues, and profit margins in material ways. We may not be able to secure enough components at reasonable prices or of acceptable quality to build new products in a timely manner in the quantities or configurations needed. For example, the Chinese government may re-impose lockdowns or similar measures to combat the spread of COVID-19 or other similar outbreaks and these measures have had, and may continue to have in the future, a negative impact on manufacturing and/or supply chains, in addition to customer demand for our products and demand through certain distributors. If as a result of global economic or political instability, such as the political uncertainty in the Middle East associated with the Israel and Hamas conflict, an escalation of the war in Ukraine, potential uncertainty related to Taiwan and its relationship with China, other disease outbreaks, or supply issues, we or our contractors could experience shortages, business disruptions or delays for materials sourced or manufactured in the affected countries, and their ability to supply us with instruments or product components may be affected. From time to time, certain

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components of our systems and reagents may reach the end of their life cycles or become obsoleted by our suppliers, and we would have to procure alternative sources for these end-of-life products. If we encounter delays or difficulties in securing the quality and quantity of materials we require for our products, our supply chain would be interrupted, which would adversely affect sales. If any of these events occur, our business and operating results could be harmed. Accordingly, if any of the foregoing occurs, our ability to commercialize our products, revenue and gross margins could suffer until lockdowns from COVID-19 or other epidemics or pandemics infections are reduced, supply issues or business disruptions are resolved and/or other sources can be developed.

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In addition, because our semiconductor suppliers are in regions that may have communities with low vaccination rates, the Omicron variant any variants of COVID-19 or any variants that evolve in the future or other outbreaks could lead to increased infections among workers that could further disrupt the supply chain. Our current manufacturing process is characterized by long lead times between the placement of orders for and delivery of our products. If we do not accurately anticipate our needs or if we receive insufficient components to manufacture our products on a timely basis to meet customer demand, our sales and our gross margin may be adversely affected, and our business could be materially harmed. If we are unable to reduce our manufacturing costs and establish and maintain reliable, high-volume manufacturing suppliers as we scale our operations and expand our product offerings, our business, operations, financial condition, and prospects could be materially and adversely harmed.

We may be unable to consistently manufacture our instruments and consumables, including SMRT Cells and reagents, to the necessary specifications or in quantities necessary to meet demand at an acceptable cost or at an acceptable performance level.

In order to successfully generate revenue from our products, we need to supply our customers with products that meet their expectations for quality and functionality in accordance with established specifications. Our customers have experienced variability in the performance of our products. We have experienced and may continue to experience delays, quality issues or other difficulties leading to customer dissatisfaction with our products. Our production of SMRT Cells, flow cells and of reagents involves for both our long and short-read technologies, involve a long and complex manufacturing process and has been and may in the future be below desired yields and resulting output levels. We have experienced and may experience in the future manufacturing delays, product defects, variability in the performance of SMRT Cells, flow cells and other products, inadequate reserves for inventory, or other issues.

There is no assurance that we will be able to manufacture our products so that they consistently achieve the product specifications and quality that our customers expect, including any products developed for clinical uses. Problems in the design or quality of our products, including low manufacturing yields of SMRT Cells, flow cells, or sub-performing reagent lots may have a material adverse effect on our brand, business, financial condition, and operating results, and could result in us losing our ISO certifications. If we were to lose our ISO certifications, then our customers might choose not to purchase products from us. There is also no assurance that we will be able to increase manufacturing yields and decrease costs, particularly if high rates of inflation continue, or that we will be successful in forecasting customer demand or manufacturing and supply costs, or that product supplies, including reagents or integrated chips, will not be limited or interrupted, or will be of satisfactory quality or continue to be available at acceptable prices. Furthermore, while we are undertaking efforts to increase our manufacturing scale and capability, we may not be able to increase manufacturing to meet anticipated demand or may experience downtime in our manufacturing facilities, including, for example, if we experience increased cases of COVID-19 among our employees, or if our suppliers are unable to meet our increased demand at a time when the supply chain is under duress due to potential dislocations and disruptions in product and employee availability (whether due to COVID-19, health epidemics or pandemics or otherwise). An inability to manufacture products and components that consistently meet specifications, in necessary quantities and at commercially acceptable costs, will have a negative impact, and may have a material adverse effect on our business, product development timelines, financial condition and results of operations.

Rapidly changing technology in life sciences and research diagnostics could make our products obsolete unless we continue to develop, manufacture and commercialize new and improved products and pursue new opportunities.

Our industry is characterized by rapid and significant technological changes, frequent new product introductions and enhancements and evolving industry standards. These new and evolving technologies may be superior to, impair, or render obsolete the products we currently offer or the technologies currently underlying our products. Our future success depends on our ability to continually improve our products, to develop and introduce new products that address the evolving needs of our customers on a timely and cost-effective basis and to pursue new opportunities. These new opportunities may be outside the scope of our proven expertise or in areas where demand is unproven, and new products and services developed by us may not gain market acceptance or may not adequately perform in order to capture market share. Our inability to develop and introduce new products and to gain market acceptance of our existing and new products could harm our future operating results. Unanticipated difficulties or delays in replacing existing products with new products or in commercializing our existing or new products in sufficient quantities and of acceptable quality to meet customer demand, including with respect to the SMRT Cell, Sequel II/Ile Systems, Revio and Onso, could diminish future demand for our products and may materially and adversely harm our future operating results.

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The size of the markets for our products, including our Revio and Onso instruments, may be smaller than estimated, and new market opportunities may not develop as quickly as we expect, or at all, limiting our ability to successfully sell our products.

The market for sequencing systems and consumables products is evolving, making it difficult to accurately predict the size of the markets for our current and future products, including our Revio and Onso instruments. Our estimates of the total addressable market for our current and future products are based on a number of internal and third-party estimates and assumptions that may be incorrect, including the assumptions that academic, governmental, corporate, or other sources of funding will continue to be available to life sciences researchers at times and in amounts necessary to allow them to purchase our products. In addition, sales of new products may take time to develop and mature and we cannot be certain that these market opportunities will develop as we expect. While we believe our assumptions and the data underlying our estimates of the total addressable market for our products are reasonable, these assumptions and estimates may not be correct and the conditions supporting our assumptions or estimates, or those underlying the third-party data we have used, may change at any time, thereby reducing the accuracy of our estimates. As a result, our estimates of the total addressable market and growth opportunities for our products may be incorrect.

The future growth of the market for our current and future products depends on many factors beyond our control, including recognition and acceptance of our products by the research and scientific communities, the growth, prevalence and costs of competing products and solutions and the development of robust ecosystems supporting our products and their methodologies. For example, the market acceptance and growth of long-read sequencing technologies, like our long-read sequencers, such as Revio require system, depends

on a variety of factors, including the availability and cost-effectiveness of related tools for effective, high quality sample collection and preparation as well as and advanced bioinformatic tools to process results; as well as the perceived advantages and disadvantages of long-read sequencing compared to short-read or other sequencing technologies; consequently, if these tools are unavailable to our potential customers whether at a reasonable cost or at all, conclude the costs of adopting long-read sequencing technologies outweigh the benefits, the market acceptance and growth of our long-read sequencers, like Revio systems may be negatively impaired. There can be no assurance that our current or future products will gain traction in the market. If the markets for our current and future products are smaller than estimated or do not develop as we expect, our growth may be limited, and it could materially and adversely affect our business, operations, financial condition and prospects.

Increased market adoption of our products by customers may depend on the availability of sample preparation and informatics tools, some of which may be developed by third parties.

Our commercial success may depend in part upon the development of sample preparation and software and informatics tools by third parties for use with our products. We cannot guarantee that product supplies, including reagents, will not be limited or interrupted, or will be of satisfactory quality or continue to be available at acceptable prices, or that third parties will develop tools that our current and future customers will find useful with our products, or that customers will adopt such third-party tools on a timely basis or at all. A lack of complementary sample preparation and informatics tools, or delayed updates of such tools, may impede the adoption of our products and may materially and adversely impact our business.

We operate in a highly competitive industry and if we are not able to compete effectively, our business and operating results will likely be harmed.

There are a significant number of companies offering nucleic acid sequencing products and/or services, including Illumina, BGI Genomics (also known as MGI or Complete Genomics), Thermo, ONT Ltd., Roche, Bionano, and Qiagen. Other companies recently entering the market include Ultima, Genomics, Element Biosciences and Singular Genomics. Singular. Many of these companies currently have greater name recognition, more substantial intellectual property portfolios, longer operating histories, significantly greater financial, technical, research and/or other resources, more experience in new product development, larger and more established manufacturing capabilities and marketing, sales, and support functions, and/or more established distribution channels to deliver products to customers than we do. These companies may be able to respond more quickly and effectively than we can to new or changing opportunities, technologies, standards, or customer requirements.

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There are also several companies that are in the process of developing or have already developed and commercialized new, competing or potentially competing technologies, products and/or services, including ONT Ltd. and its subsidiaries, against whom we have filed complaints for patent infringement in the U.S. District Court for the District of Delaware and, previously, with the U.S. International Trade Commission, in the High Court of England and Wales and in the District Court of Mannheim, Germany. ONT Ltd. previously filed claims against us in the High Court of England and Wales and the District Court of Mannheim, Germany, also for patent infringement, and its subsidiary, Oxford Nanopore Technologies, Inc. ("ONT Inc."), filed counterclaims against us in the U.S. District Court for the District of Delaware seeking declaratory judgments of non-infringement, invalidity and unenforceability of the asserted patents, as well as antitrust, false advertising and unfair competition counterclaims that were subsequently dismissed by that court. Roche is developing potentially competing sequencing products. Increased competition may result in pricing pressures, which could harm our sales, profitability or market share. Our failure to further enhance our existing products and to introduce new products to compete effectively could materially and adversely affect our business, operations, financial condition, and prospects.

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We may be unable to successfully increase sales of our current products or market and sell our future products.

Our ability to achieve profitability depends, in part, on our ability to attract customers for our current and future products including Revio and Onso, and we may be unable to effectively market or sell our products or find appropriate partners to do so. To perform sales, marketing, distribution, and customer support functions successfully, we face a number of risks, including:

- our ability to attract, retain and manage qualified sales, marketing, and service personnel necessary to expand market acceptance for our technologies;
- our ability to attract, retain and manage qualified sales, marketing, and service personnel necessary to expand market acceptance for our technologies;
- the performance and commercial availability expectations of our existing and potential customers with respect to new and existing products;
- availability of potential sales and distribution partners to sell our technologies, and our ability to attract and retain such sales and distribution partners;
- the time and cost of maintaining and growing a specialized sales, marketing and service force for a particular application, which may be difficult to justify in light of the revenue generated; and
- our sales, marketing and service force may be unable to execute successful commercial activities.
- availability of potential sales and distribution partners to sell our technologies, and our ability to attract and retain such sales and distribution partners;
- the time and cost of maintaining and growing a specialized sales, marketing and service force for a particular application, which may be difficult to justify in light of the revenue generated; and

- our sales, marketing and service force may be unable to execute successful commercial activities.

We have enlisted and may continue to enlist third parties to assist with sales, distribution and customer support. There is no guarantee that we will be successful in attracting desirable sales and distribution partners, that we will be able to enter into arrangements with such partners on terms favorable to us or that we will be able to retain such partners on a going-forward basis. If our sales and marketing efforts, or those of any of our third-party sales and distribution partners, are not successful, or our products do not perform in accordance with customer expectations, our technologies and products may not gain market acceptance, which could materially and adversely impact our business, operations, financial condition, and prospects.

Large purchases by a limited number of customers represent a significant portion of our revenue, and any loss or delay of expected purchases has resulted, and in the future could result, in material quarter-to-quarter fluctuations of our revenue or otherwise adversely affect our results of operations.

We receive a significant portion of our revenue from a limited number of customers. For example, for the years ended December 31, 2022, and 2021, and 2020, one of our customers, who is our primary distributor in China, accounted for approximately 12%, and 13%, and 14% of our total revenue, respectively. For the year ended December 31, 2023, no single customer accounted for 10% or greater of our total revenue. Many of these customers make large purchases on a purchase-order basis rather than pursuant to long-term contracts. As a consequence of the concentrated nature of our customer base and their purchasing behavior, our quarterly revenue and results of operations have fluctuated, and may fluctuate in the future, from quarter to quarter and are difficult to forecast. For example, the cancellation of orders or acceleration or delay in anticipated product purchases or the acceptance of shipped products by our larger customers has materially affected, and in the future could materially affect, our revenue and results of operations in any quarterly period. We have been, and may in the future be, unable to sustain or increase our revenue from our larger customers, or offset any discontinuation or decrease of purchases by our larger customers with purchases by new or other existing customers. To the extent one or more of our larger customers experience significant financial difficulty, bankruptcy or insolvency, this could have a material adverse effect on our sales and our ability to collect on receivables, which could materially and adversely harm our financial condition and results of operations.

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In addition, many of our customers, including some of our larger customers, have negotiated, or may in the future negotiate, volume-based discounts or other more favorable terms from us or our sales and distribution partners, which can and have had a negative effect on our gross margins or revenue.

We expect that such concentrated purchases will continue to contribute materially to our revenue for the foreseeable future and that our results of operations may fluctuate materially as a result of such larger customers' buying patterns. In addition, we may see consolidation of our customer base. The loss of one of our larger customers, a significant delay or reduction in its purchases, or any volume-based discount or other more favorable terms that we or our sales and distribution partner(s) may agree to provide, in light of the aggregated purchase volume or buying power resulting from such consolidation, has harmed, and in the future could harm, our business, financial condition, results of operations and prospects.

Our products are highly complex, have recurring support requirements and could have unknown defects or errors, which may give rise to claims against us or divert application of our resources from other purposes.

Products using our SMRT sequencing and SBB technology are highly complex and may develop or contain undetected defects or errors. Our customers have previously experienced reliability issues with our existing products, including the Sequel System and the Sequel II/IIe Systems. In addition, it is possible our customers could experience reliability issues with current or future products, including the Sequel II/IIe, Onso, Revio and Revio Onso Systems. Despite internal and external testing, defects, or errors may arise in our products, which could result in a failure to obtain, maintain, or increase market acceptance of our products,

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diversion of development resources, injury to our reputation and increased warranty, service, and maintenance costs. New products, including Revio and Onso, or enhancements to our existing products, including the SMRT Cell and Sequel II/IIe Systems, in particular may contain undetected errors or performance problems that are discovered only after delivery to customers. If our products have reliability or other quality issues or require unexpected levels of support in the future, the market acceptance and utilization of our products may not grow to levels sufficient to support our costs and our reputation and business could be harmed. Low utilization rates of our products could cause our revenue and gross margins to be adversely affected. We provide a warranty for our sequencing instruments and consumables, which is generally limited to replacing, repairing, or at our option, giving credit for any sequencing instrument or consumable with defects in material or workmanship. Service contracts for our sequencing instruments may be separately purchased. Defects or errors in our products may also discourage customers from purchasing our products. The costs incurred in correcting any defects or errors may be substantial and could materially and adversely affect our operating margins. If our service and support costs increase, our business and operations may be materially and adversely affected.

In addition, such defects or errors could lead to the filing of product liability claims against us or against third parties whom we may have an obligation to indemnify against such claims, which could be costly and time-consuming to defend and result in substantial damages. Although we have product liability insurance, any product liability insurance that we have or procure in the future may not protect our business from the financial impact of a product liability claim. Moreover, we may not be able to obtain adequate insurance coverage on acceptable terms. Any insurance that we have or obtain will be subject to deductibles and coverage limits. A product liability claim could have a material adverse effect on our business, financial condition, and results of operations.

A significant portion of our sales depends on customers' spending budgets that may be subject to significant and unexpected variation which could have a negative effect on the demand for our products.

Our instruments represent significant capital expenditures for our customers in research applications. Current and potential customers for our current or future products include academic and government institutions, genome centers, medical research institutions, clinical laboratories, pharmaceutical, agricultural, biotechnology, diagnostic and chemical companies. Their spending budgets can have a significant effect on the demand for our products. Spending budgets are based on a wide variety of factors, including the allocation of available resources to make purchases, funding from government sources which is highly uncertain and subject to change, the spending priorities among various types of research equipment, policies regarding capital expenditures during economically uncertain periods and the **impact of COVID-19, potential impacts from health epidemics or pandemics**. Any decrease in capital spending or change in spending priorities of our current and potential customers could significantly reduce the demand for our products. Any delay or reduction in purchases by current or potential customers or our inability to forecast fluctuations in demand could materially and adversely harm our future operating results.

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We may not be able to convert our orders in backlog into revenue.

Our backlog represents product orders from our customers that we have confirmed but have not been able to fulfill, and, accordingly, for which we have not yet recognized revenue. We may not receive revenue from these orders, and any order backlog we report may not be indicative of our future revenue.

Many events can cause an order to be delayed or not completed at all, some of which may be out of our control, including the potential impacts from **COVID-19 health epidemics or pandemics** and our suppliers, especially our sole source suppliers, not being able to provide us with products or components. If we delay fulfilling customer orders or if customers reconsider their orders, those customers may seek to cancel or modify their orders with us. Customers may otherwise seek to cancel or delay their orders even if we are prepared to fulfill them. If our orders in backlog do not result in sales, our operating results may suffer.

Our sales cycles are unpredictable and lengthy, which makes it difficult to forecast revenue and may increase the magnitude of quarterly or annual fluctuations in our operating results.

The sales cycles for our sequencing instruments are lengthy because they represent a major capital expenditure and generally require the approval of our customers' senior management. This may contribute to substantial fluctuations in our quarterly or annual operating results, particularly during periods in which our sales volume is low. Because of these fluctuations, it is likely that in some future quarters our operating results will fall below the expectations of securities analysts or investors. If that happens, the market price of our stock would likely decrease. Past fluctuations in our quarterly and annual operating results have resulted in decreases in our stock price. Such fluctuations also mean that investors may not be able to rely on our operating results in any particular period as an indication of future performance. Sales to existing customers and the establishment of a business relationship with other potential customers is a lengthy process, generally taking several months and sometimes longer. Following the establishment of the relationship, the negotiation of purchase terms can be time-consuming, including as a result of seasonal factors, as discussed below, and a potential customer may require an extended evaluation and testing period. Our sales cycles may also lengthen, **and those sales cycles may result in lower units sold per cycle**, as we **continue to** introduce our Revio and Onso instruments and their associated consumables to the market, as our customers may have additional administrative, technical or other requirements associated with transitioning to new products and technologies. In anticipation of product orders, we may incur substantial costs before the sales cycle is complete and before we receive any customer payments. As a result, if a sale is not completed

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or is canceled or delayed, we may have incurred substantial expenses, making it more difficult for us to become profitable or otherwise negatively impacting our financial results. Even if our selling efforts are successful, the realization of revenue may be substantially delayed, our ability to forecast our future revenue may be more limited and our revenue may fluctuate significantly from quarter to quarter and year over year. For more information on the impact of these fluctuations on our results and stock price, see "[Our operating results fluctuate from quarter to quarter and year over year, which makes our future results difficult to predict and could negatively impact the market price of our common stock](#)," below.

Because some of our customers and suppliers are based in China, our business, financial condition and results of operations could be adversely affected by the political and economic tensions between the United States and China.

We are subject to risks associated with political conflicts between the U.S. and China. A significant portion of our revenue is generated from China. For example, for the years ended December 31, 2022, **2021**, and **2020**, **2021**, one of our customers, who is our primary distributor in China, accounted for approximately 12%, **and 13%, and 14%** of our total revenue, respectively. **For the year ended December 31, 2023, no single customer accounted for 10% or greater of our total revenue.** In addition, certain components, some of which are critical components, of our products are manufactured in China. These components are either sourced directly from companies in China or indirectly from third parties that source from companies in China.

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Consequently, we are subject to significant risks associated with the trading relationship between the U.S. and China, which is currently characterized by significant uncertainty. Tariffs imposed by the U.S. and China have increased, and may continue to increase, our costs. Additionally, export restrictions imposed by the U.S. may impact our ability to export

certain products to customers or distributors in China and restrict our ability to use certain integrated circuits in our products, and it is possible that additional restrictions will be put in place that could impact our ability to provide our products to customers or distributors in China or source components from China. Moreover, the Chinese government may retaliate against U.S. trade restrictions in ways that could impact our business. Given the relatively fluid regulatory environment in China and the United States and uncertainty how the U.S. or foreign governments will act with respect to export controls, tariffs, international trade agreements and policies, there could be additional import, export, tax, or other regulatory changes in the future. Any such changes could directly and adversely impact our financial results and results of operations. For more information, see “—[Enhanced trade tariffs, import restrictions, export restrictions, Chinese regulations or other trade barriers may materially harm our business.](#)”

Other risks could include:

- [interruptions to operations in China as a result of potential disease outbreaks, including any further COVID-19 related outbreaks, and natural catastrophic events, which have in the past and can result in the future in business closures, transportation restrictions, import and export complications and cause shortages in the supply of raw materials or disruptions in manufacturing;](#)
 - [interruptions to operations in China as a result of the COVID-19 pandemic or other disease outbreaks and natural catastrophic events, which have in the past and can result in the future in business closures, transportation restrictions, import and export complications and cause shortages in the supply of raw materials or disruptions in manufacturing;](#)
 - product supply disruptions and increased costs as a result of heightened exposure to changes in the policies of the Chinese government, political unrest or unstable economic conditions in China; and
 - [the nationalization or other expropriation of private enterprises or intellectual property by the Chinese government.](#)
- [the nationalization or other expropriation of private enterprises or intellectual property by the Chinese government.](#)

Difficulties in this relationship may require us to take actions adverse to our business to comply with governmental restrictions on business and trade with China.

[In addition,](#)

[We face significant risks associated with doing business with Taiwanese suppliers and manufacturers due to the tense relationship between Taiwan and mainland China.](#)

Substantially all of our consumable chips are partly manufactured by a company based in Taiwan. Our supply of consumables chips and other critical components may be materially and adversely affected by diplomatic, geopolitical, [military](#) and other developments affecting the relationship between China and Taiwan. [Accordingly, there is a risk that current political](#) Recent military exercises in the Taiwan Strait have contributed to geopolitical uncertainty regarding the future of the relationship between China and Taiwan. [Current or future diplomatic, geopolitical, military or other](#) tensions between China and Taiwan may lead to circumstances that negatively affect the availability of such consumable chips and other critical components to us, which could limit or prohibit our ability to manufacture consumable chips and other critical components or lead to an increase in our supply costs if we cannot find a similar cost alternative supplier, which could materially and adversely impact our business, operations, prospects, financial condition and results, and results of operations.

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[Our operating operating results fluctuate from quarter to quarter and year over year, which makes our future results difficult to predict and could negatively impact the market price of our common stock.](#)

We operate on a December 31st year-end and believe that there are significant seasonal factors which may cause sales of our products, and particularly our sequencing instruments, to vary on a quarterly or yearly basis, contribute to lengthy sales cycles for our sequencing instruments, and increase the magnitude of quarterly or annual fluctuations in our operating results. We believe that this seasonality results from a number of factors, including the procurement and budgeting cycles of many of our customers, especially government-funded customers, which often coincide with government fiscal year ends. For example, the U.S. government's fiscal year-end occurs in our third quarter and may result in increased sales of our products during this quarter if government-funded customers have unused funds that may be forfeited, or future budgets that may be reduced if funds remain unspent at fiscal year-end. Furthermore, Lunar New Year celebrations, which occur during our first quarter, and may last for a week or longer, resulting in closure of many of our customers' offices in China and across the Asia-Pacific region have caused, and may in the future cause, decreased sales of our consumables during our first quarter. These factors have contributed, and in the future may contribute, to substantial fluctuations in our quarterly operating results.

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Our operating results during any given period can also be impacted by numerous other factors, including the following:

- [market acceptance for our products;](#)
 - [market acceptance for our products;](#)

- our ability to attract new customers;
- the length of our sales cycles, as discussed above;
- our ability to achieve economies of scale and other manufacturing efficiencies at the rate we anticipate;
- publications of studies by us, our competitors or third parties;
- the timing and success of new product introductions by us or our competitors or other changes in the competitive dynamics of our industry, such as consolidation;
- the amount and timing of our costs and expenses;
- changes in our pricing policies or those of our competitors;
- general economic, industry and market conditions;
- the regulatory environment in which we operate;
- expenses associated with warranty obligations or unforeseen product quality issues;
- the hiring, training, and retention of key employees, including our ability to grow our sales organization;
- litigation or other claims against us for intellectual property infringement or otherwise;
- our ability to obtain additional financing as necessary;
- changes or trends in new technologies and industry standards; and the impact of COVID-19.

- the length of our sales cycles, as discussed above;
- our ability to achieve economies of scale and other manufacturing efficiencies at the rate we anticipate;
- publications of studies by us, our competitors or third parties;
- the timing and success of new product introductions by us or our competitors or other changes in the competitive dynamics of our industry, such as consolidation;
- the amount and timing of our costs and expenses;
- changes in our pricing policies or those of our competitors;
- general economic, industry and market conditions;
- the impact of catastrophic events, including health epidemics or pandemics and military or other armed conflicts;
- the regulatory environment in which we operate;
- expenses associated with warranty obligations or unforeseen product quality issues;
- the hiring, training, and retention of key employees, including our ability to grow our sales organization;
- litigation or other claims against us for intellectual property infringement or otherwise;
- our ability to obtain additional financing as necessary; and
- changes or trends in new technologies and industry standards.

Consequently, it is possible that in some quarters our operating results will fall below the expectations of securities analysts or investors. If that happens, the market price of our common stock would likely decrease. These fluctuations, among other factors, also mean that our operating results in any particular period may not be relied upon as an indication of future performance. Seasonal or cyclical variations in our sales have in the past, and may in the future, become more or less pronounced over time, and have in the past materially affected, and may in the future materially affect, our business, financial condition, results of operations, and prospects.

Our ability to use net operating losses to offset future taxable income may be subject to substantial limitations, and changes to U.S. tax laws may cause us to make adjustments to our financial statements.

Under Section 382 of the Internal Revenue Code, a corporation that undergoes an “ownership change” is subject to limitations on its ability to utilize its pre-change net operating losses (“NOLs”) to offset future taxable income. We believe that we have had one or more ownership changes, and as a result of which our existing NOLs are currently subject to limitation. Future changes in our stock ownership could result in additional ownership changes, including potentially material changes, under Section 382. Consequently, we may not be able to utilize some or all of our NOLs even if we attain profitability.

Our facilities in California are located near earthquake faults, and the occurrence of an earthquake or other catastrophic disaster could cause damage to our facilities and equipment, which could require us to cease or curtail operations.

Our facilities in California are located near earthquake fault zones and are vulnerable to damage from earthquakes. We are also vulnerable to damage from other types of disasters, including fire, floods, power loss, communications failures and similar events. If any disaster were to occur, our ability to operate our business at our facilities would be seriously, or potentially completely, impaired. In addition, the nature of our activities could cause significant delays in our research programs and commercial activities and make it difficult for us

to recover from a disaster. The insurance we maintain may not be adequate to cover our losses resulting from disasters or other business interruptions. Accordingly, an earthquake or other disaster could materially and adversely harm our ability to conduct business.

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Risks Related to Our Intellectual Property

Failure to secure patent or other intellectual property protection for our products and improvements to our products may reduce our ability to maintain any technological or competitive advantage over our current and potential competitors.

Our ability to protect and enforce our intellectual property rights is uncertain and depends on complex legal and factual questions. Our ability to establish or maintain a technological or competitive advantage over our competitors may be diminished because of these uncertainties. For example:

- we or our licensors might not have been the first to make the inventions covered by each of our pending patent applications or issued patents;
 - we or our licensors might not have been the first to file patent applications for these inventions;
 - it is possible that neither our pending patent applications nor the pending patent applications of our licensors will result in issued patents;
 - the scope of the patent protection we or our licensors obtain may not be sufficiently broad to prevent others from practicing our technologies, developing competing products, designing around our patented technologies or independently developing similar or alternative technologies;
 - our and our licensors' patent applications or patents have been, are and may in the future be, subject to interference, opposition or similar administrative proceedings, which could result in those patent applications failing to issue as patents, those patents being held invalid or the scope of those patents being substantially reduced;
 - our enforcement of patents and proprietary rights in other countries may be problematic or unpredictable;
 - we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions;
 - we or our partners may not adequately protect our trade secrets;
 - we may not develop additional proprietary technologies that are patentable; or
 - the patents of others may limit our freedom to operate and prevent us from commercializing our technology in accordance with our plans.
- it is possible that neither our pending patent applications nor the pending patent applications of our licensors will result in issued patents;
 - the scope of the patent protection we or our licensors obtain may not be sufficiently broad to prevent others from practicing our technologies, developing competing products, designing around our patented technologies or independently developing similar or alternative technologies;
 - our and our licensors' patent applications or patents have been, are and may in the future be, subject to interference, opposition or similar administrative proceedings, which could result in those patent applications failing to issue as patents, those patents being held invalid or the scope of those patents being substantially reduced;
 - our enforcement of patents and proprietary rights in other countries may be problematic or unpredictable;
 - we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions;
 - we or our partners may not adequately protect our trade secrets;
 - we may not develop additional proprietary technologies that are patentable; or
 - the patents of others may limit our freedom to operate and prevent us from commercializing our technology in accordance with our plans.

The occurrence of any of these events could impair our ability to operate without infringing upon the proprietary rights of others or prevent us from establishing or maintaining a competitive advantage over our competitors.

Variability in intellectual property laws may adversely affect our intellectual property position.

Intellectual property laws, and patent laws and regulations in particular, have been subject to significant variability either through administrative or legislative changes to such laws or regulations or changes or differences in judicial interpretation, and it is expected that such variability will continue to occur. Additionally, intellectual property laws and regulations differ by country. Variations in the patent laws and regulations or in interpretations of patent laws and regulations in the United States and other countries may diminish the value of our intellectual property and may change the impact of third-party intellectual property on us. Accordingly, we cannot predict the scope of the patents that may be granted to us with certainty, the extent to which we will be able to enforce our patents against third parties or the extent to which third parties may be able to enforce their patents against us.

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Some of the intellectual property that is important to our business is owned by other companies or institutions and licensed to us, and changes to the rights we have licensed may adversely impact our business.

We license from third parties some of the intellectual property that is important to our business. If the third parties who license intellectual property to us fail to maintain the intellectual property that we have licensed, or lose rights to that intellectual property, the rights we have licensed may be reduced or eliminated, which would eliminate barriers against our competition. Termination of these licenses or reduction or elimination of our licensed rights may result in our having to negotiate new or reinstated licenses with less favorable terms, or could subject us to claims of intellectual property infringement or contract breach in litigation or other administrative proceedings that could result in damage awards against us and injunctions that could prohibit us from selling our products. In addition, some of our licenses from third parties limit

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the field in which we can use the licensed technology. Therefore, in order for us to use such licensed technology in potential future applications that are outside the licensed field of use, we may be required to negotiate new licenses with our licensors or expand our rights under our existing licenses. We cannot be certain that we will be able to obtain such licenses or expanded rights on reasonable terms or at all. In the event a dispute with our licensors were to occur, our licensors may seek to renegotiate the terms of our licenses, increase the royalty rates that we pay to obtain and maintain those licenses, limit the field or scope of the licenses, or terminate the license agreements. In addition, we have limited rights to participate in the prosecution and enforcement of the patents and patent applications that we have licensed. If we fail to meet our obligations under these licenses, or if we have a dispute regarding the terms of the licenses, these third parties could terminate the licenses, which could subject us to claims of intellectual property infringement. As a result, we cannot be certain that these patents and applications will be prosecuted and enforced in a manner consistent with the best interests of our business. Further, because of the rapid pace of technological change in our industry, we may need to rely on key technologies developed or licensed by third parties, and we may not be able to obtain licenses and technologies from these third parties at all or on reasonable terms. The occurrence of these events may have a material adverse effect on our business, financial condition or results of operations.

The measures that we use to protect the security of and enforce our intellectual property and other proprietary rights may not be adequate, which could result in the loss of legal protection for, and thereby diminish the value of, such intellectual property and other rights.

In addition to patents, we also rely upon trademarks, trade secrets, copyrights, and unfair competition laws, as well as license agreements and other contractual provisions, to protect our intellectual property and other proprietary rights. Despite these measures, any of our intellectual property rights could be challenged, invalidated, circumvented, or misappropriated. In addition, we attempt to protect our intellectual property and proprietary information by requiring our employees and consultants to enter into confidentiality and assignment of inventions agreements, and by entering into confidentiality agreements with our third-party development, manufacturing, sales, and distribution partners, who may also acquire, develop and/or commercialize alternative or competing products or provide services to our competitors. For example, Roche had certain access to our trade secrets and other proprietary information pursuant to an agreement we had entered into with Roche, subject to the confidentiality provisions thereof (certain of which provisions survive the termination of the agreement); however, Roche is developing potentially competing sequencing products. There can be no assurance that our measures have provided or will provide adequate protection for our intellectual property and proprietary information. These agreements may be breached, and we may not have adequate remedies for any such breach. In addition, our trade secrets and other proprietary information may be disclosed to others, or others may gain access to or disclose our trade secrets and other proprietary information. Enforcing a claim that a third party illegally obtained and is using our trade secrets is expensive and time consuming, and the outcome is unpredictable. Additionally, others may independently develop proprietary information and techniques that are substantially equivalent to ours. The occurrence of these events may have a material adverse effect on our business, financial condition, or results of operations.

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Our intellectual property may be subject to challenges in the United States or foreign jurisdictions that could adversely affect our intellectual property position.

Our pending, issued and granted U.S. and foreign patents and patent applications have been, are and may in the future be, subject to challenges by ONT Ltd., ONT Inc. and Metrichor, Ltd. ("Metrichor" and, together with ONT Ltd. and ONT Inc., "ONT") in addition to other parties asserting prior invention by others or invalidity on various grounds, through proceedings, such as interferences, reexaminations, or opposition proceedings. Addressing these challenges to our intellectual property has been, and any future challenges can be, costly and distract management's attention and resources. For example, we previously incurred significant legal expenses to litigate and settle a complaint seeking review of a patent interference decision of the U.S. Patent and Trademark Office. Additionally, ONT previously requested that the U.S. Patent and Trademark Office institute *inter partes* reviews of certain patents that we have asserted against ONT Inc. and ONT Ltd. in litigation proceedings for patent infringement. While none of the *inter partes* reviews requested by ONT were instituted by the U.S. Patent and Trademark Office, challenges of this nature before the Patent Trial and Appeal Board ("PTAB") in the future could result in determinations that our patents or pending patent applications are unpatentable to us, or are invalidated or unenforceable in whole or in part and could require us to expend significant time, funds, and other resources in litigating such challenges. Accordingly, adverse rulings in such proceedings could negatively impact the scope of our intellectual property protection for our products and technology and could materially and adversely affect our business. Similar mechanisms for challenging the validity and enforceability of a patent exist in foreign patent offices and courts and may result in the revocation, cancellation, or amendment of any foreign patents we hold now or in the future. The outcome following legal assertions of

invalidity and unenforceability is unpredictable, and prior art could render our patents invalid. If a defendant were to prevail on a legal assertion of invalidity and/or unenforceability, we would lose at least part, and perhaps all, of the patent protection on such products. Such a loss of patent protection would have a material adverse impact on our business.

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Some of our technology is subject to “march-in” rights by the U.S. government.

Some of our patented technology was developed with U.S. federal government funding. When new technologies are developed with U.S. government funding, the government obtains certain rights in any resulting patents, including a nonexclusive license authorizing the government to use the invention for non-commercial purposes. These rights may permit the government to disclose our confidential information to third parties and to exercise “march-in” rights to use or allow third parties to use our patented technology. The government can exercise its march-in rights if it determines that such action is necessary to (i) achieve practical application of the U.S. government-funded technology, (ii) alleviate health or safety needs, (iii) meet requirements of federal regulations, or (iv) give preference to U.S. industry. In addition, U.S. government-funded inventions must be reported to the government and such government funding must be disclosed in any resulting patent applications. Furthermore, our rights in such inventions are subject to government license rights and foreign manufacturing restrictions. The U.S. government has generally denied requests to exercise its march-in rights, even to provide access to potentially life-saving medications; however, if the U.S. government were to exercise its march-in rights to our patent technologies funded by the U.S. government, particularly for the benefit of one of more of our competitors, that may have a material adverse effect on our business.

We are involved in legal proceedings to enforce our intellectual property rights.

Our intellectual property rights involve complex factual, scientific, and legal questions. We operate in an industry characterized by significant intellectual property litigation. Even though we may believe that we have a valid patent on a particular technology, other companies have from time to time taken, and may in the future take, actions that we believe violate our patent rights. For example, we were previously involved in legal proceedings with ONT and Harvard University in several United States and European jurisdictions. We have in the past received adverse rulings against us with respect to our complaint with the United States International Trade Commission for one of these proceedings. Legal actions to enforce our patent rights have been, and will continue to be, expensive, and may divert significant management time and resources. Adverse parties from previous legal actions have brought, and they and others may in the future bring, claims against us and/or our intellectual property. Litigation is a significant ongoing expense, recognized in sales, general and administrative expense, with an uncertain outcome, and has been, and may in the future be, a material expense for us. Our enforcement actions may not be successful, have given rise to legal claims against us and could result in some of our intellectual property rights being determined to be invalid or not enforceable. Furthermore, an adverse determination or judgement could lead to an award of damages against us, or the issuance of an injunction against us or our products that could prevent us from selling any products found to be infringing the intellectual property rights of another party.

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We have been, are currently, and could in the future be, subject to legal proceedings with third parties who may claim that our products infringe or misappropriate their intellectual property rights.

Our products are based on complex, rapidly developing technologies. We may not be aware of issued or previously filed patent applications that belong to third parties that mature into issued patents that cover some aspect of our products or their use. In addition, because patent litigation is complex and the outcome inherently uncertain, our belief that our products do not infringe third-party patents of which we are aware or that such third-party patents are invalid and unenforceable may be determined to be incorrect. As a result, third parties have claimed, and may in the future claim, that we infringe their patent rights and have filed, and may in the future file lawsuits or engage in other proceedings against us to enforce their patent rights. For example, we are involved in legal proceedings for alleged patent infringement and related matters in the United States with Personal Genomics of Taiwan, Inc. (“PGI”), Take2 Technologies, Ltd., and the Chinese University of Hong Kong. In addition, ONT Ltd. and Harvard University have, in the past, filed claims against us in the High Court of England and Wales and the District Court of Mannheim, Germany for patent infringement, and PGI has filed claims against us in the U.S. District Court for the District of Delaware and in the Wuhan People’s Court in China. We are aware of other issued patents and patent applications owned by third parties that could be construed to read on our products, and related maintenance and support services. Although we do not believe that our products or services infringe any valid issued patents, the third-party owners of these patents and applications may in the future claim that we infringe their patent rights and file lawsuits against us. In addition, as we enter new markets, our competitors and other third parties may claim that our products infringe their intellectual property rights as part of a business strategy to impede our successful entry into those markets. Furthermore, parties making claims against us may be able to obtain injunctive or other relief, which effectively could block our ability to further develop or commercialize products or services and could result in the award of substantial damages against us. Patent litigation between competitors in our industry is common. Additionally, we have certain obligations to many of our customers and suppliers to indemnify and defend them against claims by third parties that our products or their use infringe any intellectual property of these third parties. In defending ourselves against any of these claims, we have in the past incurred, and could in the future incur, to defend ourselves or our customers, substantial costs, and the attention of our management and technical personnel could be diverted. For example, we previously incurred significant legal expenses to litigate and settle a complaint alleging patent infringement. Even if we have an agreement that indemnifies us against such costs, the indemnifying party may be unable to uphold its contractual obligations. To avoid or settle legal claims, it may be necessary or desirable in the future to obtain licenses relating to one or more products or relating to current or future

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technologies, which could negatively affect our gross margins. We may not be able to obtain these licenses on commercially reasonable terms, or at all. We may be unable to modify our products so that they do not infringe the intellectual property rights of third parties. In some situations, the results of litigation or settlement of claims may require us to cease allegedly infringing activities which could prevent us from selling some or all of our products. The occurrence of these events may have a material adverse effect on our business, financial condition, or results of operations.

In addition, in the course of our business, we may from time to time have access or be alleged to have access to confidential or proprietary information of others, which, though not patented, may be protected as trade secrets. Others could bring claims against us asserting that we improperly used their confidential or proprietary information, or that we misappropriated their technologies and incorporated those technologies into our products. A determination that we illegally used the confidential or proprietary information or misappropriated technologies of others in our products could result in us paying substantial damage awards or being prevented from further developing or selling some or all of our products, which could materially and adversely affect our business.

We have not yet registered some of our trademarks in all of our potential markets, and failure to secure those registrations could adversely affect our business.

Some of our trademark applications may not be allowed for registration, and our registered trademarks may not be maintained or enforced. In addition, in the U.S. Patent and Trademark Office and in comparable agencies in many foreign jurisdictions, third parties are given an opportunity to oppose pending trademark applications and to seek to cancel registered trademarks. Opposition or cancellation proceedings may be filed against our trademarks, and our trademarks may not survive such proceedings.

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Our use of "open source" software could adversely affect our ability to sell our products and subject us to possible litigation.

A portion of the products or technologies developed and/or distributed by us incorporate "open source" software, and we may incorporate open source software into other products or technologies in the future. Some open source software licenses require that we disclose the source code for any modifications to such open source software that we make and distribute to one or more third parties, and that we license the source code for such modifications to third parties, including our competitors, at no cost. We monitor the use of open source software in our products to avoid uses in a manner that would require us to disclose or grant licenses under our source code that we wish to maintain as proprietary; however, there can be no assurance that such efforts have been or will be successful. In some circumstances, distribution of our software that includes or is linked with open source software could require that we disclose and license some or all of our proprietary source code in that software, which could include permitting the use of such software and source code at no cost to the user. Open source license terms are often ambiguous and there is little legal precedent governing the interpretation of these licenses. Successful claims made by the licensors of open source software that we have violated the terms of these licenses could result in unanticipated obligations, including being subject to significant damages, being enjoined from distributing products that incorporate open source software and being required to make available our proprietary source code pursuant to an open source license, which could substantially help our competitors develop products that are similar to or better than ours or otherwise materially and adversely affect our business.

Risks Related to Regulation

We are, and may become, subject to governmental regulations that may impose burdens on our operations, and the markets for our products may be narrowed.

We are subject, both directly and indirectly, to the adverse impact of government regulation of our operations and markets. For example, export of our instruments may be subject to strict regulatory control in a number of jurisdictions, and we could experience disruption in our supply chain as a result of certain geopolitical events and conflicts and any related political or economic responses and counter-responses or otherwise by various global actors. Following Russia's invasion of Ukraine in February 2022, the United States and other countries imposed certain economic sanctions and severe export control restrictions against Russia and Belarus as well as certain Russian nationals and individuals and entities with ties to Russia, Belarus, and this conflict. These sanctions and restrictions have continued to increase as the conflict has further escalated and now cover the export of our products to Russia, and the United States and other countries could impose even wider sanctions and export restrictions and take other actions in the future that could further limit our ability to provide products in certain locations. Additionally, new restrictions on the ability to send certain products and technology related to semiconductors, semiconductor manufacturing, and supercomputing to China without an export license discussed above may impact our ability to provide products to customers or distributors in China. We have expanded and are continuing to expand the international jurisdictions into which we supply products, which increases the risks surrounding governmental regulations relating to our business. The need to or failure to satisfy export control criteria or to obtain necessary clearances could delay or prevent shipment of products, which could materially and adversely affect our revenue and profitability. Moreover, the life sciences industry, which is expected to continue to be one of the primary markets for our technology, has historically been heavily regulated. There are, for example, laws in several jurisdictions restricting research in genetic engineering, which may narrow our markets. Given the evolving nature of this industry, legislative bodies or regulatory authorities may adopt additional regulations that may adversely affect our market opportunities. Additionally, if

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ethical and other concerns surrounding the use of genetic information, diagnostics or therapies become widespread, there may be less demand for our products.

Our business is also directly affected by a wide variety of government regulations applicable to business enterprises generally and to companies operating in the life science industry in particular. Failure to comply with government regulations or obtain or maintain necessary permits and licenses could result in a variety of fines or other censures or an interruption in our business operations which may have a negative impact on our ability to generate revenue and the cost of operating our business. In addition, changes to laws and government regulations could cause a material adverse effect on our business as we will need to adapt our business to comply with such changes. For example, a governmental prohibition on the use of human *in vitro* diagnostics or other regulations that negatively impact the research and development activities of our customers would adversely impact our commercialization of products on which we have expended significant research and development resources, which would in turn have a material adverse impact on our business and prospects.

Our products could become subject to government regulation as medical devices by the U.S. Food and Drug Administration or other domestic and international regulatory agencies even if we do not elect to seek regulatory clearance or approval to market our products for diagnostic purposes, which could increase our costs and impede or delay our commercialization efforts, thereby materially and adversely affecting our business and results of operations.

Our products are currently labeled and promoted as research use only ("RUO") products, and are not currently designed, or intended to be used, for clinical diagnostic tests or as medical devices. However, in the future, certain of our products or related applications, such as those that may be developed for clinical uses, could be subject to regulation by the U.S. Food and Drug Administration ("FDA"), or the FDA's regulatory jurisdiction could be expanded to include our products. Also, even if our products are labeled, promoted, and intended as RUO, the FDA or comparable agencies of other countries could disagree with our conclusion that our products are intended for research use only or deem our sales, marketing and promotional efforts as being inconsistent with the FDA's guidance on RUO products. For example, our customers may independently elect to use our RUO labeled products in their own laboratory developed tests ("LDTs") for clinical diagnostic use, which could subject our products to government regulation, and the regulatory clearance or approval and maintenance process for such products may be uncertain, expensive, and time-consuming. Regulatory requirements related to marketing, selling, and distribution of RUO products could change or be uncertain, even if clinical uses of our RUO products by our customers were done without our consent. If the FDA or other regulatory authorities assert that any of our RUO products are subject to regulatory clearance or approval, our business, financial condition, or results of operations could be adversely affected. In the event that we fail to obtain and maintain necessary regulatory clearances or approvals for products that we develop for clinical uses, or if clearances or approvals for future products and indications are delayed or not issued, our commercial operations may be materially harmed. Furthermore, even if we are granted regulatory clearances or approvals, they may include significant limitations on the indicated uses for the product, which may limit the market for the product. We do not have experience in obtaining FDA approvals and no assurance can be given that we will be able to obtain or to maintain such approvals. Furthermore, any approvals that we may obtain can be revoked if safety or efficacy problems develop.

The FDA has historically exercised enforcement discretion in not enforcing the medical device regulations against laboratories developing and offering LDTs. However, in 2014, the FDA issued two draft guidance documents that set forth the FDA's proposed risk-based framework for regulating LDTs, which are designed, manufactured, and used within a single laboratory. The draft guidance documents provide the anticipated details through which the FDA would propose to establish an LDT oversight framework, including pre-market review for higher-risk LDTs, such as those that have the same intended use as FDA-approved or cleared companion diagnostic tests currently on the market. In 2017, the FDA announced that it would not issue final guidance on the oversight of LDTs, and manufacturers of products used for LDTs, but would seek further public discussion on an appropriate oversight approach, and give Congress an opportunity to develop a legislative solution. More recently, the FDA has issued warning letters to certain genomics labs for illegally marketing genetic tests that claim to predict patients' responses to specific medications, noting that the FDA has not created a legal "carve-out" for LDTs and retains discretion to take action when appropriate, such as when certain genomic tests raise significant public health concerns.

As manufacturers develop more complex diagnostic tests and diagnostic software, the FDA may increase its regulation of LDTs. Any future legislative or administrative rule making or oversight of LDTs, if and when finalized, may impact the sales of our products and how customers use our products, and may require us to change our business model in order to maintain compliance with these laws. We cannot predict how these various efforts will be resolved, how Congress or the FDA will regulate LDTs in the future, or how that regulatory system will impact our business. Changes to the current regulatory framework, including the imposition of additional or new regulations, including regulation of our products, could arise at any time during the development or marketing of our products, which may negatively affect our ability to obtain or maintain FDA or comparable regulatory approval of our products, if required. Further, sales of devices for diagnostic purposes may subject us to additional healthcare regulation and enforcement by the applicable government agencies. Such laws include, without limitation, state and federal anti-kickback or anti-referral laws, healthcare fraud and abuse laws, false claims laws, privacy

and security laws, Physician Payments Sunshine Act and related transparency and manufacturer reporting laws, and other laws and regulations applicable to medical device manufacturers.

Additionally, in 2013, the FDA issued Final Guidance "Distribution of In Vitro Diagnostic Products Labeled for Research Use Only." The guidance emphasizes that the FDA will review the totality of the circumstances when it comes to evaluating whether equipment and testing components are properly labeled as RUO. The final guidance states that merely including a labeling statement that the product is for research purposes only will not necessarily render the device exempt from the FDA's clearance, approval, and other regulatory requirements if the circumstances surrounding the distribution, marketing and promotional practices indicate that the manufacturer knows its products are, or intends for its products to be, used for clinical diagnostic purposes.

These circumstances may include written or verbal sales and marketing claims or links to articles regarding a product's performance in clinical applications and a manufacturer's provision of technical support for clinical applications.

In August 2020, the Department of Health and Human Services ("HHS") announced rescission of guidance and other informal issuances of FDA regarding pre-market review of LDT absent notice-and-comment rulemaking, stating that, absent notice-and-comment rulemaking LDTs are not required to obtain FDA pre-market authorization. In November 2021,

HHS under the Biden administration issued a statement that withdrew the August 2020 policy announcement stating that HHS does not have a policy on LDTs that is separate from FDA's longstanding approach.

Legislative and administrative proposals to amend the FDA's oversight of LDTs have been introduced in recent years, including the Verifying Accurate Leading-edge IVCT Development Act of 2021 (the "VALID Act"), which aims to create a new category of medical products separate from medical devices called "in vitro clinical tests," or IVCTs, and bring all such products within the scope of the FDA's oversight. To date, Congress has not passed the VALID Act, but may revisit the VALID Act or similar policy riders and enact other FDA programmatic reforms in the future. In October 2023, through rulemaking, the FDA proposed to amend the definition of "in vitro diagnostic products" in FDA regulations to include laboratories that manufacture such products and to phase out the FDA's general enforcement discretion approach for LDTs so that IVDs manufactured by a laboratory would be regulated similarly to IVDs. It is unclear when the FDA will finalize and begin enforcing such rule and how future legislation by federal and state governments and FDA regulation will impact the industry, including our business and that of our customers.

If the FDA determines our products or related applications should be subject to additional regulation as in vitro diagnostic devices based upon customers' use of our products for clinical diagnostic or therapeutic decision-making purposes, our ability to market and sell our products could be impeded and our business, prospects, results of operations and financial condition may be adversely affected. In addition, the FDA could consider our products to be misbranded or adulterated under the Federal Food, Drug, and Cosmetic Act and subject to recall and/or other enforcement action.

To the extent we elect to label and promote any of our products as medical devices, we would be required to obtain prior approval or clearance by the FDA or comparable foreign regulatory authority, which could take significant time and expense and could fail to result in a marketing authorization for the intended uses we believe are commercially attractive. Obtaining marketing authorization in one jurisdiction does not mean that we will be successful in obtaining marketing authorization in other jurisdictions where we conduct business.

If we elect to label and market our products for use as, or in the performance of, clinical diagnostics in the United States, thereby subjecting them to FDA regulation as medical devices, we would be required to obtain pre-market 510(k) clearance or pre-market approval from the FDA, unless an exception applies. It is possible, in the event we elect to submit 510(k) applications for certain of our products, that the FDA would take the position that a more burdensome pre-market application, such as a PMA or a *de novo* application is required for some of our products. If such applications were required, greater time and investment would be required to obtain FDA approval. Even if the FDA agreed that a 510(k) was appropriate, FDA clearance can be expensive and time consuming. It generally takes a significant amount of time to prepare a 510(k), including conducting appropriate testing on our products, and several months to years for the FDA to review a submission. Notwithstanding the effort and expense, FDA clearance or approval could be denied for some or all of our products for which we choose to market as a medical device or a clinical diagnostic device. Even if we were to seek and obtain regulatory approval or clearance, it may not be for the intended uses we request or that we believe are important or commercially attractive. There can be no assurance that future products for which we may seek pre-market clearance or approval will be approved or cleared by FDA or a comparable foreign regulatory authority on a timely basis, if at all, nor can there be assurance that labeling claims will be consistent with our anticipated claims or adequate to support continued adoption of such products. Compliance with FDA or comparable foreign regulatory authority regulations will require substantial costs, and subject us to heightened scrutiny by regulators and substantial penalties for failure to comply with such requirements or the inability to market our products. The lengthy and unpredictable pre-market clearance or approval process, as well as the unpredictability of the results of any required clinical studies, may result in our failing to obtain regulatory clearance or approval to market such products, which would significantly harm our business, results of operations, reputation, and prospects.

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If we sought and received regulatory clearance or approval for certain of our products, we would be subject to ongoing FDA obligations and continued regulatory oversight and review, including the general controls listed above and the FDA's QSRs for our development and manufacturing operations. In addition, we would be required to obtain a new 510(k) clearance before we could introduce subsequent material modifications or improvements to such products. We could also be subject to

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additional FDA post-marketing obligations for such products, any or all of which would increase our costs and divert resources away from other projects. If we sought and received regulatory clearance or approval and are not able to maintain regulatory compliance with applicable laws, we could be prohibited from marketing our products for use as, or in the performance of, clinical diagnostics and/or could be subject to enforcement actions, including warning letters and adverse publicity, fines, injunctions, and civil penalties; recall or seizure of products; operating restrictions; and criminal prosecution.

Further, if we decide to seek regulatory clearance or approval for certain of our products in countries outside of the United States or if a foreign regulatory authority determines that our products are regulated as medical devices, we would be subject to extensive medical device laws and regulations outside of the United States. Sales of such products outside the United States will likely be subject to foreign regulatory requirements, which can vary greatly from country to country. As a result, the time required to obtain clearances or approvals outside the United States may differ from that required to obtain FDA clearance or approval and we may not be able to obtain foreign regulatory approvals on a timely basis or at all. In Europe, we would need to comply with the Medical Device Regulation 2017/745 and In Vitro Diagnostic Regulation 2017/746, which became effective May 26, 2017, with application dates of May 26, 2021 (postponed from 2020) and May 26, 2022, respectively. This will increase the difficulty of regulatory approvals in Europe in the future. In addition, the FDA regulates exports of medical devices. The number and scope of these requirements are increasing. Unlike many of the other companies offering nucleic acid sequencing equipment or consumables, this is an area where we do not have expertise. We, or our other third-party sales and distribution partners, may not be able to obtain regulatory approvals in such countries or may incur significant costs in obtaining or maintaining our foreign regulatory approvals. In addition, the export by us of certain of our products, which have not yet been cleared for domestic commercial distribution, may be subject to FDA or other export restrictions. Failure to comply with these regulatory requirements or obtain and maintain required approvals, clearances and certifications could impair our ability to commercialize our products for diagnostic use outside of the United

States. Any action brought against us for violations of these laws or regulations, even if successfully defended, could cause us to incur significant legal expenses and divert our management's attention from the operation of our business.

Enhanced

Enhanced trade tariffs, import restrictions, export restrictions, Chinese regulations, or other trade barriers may materially harm our business.

We are continuing to expand our international operations as part of our growth strategy and have experienced an increasing concentration of sales in certain regions outside the United States, especially the Asia-Pacific region, as discussed above. There is currently significant uncertainty about the future relationship between the United States and various other countries, most significantly China, with respect to trade policies, treaties, government regulations and tariffs. Starting in September 2018, the U.S. Trade Representative (the "USTR") enacted various tariffs of 7.5%, 10%, 15%, and 25% on the import of Chinese products, including non-U.S. components and materials that may be used in our products. Additionally, China also has imposed tariffs on imports into China from the United States. These tariffs have and could continue to raise our costs. Furthermore, tariffs, trade restrictions, or trade barriers that have been, and may in the future be, placed on products such as ours by foreign governments, especially China, have raised, and could further raise, amounts paid for some or all of our products, which may result in the loss of customers and our business, and our financial condition and results of operations may be harmed. Further tariffs may be imposed that could cover imports of additional components and materials used in our products, or our business may be adversely impacted by retaliatory trade measures taken by China or other countries, including restricted access to components or materials used in our products or increased amounts that must be paid for our products, which could materially harm our business, financial condition, and results of operations.

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Additionally, the U.S. government recently announced new imposed controls restricting the ability to send certain products and technology related to semiconductors, semiconductor manufacturing, and supercomputing to China without an export license. These new controls also apply to certain hardware containing these specified integrated circuits. In many cases, these licenses are subject to a policy of denial and will not be issued. It is possible that additional restrictions will be put in place. These existing and future controls may impact our ability to export certain products to customers or distributors in China or other locations and restrict our ability to use certain integrated circuits in our products. The U.S. government also recently added continues to add additional entities in China to restricted party lists impacting the ability of U.S. companies to provide items to these entities. Moreover, in November 2018, the U.S. Commerce Department's Bureau of Industry and Security ("BIS") released an advance notice of proposed rulemaking to control the export of emerging technologies. This notice included "[b]iotechnology, including nanobiology; synthetic biology; genomic and genetic engineering; or neurotech" as possible areas of increased export controls. The Biden Administration has continued to provide updated lists of emerging technologies subject to national security consents, and it continues consents. These lists continue to include biotechnologies including "[g]enome and protein engineering including design tools" and "[b]iomanufacturing and bioprocessing technologies." Therefore, it is possible that our ability to export our products to customers or distributors in China may be further restricted in the future.

It is possible that the Chinese government will retaliate in response to existing or future U.S. export controls or trade restrictions in ways that could impact our business. It also is possible that additional restrictions will be put in place that could impact our ability to provide our products to customers or distributors in China or source components from China. The continued threats of tariffs, trade restrictions and trade barriers could have a generally disruptive impact on the global

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economy and, therefore, negatively impact our sales. Given the relatively fluid regulatory environment in China and the United States and uncertainty how the U.S. or foreign governments will act with respect to export controls, tariffs, international trade agreements and policies, there could be additional tax or other regulatory changes in the future. Any such changes could directly and adversely impact our financial results and results of operations.

Our international business could expose us to business, regulatory, political, operational, financial, and economic risks associated with doing business outside of the United States.

Engaging in international business inherently involves a number of difficulties and risks, including:

- required compliance with existing and changing foreign regulatory requirements and laws that are or may be applicable to our business in the future, such as the European Union's General Data Protection Regulation ("GDPR") and other data privacy requirements, labor and employment regulations, anti-competition regulations, the U.K. Bribery Act of 2010 and other anti-corruption laws, regulations relating to the use of certain hazardous substances or chemicals in commercial products, and require the collection, reuse, and recycling of waste from products we manufacture;

- required compliance with existing and changing foreign regulatory requirements and laws that are or may be applicable to our business in the future, such as the European Union's General Data Protection Regulation ("GDPR") and other data privacy requirements, labor and employment regulations, anti-competition regulations, the U.K. Bribery Act of 2010 and other anti-corruption laws, regulations relating to the use of certain hazardous substances or chemicals in commercial products, and require the collection, reuse, and recycling of waste from products we manufacture;
- required compliance with U.S. laws such as the Foreign Corrupt Practices Act, and other U.S. federal laws and trade and economic sanctions and other regulations established by the Office of Foreign Asset Control;
- export requirements and import or trade restrictions;

- laws and business practices favoring local companies;
- restrictions on both inbound and outbound cross-border investment;
- foreign currency exchange, longer payment cycles and difficulties in enforcing agreements and collecting receivables through certain foreign legal systems;
- changes in social, economic, and political conditions or in laws, regulations and policies governing foreign trade, manufacturing, research and development, and investment both domestically as well as in the other countries and jurisdictions in which we operate and into which we may sell our products including as a result of the separation of the United Kingdom from the European Union ("Brexit") and ongoing geopolitical tensions related to the political uncertainty and military actions associated with the war in Ukraine, resulting sanctions imposed by the U.S. and other countries, and retaliatory actions taken by Russia in response to such sanctions;
- potentially adverse tax consequences, tariffs, customs charges, bureaucratic requirements, and other trade barriers;
- difficulties and costs of staffing and managing foreign operations; and
- difficulties protecting, maintaining, enforcing, or procuring intellectual property rights and defending against intellectual property claims under the law and judicial systems of other countries.

- export requirements and import or trade restrictions;
- laws and business practices favoring local companies;
- restrictions on both inbound and outbound cross-border investment;
- foreign currency exchange, longer payment cycles and difficulties in enforcing agreements and collecting receivables through certain foreign legal systems;
- changes in social, economic, and political conditions or in laws, regulations and policies governing foreign trade, manufacturing, research and development, and investment both domestically as well as in the other countries and jurisdictions in which we operate and into which we may sell our products including as a result of the separation of the United Kingdom from the European Union ("Brexit") and ongoing geopolitical tensions related to the political uncertainty and military actions associated with the war in Ukraine, resulting sanctions imposed by the U.S. and other countries, and retaliatory actions taken by Russia in response to such sanctions;
- potentially adverse tax consequences, tariffs, customs charges, bureaucratic requirements, and other trade barriers;
- difficulties and costs of staffing and managing foreign operations; and

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- difficulties protecting, maintaining, enforcing, or procuring intellectual property rights and defending against intellectual property claims under the law and judicial systems of other countries.

If one or more of these risks occurs, it could require us to dedicate significant resources to remedy such occurrence, and if we are unsuccessful in finding a solution, our financial results will suffer.

Our operations involve the use of hazardous materials, and we must comply with environmental, health and safety laws, which can be expensive and may adversely affect our business, operating results and financial condition.

Our research and development and manufacturing activities involve the use of hazardous materials, including chemicals and biological materials, and some of our products include hazardous materials. Accordingly, we are subject to federal, state, local and foreign laws, regulations, and permits relating to environmental, health and safety matters, including, among others, those governing the use, storage, handling, exposure to and disposal of hazardous materials and wastes, the health and safety of our employees, and the shipment, labeling, collection, recycling, treatment, and disposal of products containing hazardous materials. Liability under environmental laws and regulations can be joint and several and without regard to fault or negligence. For example, under certain circumstances and under certain environmental laws, we could be held liable for costs relating to contamination at our or our predecessors' past or present facilities and at third-party waste disposal sites. We could also be held liable for damages arising out of human exposure to hazardous materials. There can be no assurance that violations of environmental, health and safety laws will not occur as a result of human error, accident, equipment failure or other causes. The failure to comply with past, present or future laws could result in the imposition of substantial fines and penalties, remediation costs, property damage and personal injury claims, investigations, the suspension of production or product sales, loss of permits or a cessation of operations. Any of these events could harm our business, operating results, and financial condition. We also expect that our operations will be affected by new environmental, health and safety laws and regulations on an ongoing basis, or more stringent enforcement of existing laws and regulations. New laws or changes to existing laws may result in additional costs and may increase penalties associated with violations or require us to change the content of our products or how we manufacture them, which could have a material adverse effect on our business, operating results, and financial condition.

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Ethical, legal, privacy, data protection and social concerns or governmental restrictions surrounding the use of genetic information could reduce demand for our technology.

Our products may be used to provide genetic information about humans, agricultural crops and other living organisms. The information obtained from our products could be used in a variety of applications which may have underlying ethical, legal, privacy, data protection and social concerns, including the genetic engineering or modification of agricultural products or testing for genetic predisposition for certain medical conditions. Governmental authorities could, for safety, social or other purposes, call for limits on or regulation of the use of genetic testing, and may consider or adopt such regulations or other restrictions. Such concerns or governmental restrictions could limit the use of our products or be costly and burdensome to comply with, and actual or perceived violations of any such restrictions may lead to the imposition of substantial fines and penalties, remediation costs, claims and litigation, regulatory investigations and proceedings, and other liability, any of which could have a material adverse effect on our business, financial condition, and results of operations.

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Regulations related to conflict minerals has caused us to incur, and will continue to cause us to incur, additional expenses and could limit the supply and increase the costs of certain materials used in the manufacture of our products.

We are subject to requirements under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 that require us to conduct diligence and report on whether or not our products contain conflict minerals. The implementation of these requirements could adversely affect the sourcing, availability and pricing of the materials used in the manufacture of components used in our products. Furthermore, the complex nature of our products requires components and materials that may be available only from a limited number of sources and, in some cases, from only a single source. We have incurred, and will continue to incur, additional costs to comply with the disclosure requirements, including costs related to conducting diligence procedures to determine the sources of conflict minerals that may be used or necessary to the production of our products and, if applicable, potential changes to components, processes, or sources of supply as a consequence of such verification activities. We may face reputational harm if we determine that certain of our products contain minerals that are not determined to be conflict free or if we are unable to alter our processes or sources of supply to avoid using such materials. In such circumstances, the reputational harm could materially and adversely affect our business, financial condition, or results of operations.

Risks Related to Owning Our Common Stock

The price of our common stock has been, is, and may continue to be, highly volatile, and you may be unable to sell your shares at or above the price you paid to acquire them.

The market price of our common stock is highly volatile, and we expect it to continue to be volatile for the foreseeable future in response to many risk factors listed in this section, and others beyond our control, including:

- actual or anticipated fluctuations in our financial condition and operating results;
- announcements of new products, technological innovations or strategic partnerships by us or our competitors;
- announcements by us, our customers, partners, or suppliers relating directly or indirectly to our products, services or technologies;
- overall conditions in our industry and market;
- addition or loss of significant customers;
- changes in laws or regulations applicable to our products;

- actual or anticipated changes in our growth rate relative to our competitors;
- announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures, capital commitments or achievement of significant milestones;
- additions or departures of key personnel;
- competition from existing products or new products that may emerge;
- issuance of new or updated research or reports by securities analysts;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- disputes or other developments related to proprietary rights, including patents, litigation matters or our ability to obtain intellectual property protection for our technologies;
- announcement or expectation of additional financing efforts;
- sales of our common stock by us or our stockholders;
- stock price and volume fluctuations attributable to inconsistent trading volume levels of our shares;

- reports, guidance and ratings issued by securities or industry analysts;
- operating results below the expectations of securities analysts or investors; and

- actual or anticipated fluctuations in our financial condition and operating results;
- announcements of new products, technological innovations or strategic partnerships by us or our competitors;
- announcements by us, our customers, partners, or suppliers relating directly or indirectly to our products, services or technologies;
- overall conditions in our industry and market;
- addition or loss of significant customers;
- changes in laws or regulations applicable to our products;
- actual or anticipated changes in our growth rate relative to our competitors;
- announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures, capital commitments or achievement of significant milestones;
- additions or departures of key personnel;
- competition from existing products or new products that may emerge;
- issuance of new or updated research or reports by securities analysts;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- disputes or other developments related to proprietary rights, including patents, litigation matters or our ability to obtain intellectual property protection for our technologies;
- announcement or expectation of additional financing efforts;
- sales of our common stock by us or our stockholders;

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- general economic and market conditions, which could be impacted by various events including health epidemics or pandemics, interest rate fluctuations, increases in fuel prices, foreign currency fluctuations, international tariffs, acts of terrorism, hostilities or the perception that hostilities may be imminent, military conflict and acts of war, including further political uncertainty and military actions associated with the war in Ukraine and the related response, including sanctions or other restrictive actions, by the United States and/or other countries.
- stock price and volume fluctuations attributable to inconsistent trading volume levels of our shares;
- reports, guidance and ratings issued by securities or industry analysts;
- operating results below the expectations of securities analysts or investors; and
- general economic and market conditions, which could be impacted by various events including COVID-19 or interest rate fluctuations, increases in fuel prices, foreign currency fluctuations, international tariffs, acts of terrorism, hostilities or the perception that hostilities may be imminent, military conflict and acts of war, including further political uncertainty and military actions associated with the war in Ukraine and the related response, including sanctions or other restrictive actions, by the United States and/or other countries.

If any of the foregoing occurs, it would cause our stock price or trading volume to decline. Stock markets in general and the market for companies in our industry in particular have experienced price and volume fluctuations, which have been were exacerbated by the COVID-19 pandemic, and current macroeconomic trends and geopolitical events, and have affected and continue to affect the market prices of equity securities of many companies. These fluctuations often have been unrelated or disproportionate to the operating performance of those companies. These broad market and industry fluctuations, as well as general economic, political and market conditions such as recessions, interest rate changes or international currency fluctuations, may negatively impact the market price of our common stock. You may not realize any return on your investment in us and may lose some or all of your investment. In the past, companies that have experienced volatility in the market price of their stock have been subject to securities class action litigation. We

have been a party to this type of litigation in the past and may be the target of this type of litigation again in the future. Securities litigation against us could result in substantial costs and divert our management's attention from other business concerns, which could seriously harm our business.

Sales of substantial amounts of our common stock in the public markets, or the perception that such sales might occur, could reduce the market price that our common stock might otherwise attain and may dilute your voting power and your ownership interest in us.

Sales of a substantial number of shares of our common stock in the public market, or the perception that such sales could occur, could adversely affect the market price of our common stock and may make it more difficult for existing stockholders to sell their common stock at a time and price that they deem appropriate and may dilute their voting power and ownership interest in us.

In addition, if our existing stockholders sell, or indicate an intent to sell, a large number of shares of our common stock in the public market, it could cause our stock price to fall, fall, particularly if such sales occur over a short period time (for example, following delivery of shares upon achievement of milestones in our acquisition agreements). We may also issue shares of common stock or securities convertible into our common stock in connection with a financing, acquisition, our equity incentive plans, or otherwise. Any such issuances would result in dilution to our existing stockholders and the market price of our common stock may be adversely affected.

In September 2021, in connection with the closing of the Omniome Merger, we completed a private placement of an aggregate of 11,214,953 shares of our common stock, at a price of \$26.75 per share, for aggregate gross proceeds of approximately \$300 million (the "Private Placement") and registered the Private Placement shares for resale on a registration statement on Form S-3. The Private Placement Investors may sell any or all of their shares pursuant to the registration statement from time to time.

On January 27, 2023, we issued and sold an aggregate of 20,125,000 shares of our common stock at a purchase price of \$10.00 per share pursuant to an automatic shelf registration statement filed on Form S-3 (File No. 333-249999) with the Securities and Exchange Commission, resulting in aggregate gross proceeds of approximately \$201.3 million. The investors may sell any or all of their shares from time to time.

Concentration of ownership by our principal stockholders may result in control by such stockholders of the composition of our board of directors.

Our existing principal stockholders, executive officers, directors, and their affiliates beneficially own a significant number of our outstanding shares of common stock. In addition, such parties may acquire additional control by purchasing stock that we issue in connection with our future fundraising efforts. These parties may now and in the future be able to exercise a significant level of control over all matters requiring stockholder approval, including the election of directors. This control could have the effect of delaying or preventing a change of control of our company or changes in management and will make the approval of certain transactions difficult or impossible without the support of these stockholders.

Anti-takeover provisions in our charter documents and under Delaware law could make an acquisition of us, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management and limit the market price of our common stock.

Provisions in our amended and restated certificate of incorporation and amended and restated bylaws may have the effect of delaying or preventing a change of control or changes in our management. Our amended and restated certificate of incorporation and amended and restated bylaws include provisions that:

- authorize our board of directors to issue, without further action by the stockholders, up to 50,000,000 shares of undesignated preferred stock and up to approximately 1,000,000,000 shares of authorized but unissued shares of common stock;
- require that any action to be taken by our stockholders be effected at a duly called annual or special meeting and not by written consent;

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- specify that special meetings of our stockholders can be called only by our board of directors, the Chair of the Board, the Chief Executive Officer or the President;
- authorize our board of directors to issue, without further action by the stockholders, up to 50,000,000 shares of undesignated preferred stock and up to approximately 1,000,000,000 shares of authorized but unissued shares of common stock;
- require that any action to be taken by our stockholders be effected at a duly called annual or special meeting and not by written consent;

- specify that special meetings of our stockholders can be called only by our board of directors, the Chair of the Board, the Chief Executive Officer or the President;
 - establish advance notice procedures for stockholder approvals to be brought before an annual meeting of our stockholders, including proposed nominations of persons for election to our board of directors;
 - establish that our board of directors is divided into three classes, Class I, Class II and Class III, with each class serving staggered terms;
 - provide that our directors may be removed only for cause; and
 - provide that vacancies on our board of directors may be filled only by a majority of directors then in office, even though less than a quorum.
- establish that our board of directors is divided into three classes, Class I, Class II and Class III, with each class serving staggered terms;
 - provide that our directors may be removed only for cause; and
 - provide that vacancies on our board of directors may be filled only by a majority of directors then in office, even though less than a quorum.

These provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management. In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which limits the ability of stockholders owning in excess of 15% of our outstanding voting stock to merge or combine with us.

Our amended and restated bylaws designate a state or federal court located within the State of Delaware as the exclusive forum for certain stockholder litigation matters, and also provide that the federal district courts will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act of 1933, as amended, each of which could limit our stockholders' ability to choose the judicial forum for disputes with us or our directors, officers, stockholders, or employees.

Our amended and restated bylaws provide that unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware (or, if the Court of Chancery does not have jurisdiction, another State court in Delaware or the federal district court for the District of Delaware) will, to the fullest extent permitted by law, be the sole and exclusive forum for: (i) any derivative action or proceeding brought on our behalf; (ii) any action asserting a claim of breach of a fiduciary duty owed by any of our current or former directors, stockholders, officers, or other employees to us or our stockholders; (iii) any action arising pursuant to any provision of the Delaware General Corporation Law; (iv) any action to interpret, apply, enforce or determine the validity of our amended and restated certificate of incorporation or our amended and restated bylaws; or (v) any action asserting a claim governed by the internal affairs doctrine, except as to each of (i) through (v) above, for any claim as to which such court determines that there is an indispensable party not subject to the jurisdiction of such court.

Section 22 of the Securities Act creates concurrent jurisdiction for federal and state courts over all such Securities Act actions. Accordingly, both state and federal courts have jurisdiction to entertain such claims. To prevent having to litigate claims in multiple jurisdictions and the threat of inconsistent or contrary rulings by different courts, among other considerations, our amended and restated bylaws also provide that, unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States of America will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act including, without limitation and for the avoidance of doubt, any auditor, underwriter, expert, control person or other defendant.

Any person or entity purchasing, holding or otherwise acquiring any interest in any of our securities shall be deemed to have notice of and consented to the foregoing bylaw provisions. Although we believe these exclusive forum provisions benefit us by providing increased consistency in the application of Delaware law and federal securities laws in the types of lawsuits to which each applies, the exclusive forum provisions may limit a stockholder's ability to bring a claim in a judicial forum of its choosing for disputes with us or any of our directors, stockholders, officers or other employees, which may discourage lawsuits with respect to such claims against us and our current and former directors, stockholders, officers or other employees. In addition, a stockholder that is unable to bring a claim in the judicial forum of its choosing may be required to incur additional costs in the pursuit of actions which are subject to the exclusive forum provisions described above. Our stockholders will not be deemed to have waived our compliance with the federal securities laws and the rules and regulations thereunder as a result of our exclusive forum provisions. Further, in the event a court finds either exclusive forum provision contained in our bylaws to be unenforceable or inapplicable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could harm our results of operations.

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Our large number of authorized but unissued shares of common stock may potentially dilute existing stockholders' stockholdings.

We have a significant number of authorized but unissued shares of common stock. Our board of directors may issue shares of common stock from this authorized but unissued pool from time to time without stockholder approval, resulting in the dilution of our existing stockholders.

We do not intend to pay dividends for the foreseeable future.

We have never declared or paid any dividends on our common stock and do not intend to pay any dividends in the foreseeable future. We anticipate that we will retain all of our future earnings for use in the operation of our business and for general corporate purposes. Any determination to pay dividends in the future will be at the discretion of our board of directors. Accordingly, investors must rely on sales of their common stock after price appreciation, which may never occur, as the only way to realize any future gains on their investments.

Risks Related to Our Notes

We may not have the ability to raise the funds necessary to settle conversions of the Notes in cash or to repurchase the Notes upon a fundamental change, and our future debt may contain limitations on our ability to pay cash upon conversion or repurchase of the Notes.

In February 2021,

As of December 31, 2023, we issued \$900.0 million in had outstanding approximately \$459.0 million aggregate principal amount of 1.50% Convertible Senior our 2028 Notes due 2028, which we refer to as the and \$441.0 million aggregate principal amount of our 2030 Notes. The 2028 Notes will mature on February 15, 2028, subject to earlier conversion, redemption or repurchase, including upon a fundamental change. The 2030 Notes will mature on December 15, 2030, subject to earlier conversion, redemption or repurchase, including upon a fundamental change. The 2030 Notes and 2028 Notes are collectively referred to as the Notes.

Holders of the Notes will have the right to require us to repurchase all or a portion of their Notes upon the occurrence of a fundamental change before the maturity date at a repurchase price equal to 100% of the principal amount of the Notes to be repurchased, plus unpaid interest to, but excluding, the maturity date. In addition, upon conversion of the Notes, unless we elect to deliver solely shares of our common stock to settle such conversion (other than paying cash in lieu of delivering any fractional share), we will be required to settle a portion or all of our conversion obligation in cash in respect of the Notes being converted. Moreover, we will be required to repay the Notes in cash at their maturity unless earlier converted, redeemed, or repurchased. However, we may not have enough available cash or be able to obtain financing at the time we are required to make repurchases of Notes surrendered therefor or pay cash with respect to Notes being converted or at their maturity.

In addition, our ability to repurchase Notes or to pay cash upon conversions of Notes or at their maturity may be limited by law, regulatory authority or agreements governing our future indebtedness. Our failure to repurchase Notes at a time when the repurchase is required by the indenture or to pay cash upon conversions of Notes or at their maturity as required by the indenture would constitute a default under the indenture. A default under the indenture or the fundamental change itself could also lead to a default under agreements governing our future indebtedness. Moreover, the occurrence of a fundamental change under the indenture could constitute an event of default under any such agreement. If the payment of the related indebtedness were to be accelerated after any applicable notice or grace periods, we may not have sufficient funds to repay the indebtedness or to pay cash amounts due upon conversion, upon required repurchase or at maturity of the Notes.

If the Notes are converted, it may adversely affect our financial condition and operating results.

Holders of the Notes are entitled to convert their Notes at any time at their option. If one or more holders elect to convert their Notes, unless we elect to satisfy our conversion obligation by delivering solely shares of our common stock (other than paying cash in lieu of delivering any fractional share), we would be required to settle a portion or all of our conversion obligation in cash, which could adversely affect our liquidity.

In addition, issuances of shares of common stock upon conversion of our Notes could depress the market price of our common stock and impair our ability to raise capital through the sale of additional equity securities. The existence of the Notes may encourage short selling by market participants because the conversion of the Notes could depress the price of our common stock.

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General Risk Factors

Unfavorable global economic or political conditions could adversely affect our business, financial condition or results of operations.

General conditions in the global economy and in the global financial markets could adversely affect our results of operations, including the potential effects from the ongoing COVID-19 pandemic or other similar outbreaks as discussed above, and the overall demand for nucleic acid sequencing products may be particularly vulnerable to unfavorable economic conditions. A global financial crisis, inflation or a global or regional political disruption, as well as acts of terrorism, hostilities, military conflict and acts of war, including any further political uncertainty and military actions in the Middle East associated with the Israel and Hamas conflict and the war in Ukraine, and as well as the related response, responses, could cause extreme volatility in the capital and credit markets. A severe or prolonged economic downturn or political disruption could result in a variety of risks to our business, including weakened demand for our products and our ability to raise additional capital when needed on acceptable terms, if at all. A weak or declining economy or political disruption could also strain our manufacturers or suppliers, possibly resulting in supply disruption, or cause our customers to delay making payments for our product and services. An impairment in value of our tangible or intangible assets could also be recorded as a result of weaker economic conditions. Any of the foregoing could harm our business and we cannot anticipate all of the ways in which the political or economic climate and financial market conditions could adversely impact our business.

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Delivery of our products could be delayed or disrupted by factors beyond our control, and we could lose customers as a result.

We rely on third-party carriers for the timely delivery of our products. As a result, we are subject to carrier disruptions and increased costs that are beyond our control. Any failure to deliver products to our customers in a safe and timely manner may damage our reputation and brand and could cause us to lose customers. If our relationship with any of these third-party carriers is terminated or impaired or if any of these carriers are unable to deliver our products, the delivery of our products by our customers may be delayed, which could harm our business and financial results. The failure to deliver our products in a safe and timely manner may harm our relationship with our customers, increase our costs and otherwise disrupt our operations.

Doing business internationally creates operational and financial risks for our business.

We currently conduct operations in various countries and jurisdictions, and continue to expand to new international jurisdictions as part of our growth strategy and have experienced an increasing concentration of sales in certain regions outside the U.S. We sell directly and through distribution partners throughout Europe, the Asia-Pacific region, Mexico, Brazil, and South Africa and have a significant portion of our sales and customer support personnel in Europe and the Asia-Pacific region. As a result, we or our distribution partners may be subject to additional regulations and increased diversion of management time and efforts. Conducting and launching operations on an international scale requires close coordination of activities across multiple jurisdictions and time zones and consumes significant management resources. If we fail to coordinate and manage these activities effectively, our business, financial condition or results of operations could be materially and adversely affected and failure to comply with laws and regulations applicable to business operations in foreign jurisdictions may also subject us to significant liabilities and other penalties. International operations entail a variety of other risks, including, without limitation:

- potential limits to travel as a result of COVID-19 or other epidemics or pandemics;

- challenges in staffing limits to travel as a result of the COVID-19 pandemic or other epidemics; and managing foreign operations;

- potentially longer sales cycles and more time required to engage and educate customers on the benefits of our platform outside of the United States;

- the potential need for localized software and documentation;

- reduced protection for intellectual property rights in some countries and practical difficulties of enforcing intellectual property and contract rights abroad;

- defending against intellectual property claims in other countries;

- challenges in staffing and managing foreign operations;

- potentially longer sales cycles and more time required to engage and educate customers on the benefits of our platform outside of the United States;

- the potential need for localized software and documentation;

- reduced protection for intellectual property rights in some countries and practical difficulties of enforcing intellectual property and contract rights abroad;

- defending against intellectual property claims in other countries;

- restrictions on both inbound and outbound cross-border investment, including enhanced oversight by the Committee on Foreign Investment in the United States ("CFIUS") and substantial restrictions on investment from China;

- U.S. and foreign government trade restrictions, including those which may impose restrictions on the importation, exportation, re-exportation, sale, shipment or other transfer of programming, technology, components, and/or services to foreign persons;

- changes in diplomatic and trade relationships, including new tariffs, trade protection measures, import or export licensing requirements, trade embargoes, sanctions, and other trade barriers;

- tariffs imposed by the U.S. on goods from other countries and tariffs imposed by other countries on U.S. goods, including the tariffs by the U.S. government on various imports from China, Canada, Mexico, and the European Union ("E.U.") and by the governments of these jurisdictions on certain U.S. goods, and any other possible tariffs that may be imposed on products such as ours, the scope and duration of which, if implemented, remains uncertain;
- deterioration of political relations between the U.S. and Russia, China, Japan, Korea, Canada, the United Kingdom ("U.K."), and the E.U., which could have a material adverse effect on our sales and operations in these countries;
- changes in social, political, and economic conditions or in laws, regulations and policies governing foreign trade, manufacturing, development, and investment both domestically as well as in the other countries and jurisdictions into which we sell our products, including as a result of the withdrawal of the U.K. from the E.U.;
- difficulties in obtaining export licenses or in overcoming other trade barriers and restrictions resulting in delivery delays;
- fluctuations in currency exchange rates and the related effect on our results of operations;
- increased financial accounting and reporting burdens and complexities;
- disruptions to global trade due to disease outbreaks or conflicts;
- potential increases on tariffs or restrictions on trade generally; and

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- U.S. and foreign government trade restrictions, including those which may impose restrictions on the importation, exportation, re-exportation, sale, shipment or other transfer of programming, technology, components, and/or services to foreign persons;
 - changes in diplomatic and trade relationships, including new tariffs, trade protection measures, import or export licensing requirements, trade embargoes, sanctions, and other trade barriers;
- tariffs imposed by the U.S. on goods from other countries and tariffs imposed by other countries on U.S. goods, including the tariffs by the U.S. government on various imports from China, Canada, Mexico, and the European Union ("E.U.") and by the governments of these jurisdictions on certain U.S. goods, and any other possible tariffs that may be imposed on products such as ours, the scope and duration of which, if implemented, remains uncertain;
- deterioration of political relations between the U.S. and Russia, China, Japan, Korea, Canada, the United Kingdom ("U.K."), and the E.U., which could have a material adverse effect on our sales and operations in these countries;
- changes in social, political, and economic conditions or in laws, regulations and policies governing foreign trade, manufacturing, development, and investment both domestically as well as in the other countries and jurisdictions into which we sell our products, including as a result of the withdrawal of the U.K. from the E.U.;
- difficulties in obtaining export licenses or in overcoming other trade barriers and restrictions resulting in delivery delays;
- fluctuations in currency exchange rates and the related effect on our results of operations;
- increased financial accounting and reporting burdens and complexities;
- disruptions to global trade due to disease outbreaks or conflicts;
- potential increases on tariffs or restrictions on trade generally; and
- significant taxes or other burdens of complying with a variety of foreign laws and regulations, including laws and regulations relating to privacy and data protection such as the E.U. General Data Protection Regulation which took effect in the E.U. in 2018.

In conducting our international operations, we are subject to U.S. laws relating to our international activities, such as the Foreign Corrupt Practices Act of 1977, as well as foreign laws relating to our activities in other countries, such as the United Kingdom Bribery Act of 2010. Additionally, the inclusion of one of our foreign customers on any U.S. Government

sanctioned persons list, including but not limited to the U.S. Department of Commerce's List of Denied Persons and the U.S. Department of Treasury's List of Specially Designated Nationals and Blocked Persons List, could be material to our earnings. Failure to comply with these laws may subject us to claims or financial and/or other penalties in the United States and/or foreign countries that could materially and adversely impact our operations or financial condition. These risks have become increasingly prevalent as we have expanded our sales into countries that are generally recognized as having a higher risk of corruption.

We face risks related to the current global economic environment, which could delay or prevent our customers from purchasing our products, which could in turn harm our business, financial condition, and results of operations. The state of the global economy continues to be uncertain. The current global economic conditions and uncertain credit markets and concerns regarding the availability of credit pose a risk that could impact customer demand for our products, as well as our ability to manage normal commercial relationships with our customers, suppliers, and creditors, including financial institutions. If the current global economic environment deteriorates, our business could be negatively affected.

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Moreover, changes in the value of the relevant currencies may affect the cost of certain items required in our operations. Changes in currency exchange rates may also affect the relative prices at which we are able to sell products in the same market. Our revenue from international customers may be negatively impacted as increases in the U.S. dollar relative to our international customers' local currencies could make our products more expensive, impacting our ability to compete or as a result of financial or other instability in such locations which could result in decreased sales of our products. Our costs of materials from international suppliers may also increase as the value of the U.S. dollar decreases relative to their local currency. Foreign policies and actions regarding currency valuation could result in actions by the United States and other countries to offset the effects of such fluctuations. Such actions may materially and adversely impact our financial condition and results of operations.

Violations of complex foreign and U.S. laws and regulations could result in fines and penalties, criminal sanctions against us, our officers, or our employees, prohibitions on the conduct of our business and on our ability to offer our products and services in one or more countries, and could also materially affect our brand, our international growth efforts, our ability to attract and retain employees, our business, and our operating results. Even if we implement policies or procedures designed to ensure compliance with these laws and regulations, there can be no assurance that our distribution partners, our employees, contractors, or agents will not violate our policies and subject us to potential claims or penalties.

If we fail to maintain proper and effective internal controls, our ability to produce accurate financial statements on a timely basis could be impaired, which would adversely affect our business and our stock price.

Ensuring that we have adequate internal financial and accounting controls and procedures in place to produce accurate financial statements on a timely basis is a costly and time-consuming effort that needs to be evaluated frequently. We may in the future discover areas of our internal financial and accounting controls and procedures that need improvement. Operating as a public company requires sufficient resources within the accounting and finance functions in order to produce timely financial information, ensure the level of segregation of duties, and maintain adequate internal control over financial reporting customary for a U.S. public company.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with U.S. GAAP. Our management does not expect that our internal control over financial reporting will prevent or detect all errors and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud, if any, within our company will have been detected.

Pursuant to Section 404 of the Sarbanes-Oxley Act, we perform periodic evaluations of our internal control over financial reporting. While we have in the past performed this evaluation and concluded that our internal control over financial reporting was operating effectively, there can be no assurance that in the future material weaknesses or significant deficiencies will not exist or otherwise be discovered. In addition, if we are unable to produce accurate financial statements on a timely basis, investors could lose confidence in the reliability of our financial statements, which could cause the market price of our common stock to decline and make it more difficult for us to finance our operations and growth.

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Our business could be negatively impacted by changes in the United States political environment.

There is significant ongoing uncertainty with respect to potential legislation, regulation and government policy at the federal level, as well as the state and local levels. Any such changes could significantly impact our business as well as the markets in which we compete. Specific legislative and regulatory proposals discussed during election campaigns and more recently that might materially impact us include, but are not limited to, changes to spending priorities and potential reductions in research funding. Uncertainty about U.S. government funding has posed, and may continue to pose, a risk as customers may choose to postpone or reduce spending in response to actual or anticipated restraints on funding. To the extent changes in the political environment have a negative impact on us or on our markets, our business, results of operation and financial condition could be materially and adversely impacted in the future.

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Disruption of critical information technology systems or material breaches in the security of our systems could harm our business, customer relations and financial condition.

Information technology ("IT") helps us to operate efficiently, interface with customers, maintain financial accuracy and efficiently and accurately produce our financial statements. IT systems are used extensively in virtually all aspects of our business, including in our products, sales forecast, order fulfillment and billing, customer service, logistics, and management of data from running samples on our products. Our success depends, in part, on the continued and uninterrupted performance of our IT systems. Our IT systems, including those used in our products, may be vulnerable to damage from a variety of sources, including telecommunications or network failures, power loss, natural disasters, human acts, computer viruses, ransomware, computer denial-of-service attacks, unauthorized access to customer or employee data or company trade secrets, and other attempts to harm our systems. Furthermore, there may be a heightened risk of potential cybersecurity incidents and security breaches to which we could be vulnerable by state-sponsored or affiliated actors or others in connection with the political uncertainty and military actions in the Middle East associated with the Israel and Hamas conflict and the war in Ukraine. Certain of our systems are not redundant, and our disaster recovery planning is not sufficient for every eventuality. Despite any precautions we may take, such problems could result in, among other consequences, disruption of our operations, which could harm our reputation and financial results.

If we do not allocate and effectively manage the resources necessary to build and sustain the proper IT infrastructure, including those used in our products, we could be subject to transaction errors, processing inefficiencies, loss of customers, business disruptions or loss of or damage to intellectual property. If our data management systems do not effectively collect, store, process and report relevant data for the operation of our business, whether due to equipment malfunction or constraints, software deficiencies or human error, our ability to effectively plan, forecast and execute our business plan and comply with applicable laws and regulations will be impaired, perhaps materially. Any such impairment could materially and adversely affect our reputation, financial condition, results of operations, cash flows and the timeliness with which we report our internal and external operating results.

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Security breaches and other disruptions could compromise our information and expose us to liability, which would cause our business and reputation to suffer.

In the ordinary course of our business, we collect and store sensitive data, including intellectual property, our proprietary business information and that of our customers, suppliers and business partners, and personally identifiable personal information of our customers and employees, in our data centers and on our networks. The secure processing, maintenance and transmission of this information is critical to our operations. Despite our security measures, our IT infrastructure may be vulnerable to attacks by hackers, computer viruses, malicious codes, ransomware, unauthorized access attempts, and cyber- or phishing-attacks, or breached or otherwise disrupted due to employee error, malfeasance, faulty password management or other disruptions. Third parties may attempt to fraudulently induce employees or other persons into disclosing usernames, passwords or other sensitive information, which may in turn be used to access our IT systems, commit identity theft or carry out other unauthorized or illegal activities. Any such breach or incident could compromise our systems and networks and the information stored or otherwise processed there could be accessed, publicly disclosed, lost, stolen or otherwise processed in an unauthorized manner. We engage third-party vendors and service providers to store and otherwise process some of our data, including sensitive and personal information. Our vendors and service providers may also be the targets of the risks described above, including cyberattacks, cyber-attacks, malicious software, ransomware, phishing schemes, and fraud. Our ability to monitor our vendors and service providers' data security is limited, and, in any event, third parties may be able to circumvent those security measures, resulting in the unauthorized access to, misuse, disclosure, loss or destruction of our data, including sensitive and personal information, and disruption of our or third-party service providers' systems. We and our third-party service providers may face difficulties in identifying, or promptly responding to, potential security breaches and other instances of unauthorized access to, or disclosure, other processing, or other loss or unavailability of, information. Any hacking or other attack on our or our third-party service providers' or vendors' systems, and any unauthorized access to, or disclosure, other processing, or other loss or unavailability of, information suffered by us or our third-party service providers or vendors, or the perception that any of these have occurred, could result in legal claims or proceedings, loss of intellectual property, liability under laws that protect the privacy of personal information, negative publicity, disruption of our operations and damage to our reputation, and data integrity issues, which could divert our management's attention from the operation of our business and materially and adversely affect our business, revenues and competitive position. Moreover, we may need to increase our efforts to train our personnel to detect and defend against cyber- or phishing-attacks, which are becoming more sophisticated and frequent, and we may need to implement additional

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protective measures to reduce the risk of potential security breaches and security incidents, which could cause us to incur significant additional expenses. Retaliatory acts by Russia in response to Western sanctions or otherwise in connection with the war in Ukraine could include cyber attacks cyber-attacks that could disrupt the economy generally or that may either directly or indirectly impact our operations specifically.

In addition, our insurance may be insufficient to cover our losses resulting from cyber-attacks, breaches, or other interruptions, and any incidents may result in loss of, or increased costs of, such insurance. The successful assertion of one or more large claims against us that exceed available insurance coverage, the occurrence of changes in our insurance policies, including premium increases or the imposition of large deductible or co-insurance requirements, or denials of coverage, could have a material adverse effect on our business, including our financial condition, results of operations and reputation.

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Our use of artificial intelligence and machine learning technologies may result in reputational harm or liability.

We have incorporated and may continue to incorporate additional artificial intelligence and machine learning, or AIML, technologies into our sequencing platforms, marketing programs, and analysis software, including Revio and otherwise within our business, and these solutions and features are advantageous to describing, enhancing, and maximizing the capabilities of our differentiated technologies and to our future growth over time. We rely and expect to rely on AIML technologies such as basecalling, variant calling, epigenetic analysis and tertiary analysis, but there can be no assurance that we will realize the desired or anticipated benefits from AIML or any at all. We may also fail to properly implement or utilize AIML technologies. Our competitors or other third parties may incorporate AIML into their products, platforms, software and services or otherwise within their business more quickly or more successfully than us, which could impair our ability to compete effectively and adversely affect our results of operations. Additionally, our use of AIML technologies may expose us to additional claims, demands and proceedings by private parties and regulatory authorities and subject us to legal liability as well as brand and reputational harm. For example, if output from AIML technologies or that they assist in producing are or are alleged to be deficient, inaccurate, or biased, or for such output, or such technologies or their development or deployment, including the collection, use, or other processing of data used to train or create such AIML technologies, to alleged to infringe upon or to have misappropriated third-party intellectual property rights or to violate applicable laws, regulations, or other actual or asserted legal obligations to which we are or may become subject, then our business, financial condition, and results of operations may be adversely affected. The legal, regulatory, and policy environments around AIML are evolving rapidly, and we may become subject to new and evolving legal and other obligations. These and other developments may require us to make significant changes to our use of AIML, including by limiting or restricting our use of AIML, and may require us to make significant changes to our policies and practices, which may necessitate expenditure of significant time, expense, and other resources, AIML also presents emerging ethical issues, and if our use of AIML becomes controversial, we may experience brand or reputational harm.

We are currently subject to, and may in the future become subject to additional, U.S. federal and state laws and regulations imposing obligations on how we collect, store and process personal information. Our actual or perceived failure to comply with such obligations could harm our business. Ensuring compliance with such laws could also impair our efforts to maintain and expand our future customer base, and thereby decrease our revenue.

In the ordinary course of our business, we currently, and in the future will, collect, store, transfer, use or process sensitive data, including personally identifiable personal information of employees, and intellectual property and proprietary business information owned or controlled by ourselves and other parties. The secure processing, storage, maintenance, and transmission of this critical information are vital to our operations and business strategy. We are, and may increasingly become, subject to various laws and regulations, as well as contractual obligations, relating to data privacy and security in the jurisdictions in which we operate. The regulatory environment related to data privacy and security is increasingly rigorous, with new and constantly changing requirements applicable to our business, and enforcement practices are likely to remain uncertain for the foreseeable future. These laws and regulations may be interpreted and applied differently over time and from jurisdiction to jurisdiction, and it is possible that they will be interpreted and applied in ways that may have a material adverse effect on our business, financial condition, results of operations and prospects.

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In the United States, various federal and state regulators, including governmental agencies like the Consumer Financial Protection Bureau and the Federal Trade Commission, have adopted, or are considering adopting, laws and regulations concerning personal information and data security. Certain state laws may be more stringent or broader in scope, or offer greater individual rights, with respect to personal information than federal, international or other state laws, and such laws may differ from each other, all of which may complicate compliance efforts. For example, the California Consumer Privacy Act ("CCPA"), which increases privacy rights for California residents and imposes obligations on companies that process their personal information, came into effect on January 1, 2020. Among other things, the CCPA requires covered companies to provide new disclosures to California consumers and provide such consumers new data protection and privacy rights, including the ability to opt-out of certain sales of personal information. The CCPA provides for civil penalties for violations, as well as a private right of action for certain data breaches that result in the loss of personal information. This private right of action may increase the likelihood of, and risks associated with, data breach litigation. In November 2020, California also passed the California Privacy Rights Act, or ("CPRA"), which significantly expands expanded the CCPA as of January 1, 2023, including by introducing additional obligations such as data minimization and storage limitations and granting additional rights to consumers, among others. The enactment of the CCPA has prompted similar legislative developments in other states, such as Virginia, and numerous other states have proposed, and in certain cases enacted, legislation relating to privacy and data security, many of which in March 2021 enacted a Consumer Data Protection Act that is effective as of January 1, 2023, are similar to the CCPA and Colorado, which in June 2021 enacted a Colorado Privacy Act that is effective as of July 1, 2023, Utah, which in March 2022 enacted a Utah Consumer Privacy Act that is effective as of July 1, 2023, and Connecticut, which in May 2022 enacted a similar law, An Act Concerning Personal Data Privacy and Online Monitoring, that is effective as of July 1, 2023. CPRA. Similar laws are being considered by other state legislatures. In addition, laws in all 50 U.S. states require businesses to provide notice to consumers whose personal information has been disclosed as a result of a data breach. State laws are changing rapidly and there is discussion in the U.S. Congress of a new comprehensive federal data privacy law to which we would become subject if it is enacted. law. These and future laws and regulations may increase our compliance costs and potential liability.

Furthermore, regulations promulgated pursuant to the Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), establish privacy and security standards that limit the use and disclosure of individually identifiable health information (known as "protected health information") and require the implementation of administrative, physical and technological safeguards to protect the privacy of protected health information and ensure the confidentiality, integrity and availability of electronic protected health information. Determining whether protected health information has been handled in compliance with applicable privacy standards and our contractual obligations can require complex factual and statistical analyses and may be subject to changing interpretation. Although we take measures to protect sensitive data from unauthorized access, use or disclosure, our information technology and infrastructure may be vulnerable to attacks by hackers or viruses or disrupted, breached or otherwise compromised due to employee error, malfeasance or other malicious or inadvertent disruptions. Any such breach or interruption disruption could compromise our networks and the information stored there could be accessed, by unauthorized parties, manipulated, publicly disclosed, lost, stolen, made unavailable, or stolen, otherwise processed without authorization. Any such disruption, access, breach, unavailability, theft, loss or other loss unauthorized processing of information, or the perception that any of these has occurred could result in legal claims or

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proceedings, and liability under federal or state laws that protect the privacy of personal information, such as the HIPAA, the Health Information Technology for Economic and Clinical Health Act, ("HITECH"), and regulatory penalties. Notice of breaches must be made to affected individuals, the Secretary of the Department of Health and Human Services, and for extensive breaches, notice may need to be made to the media or **State Attorneys General, state attorneys general**. Such a notice could harm our reputation and our ability to compete.

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While we have in place formal policies and procedures related to the storage, collection, and processing of information, and have conducted data privacy audits, we continue to evaluate our compliance needs, including the need to conduct additional internal and external data privacy audits or adopt additional policies and procedures, to ensure our compliance with all applicable data protection laws and regulations. Additionally, we do not currently have policies and procedures in place for assessing our third-party vendors' compliance with applicable data protection laws and regulations. All of these evolving compliance and operational requirements impose significant costs, such as costs related to organizational changes, implementing additional protection technologies, training employees and engaging consultants, which are likely to increase over time. In addition, such requirements may require us to modify our data processing practices and policies, distract management or divert resources from other initiatives and projects, all of which could have a material adverse effect on our business, financial condition, results of operations and prospects. Any failure or perceived failure by us or our third-party vendors, collaborators, contractors and consultants to comply with any applicable federal, state or similar foreign laws and regulations relating to data privacy and security, could result in damage to our reputation, as well as proceedings or litigation by governmental agencies or other third parties, including class action privacy litigation in certain jurisdictions, which would subject us to significant fines, sanctions, awards, penalties or judgments, all of which could have a material adverse effect on our business, financial condition, results of operations and prospects.

Increased scrutiny of our environmental, social or governance responsibilities may result in additional costs and risks, and may adversely impact our reputation, employee retention, and willingness of customers and suppliers to do business with us.

Investor advocacy groups, institutional investors, investment funds, proxy advisory services, stockholders, and customers are increasingly focused on environmental, social, and governance ("ESG") practices of companies. Additionally, public interest and legislative pressure related to public companies' ESG practices continues to grow. If our ESG practices fail to meet regulatory requirements or investor or other industry stakeholders' evolving expectations and standards for responsible corporate citizenship in areas including environmental stewardship, support for local communities, **Board of Director board** and employee diversity, human capital management, employee health and safety practices, product quality, supply chain management, corporate governance and transparency, and employing ESG strategies in our operations, our brand, reputation and employee retention may be negatively impacted and customers and suppliers may be unwilling to do business with us. In addition, as we work to align our ESG practices with industry standards, we will likely continue to expand our disclosures in these areas and doing so may result in additional costs and require additional resources to monitor, report, and comply with our various ESG practices. If we fail to adopt ESG standards or practices as quickly as stakeholders desire, report on our ESG efforts or practices accurately, or satisfy the expectations of stakeholders, our reputation, business, financial performance, and growth may be adversely impacted.

ITEM 1B.UNRESOLVED STAFF COMMENTS

None.

ITEM 1C. CYBERSECURITY

Risk Management and Strategy

We have established policies and processes for assessing, identifying, and managing material risk from cybersecurity threats, and have integrated these processes into our overall risk management systems and processes. We routinely assess material risks from cybersecurity threats, including any potential unauthorized occurrence on or conducted through our information systems that may result in adverse effects on the confidentiality, integrity, or availability of our information systems or any information residing therein.

We conduct periodic risk assessments to identify cybersecurity threats, as well as assessments in the event of a material change in our business practices that may affect information systems that are vulnerable to such cybersecurity threats. These risk assessments include identification of reasonably foreseeable internal and external risks, the likelihood and potential damage that could result from such risks, and the sufficiency of existing policies, procedures, systems, and safeguards in place to manage such risks.

Following these risk assessments, we evaluate whether and how to re-design, implement, and maintain reasonable safeguards to minimize identified risks; reasonably address any identified gaps in existing safeguards; and regularly monitor the effectiveness of our safeguards. We devote significant resources and designate high-level personnel, including our Senior Director and Head of Information Technology who reports to our Chief Operating Officer, to manage the risk assessment and mitigation process.

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As part of our overall risk management system, we monitor and test our safeguards, including through annual third-party vulnerability assessments. We train our employees on these safeguards, in collaboration with human resources, IT, and departmental management. Personnel at all levels and departments are made aware of our cybersecurity policies through trainings.

We engage assessors, consultants, auditors, or other third parties in connection with our risk assessment processes. These service providers assist us to design and implement our cybersecurity policies and procedures, as well as to monitor and test our safeguards.

We require each third-party infrastructure and applications service provider that has access to our system to certify that it has the ability to implement and maintain appropriate security measures, consistent with all applicable laws, to implement and maintain reasonable security measures in connection with their work with us, and to promptly report any suspected breach of its security measures that may affect our company.

We have not previously experienced a cybersecurity incident that was determined to be material. For additional information regarding whether any risks from cybersecurity threats are reasonably likely to materially affect our company, including our business strategy, results of operations, or financial condition, please refer to Item 1A, "Risk Factors," in this annual report on Form 10-K.

Governance

One of the key functions of our board of directors is informed oversight of our risk management process, including risks from cybersecurity threats. Our board of directors is responsible for monitoring and assessing strategic risk exposure, and our executive officers are responsible for the day-to-day management of the material risks we face. Our board of directors administers its cybersecurity risk oversight function directly as a whole, as well as through the audit committee.

Our Senior Director and Head of Information Technology and our management committee on cybersecurity, which includes Facilities, HR, IT, Legal, and Management, are primarily responsible to assess and manage our material risks from cybersecurity threats. Our cybersecurity team and IT management have years of cybersecurity experience and expertise including holding numerous applicable cybersecurity certifications, such as ISC2 Certified Information Systems Security Professional (CISSP).

Our Senior Director and Head of Information Technology and our management committee on cybersecurity oversee our cybersecurity policies and processes, including those described in "Risk Management and Strategy" above. Our Senior Director and Head of Information Technology is informed about and monitors the prevention, detection, mitigation, and remediation of cybersecurity incidents by leading the implantation of the cybersecurity risk management program and working directly with our security team. The Senior Director and Head of Information Technology also provides appropriate information and updates to our management committee on cybersecurity.

Our Senior Director and Head of Information Technology and representatives from our management committee on cybersecurity provide annual briefings to the audit committee regarding our company's cybersecurity risks and activities, including any recent cybersecurity incidents and related responses, cybersecurity systems testing, activities of third parties, and the like. Our audit committee provides regular updates to the board of directors on such reports.

ITEM 2.PROPERTIES

Our corporate headquarters, research and development facilities, and manufacturing and distribution centers are located in Menlo Park, California, where we lease approximately 180,200 square feet under a lease expiring on October 31, 2027. We operate additional research, development, and support functions in San Diego, where we lease approximately 73,500 square feet under a lease expiring on September 30, 2027. Additionally, our European headquarters is located in London, where we lease approximately 7,300 square feet under a lease expiring November 30, 2026. Including these leases, we lease approximately 275,000 270,000 square feet globally.

We believe that our existing facilities, together with suitable additional or alternative space available on commercially reasonable terms, will be sufficient to meet our needs.

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ITEM 3.LEGAL PROCEEDINGS

U.S. District Court Proceedings

On September 26, 2019, Personal Genomics of Taiwan, Inc. ("PGI") filed a complaint in the U.S. District Court for the District of Delaware against us for patent infringement (C.A. No. 19-cv-1810) (the "PGI District Court matter"). The matter from this complaint is based on PGI's U.S. Patent No. 7,767,441 (the "'441 Patent"). We plan to vigorously defend in this matter. On November 20, 2019, we filed our answer to the complaint, denying infringement and seeking a declaratory judgement of invalidity of the '441 Patent.

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On June 22, 2020, we filed a petition requesting institution of an inter-partes review ("IPR") to the Patent Trial and Appeals Board (the "Board") at the United States Patent Office requesting the Board to find a set of claims in the '441 Patent invalid. On June 27, 2020, we filed a second petition requesting institution of an IPR requesting the Board to find another set of claims in the '441 Patent invalid. The two petitions (the "PacBio IPR Petitions") requesting IPRs assert that all of the claims relevant to the PGI complaint are invalid. On January 19, 2021, the Board ordered that both PacBio IPR Petitions be instituted on all grounds presented. On January 18, 2022, the Board issued decisions on the two IPRs. In one IPR, all challenged claims were found unpatentable, including PGI's core device claims. In the second IPR, the Board did not find the disputed claims unpatentable. We are appealing appealed the decision in the second IPR to the U.S. Court of Appeals for the Federal Circuit.

Circuit, which held a hearing on December 7, 2023. On January 9, 2024, the U.S. Court of Appeals for the Federal Circuit affirmed the decisions of the Board.

On August 19, 2020, the court ordered a stay of the PGI District Court matter based on a joint stipulation by the parties pending a final written decision on the IPRs. Following the final decision on the IPRs described above, on February 2, 2022, the judge ordered that the PGI District Court matter be reopened. However, in a subsequent order dated September 15, 2022, the judge stayed the PGI District Court matter pending a final decision by the U.S. Court of Appeals for the Federal Circuit regarding the appeal described above. We plan to vigorously defend against the remaining claims.

In December 2022, Take2 Technologies, Ltd. ("Take2") and the Chinese University of Hong Kong filed a complaint in the U.S. District Court for Delaware against us alleging infringement of U.S. Patent No. 11,091,794 (the "'794 Patent") (C.A. No. 22- cv-01595). The complaint alleges that our Sequel® Sequel™ II systems, Sequel IIe Systems, and Revio™ Revio™ Systems that operate version 11.0 or later of the SMRT® SMRT™ Link software, infringe the '794 Patent. The complaint seeks unspecified monetary damages and an order enjoining us from infringing the '794 Patent. We filed a motion to dismiss on February 14, 2023. We believe the infringement allegations in the complaint lack merit and we intend to vigorously defend in this matter. We filed a motion to dismiss on February 14, 2023. We also filed a motion to transfer the case to the Northern District of California which was granted on August 2, 2023 and the case was transferred on August 16, 2023 (C.A. No. 5:23-cv-04166). A hearing occurred on February 22, 2024 on the motion to dismiss the case and the motion was taken under submission for future decision. Take2 filed a motion to disqualify our in-house legal department from representing PacBio in the district court action on September 20, 2023. We opposed Take2's disqualification motion on October 4, 2023. An oral hearing on the disqualification motion was held on October 26, 2023 and the court issued orders November 6 and December 4 of 2023 partially granting the motion. While some members of the in-house legal department were disqualified, General Counsel for PacBio was not disqualified and continues to represent PacBio in the district court action. On October 17, 2023, we filed a petition requesting institution of an IPR requesting the Board to find all claims of the '794 patent invalid. We anticipate a decision by the United States Patent and Trademark Office on whether to institute a trial on the validity of the claims of the '794 patent on or before April 26, 2024.

Proceedings in China

On May 12, 2020, PGI filed a complaint in the Wuhan Intermediate People's Court in China alleging infringement of one or more claims of China patent No. CN101743321B (the "CN321 Patent"), which is related to the '441 Patent. On November 23, 2020, we filed an Invalidation Petition at the China National Intellectual Property Administration (CNIPA) demonstrating the invalidity of the claims in the CN321 Patent on grounds of insufficient disclosure, and the lack of support, essential technical features, clarity, novelty, and inventiveness. A hearing in the invalidation proceeding at the CNIPA was held on April 29, 2021. On September 2, 2021, the CNIPA issued its decision on the Invalidation Petition and determined that all claims (1-61) of the CN321 patent were invalid. On December 1, 2021, PGI filed an appeal with the Beijing IP Court, contesting the CNIPA decision. We filed a petition with the Wuhan Intermediate People's court requesting dismissal of the infringement action based on the CNIPA invalidation decision, and PGI filed a petition to withdraw its complaint. The Wuhan Intermediate People's court granted PGI's petition and dismissed the infringement action in May 2022.

Other Proceedings

From time to time, we may also be involved in a variety of other claims, lawsuits, investigations, and proceedings relating to securities laws, product liability, patent infringement, contract disputes, employment, and other matters that arise in the normal course of our business. In addition, third parties may, from time to time, assert claims against us in the form of letters and other communications.

We record a provision for contingent losses when it is both probable that a liability has been incurred and the amount of the loss can be reasonably estimated. We currently do not believe that the ultimate outcome of any of the matters described above is probable or reasonably estimable, or that these matters will have a material adverse effect on our business; however, the results of litigation and claims are inherently unpredictable. Regardless of the outcome, litigation can have an adverse impact on us because of litigation and settlement costs, diversion of management resources, and other factors.

ITEM 4.MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5.MARKET FOR REGISTRANT’S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Our common stock is traded on The Nasdaq Global Select Market under the symbol "PACB."

Holdings of Record

As of January 31, 2023 January 31, 2024, there were approximately 58 76 stockholders of record of our common stock, although we believe that there are a significantly larger number of beneficial owners of our common stock.

Dividend Policy

We have never declared or paid any cash dividend on our common stock and have no present plans to do so. We intend to retain earnings for use in the operation and expansion of our business.

Performance Graph

The performance graph included in this Annual Report on Form 10-K shall not be deemed "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), or incorporated by reference into any filing of Pacific Biosciences under the Securities Act of 1933, as amended, or the Exchange Act, except as shall be expressly set forth by specific reference in such filing.

The following graph shows a comparison from December 31, 2017 December 31, 2018 through December 31, 2022 December 31, 2023 of the cumulative total return for our common stock, the Nasdaq Composite Index and the Nasdaq Biotechnology Index. Such returns are based on historical results and are not intended to suggest future performance. Data for The Nasdaq Composite Index and the Nasdaq Biotechnology Index assume reinvestment of dividends.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*

Among Pacific Biosciences, Inc., the NASDAQ Composite Index
and the NASDAQ Biotechnology Index

Screenshot 2024-01-26 115201.gif

*\$100 invested on 12/31/2018 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31.

Recent Sales of Unregistered Securities

Not applicable.

ITEM 6. [Reserved]

Other than as previously reported on our Current Reports on Form 8-K filed with the SEC on June 26, 2023 and August 2, 2023, there were no unregistered sales of equity securities by us during 2023.

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ITEM

6. [Reserved]

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and the related notes included in this Annual Report on Form 10-K. Some of the information contained in this discussion and analysis or set forth elsewhere in this Annual Report on Form 10-K, including information with respect to our plans and strategy for our business and related financing, includes forward-looking statements that involve risks and uncertainties. You should read the "Risk Factors" section of this Annual Report on Form 10-K for a discussion of important factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Our Management's Discussion and Analysis (MD&A) is organized in the following sections:

- Overview and Outlook
- Results of Operations
- Liquidity and Capital Resources
- Critical Accounting Policies and Estimates
- Quantitative and Qualitative Disclosure of Market Risk
- Recent Accounting Pronouncements
- Contractual Obligations
- Off Balance Sheet Arrangements

Overview and Outlook

About PacBio

We are a premier life science technology company that is designing, developing, and manufacturing advanced sequencing solutions that enable scientists and clinical researchers to improve their understanding of the genome and ultimately, resolve genetically complex problems.

Our products and technology under development stem from two highly differentiated core technologies focused on accuracy, quality, and completeness, which include our **existing** HiFi long-read sequencing technology and our **emerging** Sequencing by Binding (SBB®) short-read sequencing technology. Our products address solutions across a broad set of research applications including human **genomics, genetics**, plant and animal sciences, infectious disease and microbiology, oncology, and other emerging applications.

Our focus is on **providing creating some of the world's most advanced sequencing systems to provide** our customers **with advanced sequencing technologies with higher throughput the most complete and improved workflows that we believe will enable dramatic advancements in routine healthcare.**

accurate view of genomes, transcriptomes, and epigenomes.

Our customers include academic and governmental research institutions, commercial testing and service laboratories, genome centers, public health labs, hospitals and clinical research institutes, contract research organizations (CROs), pharmaceutical companies, and agricultural companies.

As of **December 31, 2022** December 31, 2023, our commercial team is comprised of approximately **195 215** employees, including **57 71** quota-carrying representatives, many with advanced degrees in biology and significant experience in the genomics industry.

Strategic Objectives

2022 was a productive year for us

2023 exceeded our expectations as we **set out to transform the company, scale the business, and drive drove** adoption **for of** our advanced sequencing **technologies.**

technologies, demonstrated short-read accuracy with our Onso platform, and progressed development of our pipeline technologies and products.

Our **2023 2024** strategic objectives are to:

- - **Increase technology adoption by increasing market share via new customer acquisition, continue Sequel II conversions to Revio, and scale Onso production;**
- **Leverage innovation to complete development of new sequencing platforms and launch on-market system improvements;**

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- **Build upon clinical momentum by expanding HiFi usage in large-scale programs and translational research projects; and**
- **Drive rapid adoption of Revio™ by converting existing Sequel II/IIe customers and attracting new PacBio customers**
 - **Demonstrate Onso's extraordinary level of accuracy in the field and show how it can transform research in needle-in-haystack applications**
 - **Progress development of ultra-high-throughput and bench top long-read sequencers and next generation SBB short-read sequencer**
 - **Leverage current infrastructure to drive toward towards positive cash flow**
 - **Expand partnerships across ecosystem through gross margin expansion, disciplined operating expense management, and workflow to drive customer adoption of SBB short-read sequencing and HiFi long-read sequencing a focus on working capital.**

We will continue to leverage our commercial organization and make significant improvements in the efficiency and usability of our products **to seek to reach in pursuit of** a broader customer base. We believe the commercial investments we have recently made will further help drive growth in our business.

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To increase the adoption of HiFi sequencing, we have various development programs in progress to expand our product portfolio as well as increase the throughput and improve the usability of our existing sequencing technologies. We continue to focus on programs to accelerate new platform launches in the near to mid-term as well as increase applications for our technologies. **In October 2022, we announced Revio, our new HiFi long-read sequencing system. We began taking orders in the fourth quarter of 2022 and expect to commence commercial Revio shipments in March 2023. To address the oncology research markets with a highly differentiated alternative to existing third-party short-read sequencing products already on the market, we are also progressing development of Onso™, our SBB short-read platform. We began taking orders in January 2023 and remain on track for commercial shipment in the second quarter of 2023.**

We continue to believe that with the capabilities of our HiFi chemistry and SMRT technology, we can be a market leader in whole-genome clinical sequencing. Leading institutions have adopted our products to study rare and inherited disease. We believe the market opportunity for clinical sequencing is significant and could drive substantial revenue growth for the company. We plan to continue to pursue partner collaborations where the technologies being developed or applications being considered extend beyond whole-genome clinical sequencing. Collaborative arrangements add to the awareness of our products and service offerings and may drive new applications for use of our technology.

Financial Overview

Key highlights of our 2023 consolidated financial results include the following:

- Broader macroeconomic dynamics including rising inflation, global supply chain constraints, volatile capital markets, competition, Revenue increased \$72.2 million, or 56%, to \$200.5 million for the year ended December 31, 2023, as compared to \$128.3 million for the year ended December 31, 2022. Revenue was comprised of \$120.5 million in instrument revenue, \$63.4 million in consumables revenue and lockdown restrictions associated with COVID-19 have adversely impacted our customers \$16.6 million in service and lengthened customer sales cycles. Additionally, lockdowns in China have led to lower than previously anticipated other revenue for the year ended December 31, 2023. The increase was primarily driven by the launch of Revio in the Asia-Pacific region as customers had difficulty accessing labs first quarter of 2023, which is sold at a higher average selling price than our previous Sequel II and lower sample volumes from which to sequence. Ile platforms. We expect some headwinds from a strengthening U.S. dollar, which impacts our revenue denominated in EUR and GBP but also impacts purchasing power ended the year with an installed base of our customers in Asia 173 Revio systems.
- Gross profit as a stronger U.S. dollar makes buying our products more expensive.
- Ongoing global supply chain constraints and rising inflation are also increasing our costs; as a result, we expect these costs percentage of revenue (gross margin) was 26.3% for the year ended December 31, 2023, compared to impact gross margins and cash flow. Due 38.2% for the year ended December 31, 2022. Gross margin declined due primarily to the rising instrument mix, as Revio instruments sold during the period had a lower margin than the Sequel II/Ile system, primarily due to loyalty discounts provided and higher initial manufacturing costs, from global supply chain constraints and rising inflation, we are moderating our hiring with the aim of reducing our operating expense growth in 2023. We will continue to prioritize investments to develop and commercialize our new products, prioritizing opportunities that will generate a return over the near to mid-term.
- The degree of further adverse impacts of COVID-19 on our business will depend on several factors, such as the duration and the extent of the pandemic, including warranty costs as well as actions taken charges for scrap inventory. In addition, we recognized an adjustment during the year ended December 31, 2023 primarily related to excess instrument and consumables inventory. The excess instrument adjustment was primarily due to a change in the Sequel II demand primarily from one customer. The consumables inventory adjustment was primarily resulting from a faster-than-expected decline in demand of Sequel II/Ile consumables due primarily to a faster than expected ramp on the Revio system.
- Loss from operations increased \$27.3 million or 9%, to \$334.5 million for the year ended December 31, 2023, as compared to \$307.2 million for the year ended December 31, 2022, driven primarily by governments, businesses, an increase of \$31.0 million of operating expenses, including a \$12.7 million increase in the change in the fair value of the contingent consideration, a \$9.0 million increase in non-recurring merger-related costs incurred, and consumers a \$9.0 million increase in response sales, general, and administrative expenses, partially offset by a \$5.8 million decrease in research and development expenses. See [Note 2. Business Acquisitions](#) for further details.
- Cash, cash equivalents, and short-term investments were \$631.4 million at December 31, 2023, which represents an 18% decrease compared to the pandemic, all of which balance at December 31, 2022.

Macroeconomic dynamics including inflation, exchange rates and concerns about an economic downturn, have impacted both the Company and our customers' behavior. For example, some customers and potential customers are managing capital more conservatively, resulting in lengthened sales cycles, and capital funding in China is being deferred, resulting in less capital equipment purchases. These factors could continue to evolve impact our revenues and remain uncertain at this time.

The COVID-19 pandemic and efforts to control its spread have significantly curtailed results of operations in 2024; however, as the movement of people, goods, and services worldwide, including in the regions in which we sell our products and services and conduct our business operations. We have been negatively impacted by the COVID-19 pandemic and expect to continue to be impacted by COVID-19 for the foreseeable future. Due to the uncertain scope size and duration of the pandemic, these impacts is uncertain, we cannot reasonably estimate the future impact to our operations and financial results.

The spread of COVID-19 caused us to modify our business practices, including limiting some of our commercial operations and limiting certain employees from working in the office. Starting in April 2022, we invited employees located near our reopened offices to return to the office.

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See the [Risk Factors](#) section for further discussion of the possible impact of the COVID-19 pandemic macroeconomic factors on our business.

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Key highlights of our 2022 consolidated financial results include the following:

- Revenue decreased \$2.2 million, or 2%, to \$128.3 million for the year ended December 31, 2022, as compared to \$130.5 million for the year ended December 31, 2021. The decline was primarily caused by a decrease in instrument revenue, which was due in part to the robust demand for Revio, displacing previously anticipated Sequel IIe sales in the fourth quarter of 2022. We received orders in the fourth quarter of 2022 for 76 Revio systems with delivery in 2023. The decline in instrument revenue was partially offset by an increase in consumables revenue of \$7.8 million.
- Gross profit as a percentage of revenue (gross margin) was 38.2% for the year ended December 31, 2022, compared to 45.1% for the year ended December 31, 2021. Gross margin declined due primarily to adjustments for excess inventory, either on hand or at our contract manufacturer, related to a faster than expected ramp in Revio demand, which resulted in a faster than expected decline in Sequel II/Ile demand upon the launch of Revio, as well as a decrease in instrument volume and higher overall product costs. Our gross margin in future periods will depend on several factors, including new product transitions, strategic product pricing; product mix; sales of higher-margin consumables; supply chain constraints and inflation increasing costs of raw materials; manufacturing capacity and production volumes impacting the cost of inventory; freight costs; and excess or obsolete inventories.
- Loss from operations increased \$96.8 million or 46%, to \$307.2 million for the year ended December 31, 2022, as compared to \$210.4 million for the year ended December 31, 2021, driven primarily by an increase of \$86.9 million of operating expenses, including a \$80.1 million increase in research and development expenses, a \$36.7 million increase in sales, general, and administrative expenses, and a \$1.2 million increase in the change in the fair value of the contingent consideration, partially offset by a \$31.1 million decrease in non-recurring merger-related costs incurred in 2021. See [Note 2. Business Acquisitions](#) for further details.
- Cash, cash equivalents, and short-term investments were \$772.3 million at December 31, 2022, which represents a 26% decrease compared to the balance at December 31, 2021.

Recent Developments

Product Announcements

On October 25, 2022, we announced two new sequencing platforms, Revio and Onso.

Revio is a new long-read sequencing system designed to enable the use of HiFi sequencing for large studies in human genetics, cancer research, and agricultural genomics. We expect to commence commercial Revio shipments in March 2023.

Onso, a short-read DNA sequencing system, is designed to deliver industry-leading sensitivity and specificity for novel insights in oncology, disease research, and other applications. We commenced the beta program for Onso in the fourth quarter of 2022. We began taking orders for Onso during the first quarter of 2023 and remain on track for commercial shipment in the second quarter of 2023.

January 2023 Public Offering

On January 27, 2023, we issued and sold an aggregate of 20,125,000 shares of our common stock at a purchase price of \$10.00 per share pursuant to an automatic shelf registration statement filed on Form S-3 (File No. 333-249999) with the Securities and Exchange Commission, resulting in aggregate gross proceeds of approximately \$201.3 million.

Results of Operations

A detailed discussion of our consolidated financial results comparison between 2022 2023 and 2021 2022 is presented below. A discussion of the changes in our results of operations between the years ended December 31, 2021 December 31, 2022 and December 31, 2020 December 31, 2021, has been omitted from this Annual Report on Form 10-K but may be found in Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations of our Annual Report on Form 10-K for the year ended December 31, 2021 December 31, 2022, filed with the Securities and Exchange Commission on February 28, 2022 February 28, 2023, which is incorporated herein by reference, and which is available free of charge on the SEC's website at www.sec.gov and our corporate website (www.pacb.com) (www.pacb.com).

Comparison of the Years Ended December 31, 2022 December 31, 2023 and 2021

2022	Year Ended December 31,				
(in thousands, except percentages)	2022	2021	\$ Change	% Change	
	Years Ended December 31,				
(in thousands, except per share amounts)					
(in thousands, except per share amounts)					

(in thousands, except per share amounts)												2023	2022	\$ Change
Revenue:														
Product revenue														
Product revenue														
Product revenue		\$ 108,699	\$ 113,505	\$ (4,806)	(4%)	\$ 183,872	\$	\$ 108,699	\$	\$ 75,173	69			
Service and other revenue		19,605	17,008	2,597	15%	Service and other revenue	16,649	19,605	19,605	(2,956)	(2,956)			
Total revenue		128,304	130,513	(2,209)	(2%)	Total revenue	200,521	128,304	128,304	72,217	72,217			
Cost of revenue:														
Cost of Revenue:														
Cost of product revenue														
Cost of product revenue														
Cost of product revenue		60,932	56,358	4,574	8%	127,568	60,932	60,932	66,636	66,636				
Cost of service and other revenue		13,899	14,989	(1,090)	(7%)	Cost of service and other revenue	14,754	13,899	13,899	855	855			
Amortization of intangible assets		733	306	427	140%									
Amortization of acquired intangible assets						Amortization of acquired intangible assets	1,983		733	1,250				
Loss on purchase commitment		3,705	—	3,705	100%	Loss on purchase commitment	3,436	3,705	3,705	(269)	(269)			
Total cost of revenue		79,269	71,653	7,616	11%	Total cost of revenue	147,741	79,269	79,269	68,472	68,472			
Gross profit		49,035	58,860	(9,825)	(17%)	Gross profit	52,780	49,035	49,035	3,745	3,745			
Operating expense:														
Operating Expense:														
Research and development														
Research and development														
Research and development		193,000	112,899	80,101	71%	187,170	193,000	193,000	(5,830)	(5,830)				
Sales, general and administrative		160,854	124,124	36,730	30%	Sales, general and administrative	169,818	160,854	160,854	8,964	8,964			
Merger-related expenses		—	31,129	(31,129)	(100%)									
Amortization of acquired intangible assets														
Change in fair value of contingent consideration		2,377	1,143	1,234	108%	Change in fair value of contingent consideration	15,060	2,377	2,377	12,683	12,683			
Total operating expense		356,231	269,295	86,936	32%	Total operating expense	387,247	356,231	356,231	31,016	31,016			
Operating loss		(307,196)	(210,435)	(96,761)	(46%)	Operating loss	(334,467)	(307,196)	(307,196)	(27,271)	(27,271)			

2022 respectively.

The loss on purchase commitment was \$3.4 million and \$3.7 million for the year years ended December 31, 2022, December 31, 2023 and 2022, respectively. The purchase commitment loss is based on an estimate of future excess inventory related to a supply agreement with a third-party vendor, agreements, for which we do not expect to have related sales.

Gross profit decreased \$9.8 million increased \$3.7 million, or 17% 8%. Gross margin was 26.3% for the year ended December 31, 2023 compared to 38.2% for the year ended December 31, 2022 compared to 45.1% for the year ended December 31, 2021. The decrease in gross margin percentage was primarily due to instrument mix, in addition to charges for scrap inventory and an increase in adjustments for primarily relating to excess consumables inventory either on hand or at our contract manufacturer, related resulting from a faster-than-expected decline in demand of Sequel II/IIe consumables due primarily to a faster than expected ramp in on the Revio demand, system. Revio instruments sold during the period had a lower margin primarily due to loyalty discounts provided and higher initial manufacturing costs, including warranty costs. Gross margin could fluctuate depending on the pace at which resulted in a faster than expected decline in Sequel II/IIe demand upon the launch of revenue declines, Revio consumable revenue ramps, manufacturing efficiencies and warranty costs improve, as well as a decrease fluctuation in instrument sales volume and higher product costs, which was partially offset by consumables volumes and higher service and other revenues during the year ended December 31, 2022, compared to the year ended December 31, 2021.

We expect our gross margin will trend slightly lower during the first half of 2023, due in part to new product transitions and the impacts of inflation and increased supply chain costs. The global shortage of semiconductors continues to be a challenge for us in our supply chain and has resulted in cost increases that have and may continue to adversely impact margins. During these periods of shortages or delays, the price of components may increase, or the components may not be available at all. Additionally, in response to the surge in COVID-19 infections in 2022, the Chinese government-imposed lockdowns in certain parts of the country, which has had, and may continue to have, a negative impact on manufacturing and/or supply chains, as well as customer demand for our products and demand through certain distributors. We may not be able to secure enough components at reasonable prices or of acceptable quality to build new products in a timely manner in the quantities or configurations needed. Accordingly, our revenue and gross margins could suffer until other sources can be developed.

average selling prices.

Research and Development Expense

The increase decrease in research and development expense was primarily driven by an increase the transition of \$34.1 million in product Revio from development costs and an increase of \$33.9 million in personnel expenses, including the acquired workforce from the Omniome acquisition. In addition, facilities and information technology related expenses associated with our research and development activities increased \$9.9 million to support our operational expansion during the year ended December 31, 2022, compared to the year ended December 31, 2021, commercialization. Research and development expense included share-based compensation expense of \$30.7 million \$22.4 million and \$20.3 million \$30.7 million during the twelve months years ended December 31, 2022 December 31, 2023 and 2021, 2022, respectively.

We will continue to focus a significant portion of our resources on developing new products and solutions, including improving the efficiency and usability of existing products, developing new solutions, software, workflows and applications leveraging our core technologies. We anticipate that our spend will decline slightly in 2023 due to new product transitions. Additionally, we have collaborated and expect to continue to collaborate with strategic partners to develop sequencing solutions and expand the application of our technology.

Sales, General, and Administrative Expense

The increase in sales, general, and administrative expense was primarily driven by an increase of \$13.0 million in personnel costs, \$9.7 million in sales and marketing expenses, including costs incurred in connection with product launches, \$4.7 million in consulting and professional services, \$4.2 million in travel-related expenses, and \$2.7 million in facilities expenses and information technology related expenses, headcount as we continue to grow our commercial footprint. Sales, general, and administrative expense included share-based compensation expense expenses of \$43.1 million \$44.3 million and \$35.4 million \$43.1 million during the twelve months years ended December 31, 2022 December 31, 2023 and 2021, 2022, respectively.

Merger-Related Expenses

Merger-related expenses of \$9.0 million during the year ended December 31, 2023, consist of \$4.9 million of transaction costs arising from the acquisition of Apton, \$2.8 million of compensation expense resulting from the liquidity event bonus plan in connection with the Apton acquisition, and \$1.3 million of share-based compensation expense resulting from the acceleration of certain equity awards in connection with the Apton acquisition. We anticipate recognized \$1.3 million of share-based compensation expense for the acceleration that was not attributable to pre-combination services.

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Amortization of Acquired Intangible Assets

Amortization of acquired intangible assets of \$6.2 million during the year ended December 31, 2023 consists of amortization expense attributable to acquired intangible assets that are not directly related to sales general, and administrative expense to continue to increase primarily as a result of the new product commercialization efforts.

generating activities.

Change in Fair Value of Contingent Consideration

The change in fair value of contingent consideration during the year ended December 31, 2022 December 31, 2023, represents the remeasurement impact of the Omniome and Apton contingent consideration of \$200 million (composed of \$100 million in cash and \$100 million in shares of our common stock) that is due upon the achievement of a the

respective milestone. The increase in the change in fair value of contingent consideration during the year was primarily due to the Omniome contingent consideration and was primarily attributable to the passage of time, changes in the discount rates and probabilities of milestone achievement.

The contingent consideration milestone for the Omniome acquisition was defined as the first commercial shipment to a customer of both an instrument and related consumables, utilizing SBB technology. The increase As a result of the milestone achievement in contingent September 2023, former Omniome securityholders received as milestone consideration, liability was primarily due among other things, an aggregate of approximately \$100.9 million in cash and approximately 9.0 million shares of our common stock.

Loss on Extinguishment of Debt

Loss on extinguishment of debt of \$2.0 million during the year ended December 31, 2023, represents the loss resulting from the difference in the fair value of the 2030 Notes and the principal, in addition to the passage write-off of time and changes in the probabilities unamortized debt issuance costs on the portion of milestone achievement, offset by increases in the discount rate.

Loss from Continuation Advances from Illumina

As 2028 Notes that were exchanged as part of the Termination Agreement, Illumina paid us Continuation Advances totaling \$52.0 million, which was repayable without interest to Illumina if, within two years of March 31, 2020, we entered into, or consummated a Change of Control

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Transaction or raised at least \$100 million in a single equity or debt financing (that may have multiple closings), with the amount repayable dependent on the amount raised by us.

Resulting from the issuance and sale of \$900 million of 1.50% Convertible Senior Notes due February 15, 2028, \$52.0 million of Continuation Advances were paid without interest to Illumina in February 2021 and recorded as other expense in modification during the year ended December 31, 2021 December 31, 2023.

Interest Expense

The increase in interest

Interest expense for the year ended December 31, 2022, December 31, 2023 was primarily due \$14.3 million compared to the twelve months of interest incurred on the \$900 million of 1.50% Convertible Senior Notes due February 15, 2028, that we issued on February 16, 2021 during \$14.7 million for the year ended December 31, 2022 compared to only ten months and was primarily comprised of interest during on the year ended December 31, 2021.

Convertible Senior Notes.

Other Income, Net

The increase in other income, net was primarily driven by a \$8.4 million increase in interest income, partially offset by a \$0.6 million increase in foreign exchange loss.

investment income.

Benefit from Income Taxes

A deferred income tax benefit of \$93.6 million \$11.4 million for the year ended December 31, 2021 December 31, 2023, is related to the release of the valuation allowance for deferred tax assets due to the recognition of deferred tax liabilities in connection with the Omniome and Circulomics acquisitions. Apton acquisition. We maintain a full valuation allowance on the net deferred tax assets of our U.S. entities as we have concluded that it is more likely than not that we will not realize our deferred tax assets. Accordingly, this benefit from income taxes is reflected on our Consolidated Statements consolidated statements of Operations operations and Comprehensive (Loss) Income comprehensive loss for the year ended December 31, 2021 December 31, 2023.

Liquidity and Capital Resources

Our primary sources of liquidity, other than our holdings of cash, cash equivalents, and investments, has primarily been through the issuance of debt or equity securities, together with cash flow from operating activities. For example, in January 2023, as discussed above, we issued and sold an aggregate of 20,125,000 shares of our common stock in a follow-on public offering for aggregate gross proceeds of approximately \$201.3 million. \$201.3 million. We have historically incurred, and expect to continue to incur, operating losses and generate negative cash flows from operations on an annual basis due to the investments we intend to make as described in Results of Operations above, and as a result, we may require additional capital resources to execute our strategic initiatives to grow our business.

Cash, cash equivalents, Cash Equivalents, and investments

Investments

As of December 31, 2022 December 31, 2023, we had \$772.3 million \$631.4 million in cash, cash equivalents, and investments, compared to \$1.0 billion \$772.3 million at December 31, 2021 December 31, 2022. The decrease was primarily attributable to \$263.2 million \$259.2 million cash used in operating activities for the twelve months ended December 31, 2022 December 31, 2023.

Convertible Senior Notes

At December 31, 2022, we had \$900 million of principal Convertible Senior Notes outstanding resulting from our February 9, 2021, issuance of convertible notes due 2028 (the "Notes" "2028 Notes") with an aggregate principal of \$900 million. The Notes bear interest at a rate of 1.50% per annum. Interest on the 2028 Notes is payable semi-annually semi-

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annually in arrears on February 15 and August 15 commencing on August 15, 2021. The 2028 Notes will mature on February 15, 2028, subject to earlier conversion, redemption, or repurchase. The proceeds from the issuance of the convertible notes are being used to fund operations, strategic investments, and capital requirements.

The 2028 Notes are convertible at the option of the holder at any time until the second scheduled trading day prior to the maturity date, including in connection with a redemption by the Company. The 2028 Notes are convertible into shares of our common stock based on an initial conversion rate of 22.9885 shares of common stock per \$1,000 principal amount of the 2028 Notes (which is equal to an initial conversion price of \$43.50 per share), in each case subject to customary anti-dilution and other adjustments as a result of certain extraordinary transactions. Upon conversion of the 2028 Notes, we may elect to settle such conversion obligation in shares, cash or a combination of shares and cash.

In June 2023, we entered into a privately negotiated exchange agreement with the holder of our outstanding 2028 Notes, pursuant to which we issued \$441.0 million in aggregate principal amount of our 1.375% Convertible Senior Notes due in 2030 (the "2030 Notes") in exchange for \$441.0 million principal amount of the 2028 Notes. Interest on the 2030 Notes is payable semi-annually in arrears on June 15 and December 15 commencing on December 15, 2023. The 2030 Notes will mature on December 15, 2030, subject to earlier conversion, redemption, or repurchase.

The 2030 Notes are convertible at the option of the holder at any time until the second scheduled trading day prior to the maturity date, including in connection with a redemption by the Company. The 2030 Notes are convertible into shares of our common stock based on an initial conversion rate of 46.5116 shares of common stock per \$1,000 principal amount of the 2030 Notes (which is equal to an initial conversion price of \$21.50 per share), in each case subject to customary anti-dilution and other adjustments as a result of certain extraordinary transactions. Upon conversion of the 2030 Notes, we may elect to settle such conversion obligation in shares, cash or a combination of shares and cash.

With certain exceptions, upon a change of control of the Company or the failure of our common stock to be listed on certain stock exchanges, the holders of the 2028 Notes and 2030 notes may require that we repurchase all or part of the principal amount of the Notes at a purchase price of par plus unpaid interest up to, but excluding, the maturity date.

The Indenture includes customary "events of default," which may result in the acceleration of the maturity of the Notes under the Indenture. The Indenture also includes customary covenants for convertible notes of this type.

See [Note 7. Convertible Senior Notes](#) for further details.

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Additional Capital Requirements

We believe that our existing cash, cash equivalents, and investments will be sufficient to fund our projected operating and capital requirements for at least the next 12 months from the date of filing of this Annual Report on Form 10-K for the year ended December 31, 2022. Operating needs include planned costs to operate our business, including costs to fund working capital and capital expenditures. Recent and expected working and other capital requirements, in addition to the above matters, include:

- Our purchase orders and contractual obligations of approximately \$145.7 million as of December 31, 2022, which consist of open purchase orders and contractual obligations in the ordinary course of business, including commitments with contract manufacturers and suppliers for which we have not received the goods or services. A majority of these purchase obligations are due within a year. Although open purchase orders are considered enforceable and legally binding, the terms generally allow us the option to cancel, reschedule and adjust our requirements based on our business needs prior to the delivery of goods or performance of services.
- As described in more detail in [Note 8 - Commitments and Contingencies](#) in the Notes to the Consolidated Financial Statements, we signed a Supply Agreement, which was amended in October 2022, with a supplier for the purchase of certain products over the period of 2023 through 2026. As part of the Supply Agreement, we made a \$9.0 million deposit during the year ended December 31, 2022, and will pay an additional deposit of \$6.0 million in 2023, to secure the supply of certain products through the term of the contract. If we breach the minimum volume purchase commitment during any applicable year, the supplier is entitled to retain a portion or all of the deposit corresponding to that year. If we terminate the Supply Agreement before January 15, 2027, Supplier will refund the remaining balance of the Deposit. If the supplier breaches its minimum volume supply commitment during any applicable year or portions thereof, our remedies include termination, pursuit of damages, or pursuit of specific

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performance. If, on or before October 31, 2024, we commit to purchasing a set amount of additional products during the calendar year 2026, Supplier will increase its maximum capacity guarantee to meet the additional demand. Should we exercise this option, we will be required to make an additional deposit of \$5.0 million to Supplier within 30 days of the exercise.

- Our research and development expenditures of \$187.2 million in 2023 and \$193.0 million in 2022 and \$112.9 million in 2021. While we expect to continue our investment in research and development in 2023, 2024, including enhancements of our existing products, and continued development of our Revio and Onso systems and other new technology and products, we expect research and development expenses to decline slightly in 2023 as compared to the year ended December 31, 2022 due to new product transitions.

- Cash outflows for capital expenditures of \$8.8 million in 2023 and \$16.8 million in 2022 and \$5.9 million in 2021, 2022. We expect to continue to invest in capital expenditures in fiscal 2023 2024 to continue to support manufacturing and expansion of our business, and anticipate a slight decline increase in 2023 2024 as compared to the year ended December 31, 2022 December 31, 2023.
- Amounts related to future lease payments for operating lease obligations at December 31, 2022 December 31, 2023, totaling \$58.6 million, \$46.7 million, with \$12.0 million \$12.1 million expected to be paid within the next 12 months.
- Amounts due under the term loan acquired in connection with Omniome at December 31, 2022 December 31, 2023, totaling \$2.3 million \$0.5 million, with \$1.8 million the remainder of which is expected to be paid within the next 12 months. Please see [Note 6. Balance Sheet Components](#) for additional information.
- Payments made to third party collaborators to help advance our technologies and the capabilities of our products. We may also choose to drive investments to help create an ecosystem of customers, partners, and collaborators whose expertise and offerings complement and enhance the capabilities and utility of our technology and increase genomic data available on our platforms.
- Payments related to licensing and other arrangements, which are cancelable cancellable license agreements with third parties for certain patent rights and technology. Under the terms of these agreements, we may be obligated to pay royalties based on revenue from the sales of licensed products, or minimum royalties, whichever is greater, and license maintenance fees. The future license maintenance fees and minimum royalty payments under the license agreements are not deemed to be material.

Our future capital requirements and the adequacy of our available funds will depend on many factors, including:

- our ability to successfully commercialize and develop products and solutions that address customer needs;
- the pace of adoption of our products and our ability to obtain new customers in markets;
- the progress of our research and development programs and our ability to initiate or expand research programs;
- our ability to manage manufacturing and production costs, including purchase obligations, and litigation costs, including the costs involved in preparing, filing, prosecuting, defending and enforcing intellectual property rights; and
- the extent to which we engage in collaborations with partners and acquire other businesses or technologies.

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If economic, financial, business, or other factors adversely affect our ability to fund our projected operating cash requirements, we may be required to obtain funding through traditional or alternative sources of financing. We cannot be certain that funds will be available on favorable terms, or at all. If we are required and unable to raise additional capital when desired, our business, operating results, and financial condition may be adversely affected. [See our risk factor captioned “We are not cash flow positive and may not have sufficient cash to make required payments under the terms of our debt or fund our long-term planned operations” for more information.](#)

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Cash Flow Summary

		Year Ended December 31,			
		Years Ended December 31,		Years Ended December 31,	
(in thousands)		2022	2021	(in thousands) 2023	2022
Cash used in operating activities		\$ (263,211)	\$ (111,180)		
Cash provided by (used in) investing activities		116,083	(678,531)		
Cash provided by investing activities					
Cash provided by financing activities		9,622	1,169,581		
Net (decrease) increase in cash, cash equivalents, and restricted cash		\$ (137,506)	\$ 379,870		
Net decrease in cash, cash equivalents and restricted cash					

Operating Activities

Our primary uses of cash in operating activities include the development of future products and product enhancements, manufacturing, and support functions related to our sales, general, and administrative activities.

Cash used in operating activities for the year ended December 31, 2023, of \$259.2 million was due primarily to a \$306.7 million net loss that was partially offset by non-cash items such as share-based compensation of \$72.1 million, a change in the estimated fair value of contingent consideration of \$15.1 million, depreciation of \$11.5 million, inventory provision of \$10.6 million, amortization of intangible assets of \$8.3 million, and amortization of right-of-use assets of \$6.8 million, offset by accretion of discount and amortization of premium on marketable securities, net of \$12.8 million, and deferred income taxes of \$11.4 million. Cash flow impact from changes in net operating assets and liabilities of \$59.0 million, was primarily attributable to increases of \$17.8 million in accounts receivable, net, \$13.8 million in inventory, net, \$9.0 million in prepaid expenses and other assets, and decreases of \$14.9 million in contingent consideration liability, \$10.4 million in deferred revenue, and \$8.8 million in operating lease liabilities, partially offset by increases of \$13.1 million in accrued expenses, and \$2.4 million in other liabilities.

Cash used in operating activities for the year ended December 31, 2022, of \$263.2 million was due primarily to a \$314.2 million net loss that was partially offset by non-cash items such as share-based compensation of \$78.6 million, depreciation of \$9.5 million, amortization of right-of-use assets of \$6.9 million, inventory provision of \$6.0 million, and a change in the estimated fair value of contingent consideration of \$2.4 million. Cash flow impact from changes in net operating assets and liabilities of \$54.0 million, was primarily attributable to increases of \$33.9 million in inventory, net, \$12.3 million in prepaid expenses and other assets, and decreases of \$7.7 million in operating lease liabilities, \$3.7 million in accrued expenses, and \$3.7 million in deferred revenue, partially offset by a decrease of \$5.5 million in accounts receivable, net, an increase of \$1.0 million in accounts payable, and \$0.9 million in other liabilities.

Cash used in operating activities for the year ended December 31, 2021, of \$111.2 million was due primarily to a \$181.2 million net loss, which includes a \$93.6 million deferred income tax benefit, that was partially offset by a loss of \$52.0 million from Continuation Advances repaid to Illumina that is considered a financing activity, non-cash items such as share-based compensation of \$73.4 million, depreciation of \$7.2 million, amortization of right-of-use assets of \$4.0 million and a net cash inflow from changes in operating assets and liabilities of \$20.3 million. Cash flow impact from changes in operating assets and liabilities was primarily attributable to increases of \$25.7 million in deferred revenue, an increase of \$15.3 million in accrued expenses and an increase of \$6.4 million in accounts payable partially offset by an increase of \$13.1 million in inventory, net, an increase of \$7.2 million in accounts receivable, net, an increase of \$1.0 million in prepaid expenses and other assets, and a decrease of \$5.0 million in operating lease liabilities.

Investing Activities

Our investing activities consist primarily of capital expenditures and investment purchases and maturities. Cash provided by investing activities for the year ended December 31, 2023, was due primarily to capital expenditures of \$8.8 million and purchases of investments of \$756.6 million offset by maturities of investments of \$769.5 million.

Cash used in investing activities for the year ended December 31, 2022, was due primarily to capital expenditures of \$16.8 million and purchases of investments of \$442.8 million offset by maturities of investments of \$575.8 million.

Financing Activities

Cash used in investing provided by financing activities for during the year ended December 31, 2021 December 31, 2023, was resulted from net proceeds from issuance of common stock under equity offerings of \$189.2 million, net proceeds of \$15.3 million from the issuance of common stock through our equity compensation plans, partially offset by \$86.4 million due primarily to net purchases the payment of investments contingent consideration, \$7.4 million due to the payment of \$352.8 million, cash paid, net debt issuance costs, and \$1.8 million due to the payment of cash acquired, of \$319.8 million for the acquisitions of Omniome and Circulomics, and purchases of property and equipment of \$5.9 million.

Financing Activities

notes payable.

Cash provided by financing activities during the year ended December 31, 2022, resulted from net proceeds of \$11.2 million from the issuance of common stock through our equity compensation plans, partially offset by \$1.6 million due to the payment of notes payable.

Cash provided by financing activities during the year ended December 31, 2021, resulted from net proceeds of \$895.5 million from our February 2021 issuance of \$900 million of 1.50% Convertible Senior Notes after deducting debt issuance costs, net proceeds of \$294.8 million from our September 2021 private placement of common stock after deducting issuance costs and proceeds of \$31.8 million from the issuance of common stock through our equity compensation plans, partially offset by \$52.0 million of Continuation Advances repaid to Illumina.

Off-Balance Sheet Arrangements

As of December 31, 2022 December 31, 2023, we did not have any off-balance sheet arrangements.

In the ordinary course of business, we enter into standard indemnification arrangements. Pursuant to these arrangements, we indemnify, hold harmless, and agree to reimburse the indemnified parties for losses suffered or incurred by the indemnified party in connection with any trade secret, copyright, patent or other intellectual property infringement claim by any third party with respect to its technology, or from claims relating to our performance or non-performance under a contract,

any defective products supplied by us, or any acts or omissions, or willful misconduct, committed by us or any of our employees, agents or representatives. The term of these indemnification agreements is generally perpetual after the execution of the agreement. The maximum potential amount of future payments we could be required to make under these agreements is not determinable because it involves claims that may be made against us in future periods but have not yet been made. To date, we have not incurred costs to defend lawsuits or settle claims related to these indemnification agreements.

We also enter and have entered into indemnification agreements with our directors and officers that may require us to indemnify them against liabilities that arise by reason of their status or service as directors or officers, except as prohibited by applicable law. In addition, we may have obligations to hold harmless and indemnify third parties involved with our fundraising efforts and their respective affiliates, directors, officers, employees, agents or other representatives against any and all losses, claims, damages and liabilities related to claims arising against such parties pursuant to the terms of agreements entered into between us and such third parties in connection with such fundraising efforts. To the extent that such indemnification obligations apply to the lawsuits described in [Legal Proceedings](#), in Part I, Item 3 of this Annual Report on Form 10-K, any associated expenses incurred are included within the related accrued litigation expense amounts. No additional liability associated with such indemnification agreements has been recorded as of **December 31, 2022** **December 31, 2023**.

Critical Accounting Policies and Estimates

Management's Discussion and Analysis of Financial Condition and Results of Operations is based upon our Consolidated Financial Statements, which we have prepared in accordance with U.S. GAAP. The preparation of these financial statements requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenue, cost of revenue, and operating expenses, and related disclosure of contingent assets and liabilities. Management based its estimates on historical experience and on various other assumptions that it believes to be reasonable under the circumstances, the results of which form the basis for making judgements about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ materially from these estimates under different assumptions or conditions.

An accounting policy is deemed to be critical if it requires an accounting estimate to be made based on assumptions about matters that are highly uncertain at the time the estimate is made, if different estimates reasonably could have been used, or if changes in the estimate that are reasonably likely to occur could materially impact the financial statements.

Revenue Recognition

Our revenue is generated primarily from the sale of products and services. Product revenue primarily consists of sales of our instruments and related consumables; service and other revenue consist primarily of revenue earned from product maintenance agreements.

We account for a contract with a customer when there is a legally enforceable contract between us and the customer, the rights of the parties are identified, the contract has commercial substance, and collectability of the contract consideration is probable. Revenues are recognized when control of the promised goods or services is transferred to our customers, or services are performed, in an amount that reflects the consideration we expect to be entitled to in exchange for those goods or services.

Our instrument sales are generally sold in

We may enter into contracts with customers that include a bundled arrangement and commonly include the instrument, instrument accessories, training, and consumables. For such bundled arrangements, we account for individual combination of promised products and services, separately if they are distinct, that is, if a resulting in arrangements containing multiple performance obligations. We determine whether each product or service is separately identifiable distinct, in order to identify the performance obligations in the contract and allocate the contract transaction price among the distinct performance obligations. A performance obligation is considered distinct from other items obligations in a contract when it provides a benefit to the bundled package and if a customer can benefit from it either on its own or together with other resources that are readily available to the customer. Installation services are considered distinct from customer and is separately identified in the instrument contract. We consider a performance obligation satisfied once we have transferred control of a good or service to the customer, meaning the customer has the ability to use and obtain the benefit of the good or service. Therefore, instrument revenue is recognized upon transfer of control of the asset to the customer, which is generally upon delivery for sales made to our non-distributor customers and upon shipment for sales made to our distributor customers.

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The consideration for bundled arrangements contracts with multiple performance obligations is allocated between separate performance obligations based on their individual standalone selling price. We determine the best estimate of standalone selling price using average selling prices over a 12-month period combined with an assessment of current market conditions. If the standalone selling price is not directly observable, we rely on estimates by considering multiple factors including, but not limited to, overall market conditions, including geographic or regional specific factors, internal costs, profit objectives, pricing practices, and other observable inputs. We recognize revenues as performance obligations are satisfied by transferring control of the product or service to the customer or over the term of a product maintenance agreement with a customer. Our revenue arrangements generally do not provide a right of return.

Certain of our agreements provide options to customers which can be exercised at a future date, such as the option to purchase our product at discounted prices, among others. In accounting for customer options, we determine whether an option is a material right and this requires us to exercise significant judgment. If a contract provides the customer an option to acquire additional goods or services at a discount that exceeds the range of discounts that we typically give for that

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product or service for the same class of customer, or if the option provides the customer certain additional goods or services for free, the option may be considered a material right. If the contract gives the customer the option to acquire additional goods or services at their normal standalone selling prices, we would likely determine that the option is not a

material right and, therefore, account for it as a separate performance obligation when the customer exercises the option. If the standalone selling price of the option is not directly observable, an estimated standalone selling price is utilized which considers adjustments for discounts that the customer could receive without exercising the option and the likelihood that the option will be exercised. We may also utilize the alternative approach to estimate the standalone selling price, available pursuant to the applicable accounting guidance, to the extent we conclude the applicable criteria for using the alternative approach has been met. We update the transaction price for expected consideration, subject to constraint, each reporting period if our estimate of future goods to be ordered by customers change.

Inventories

Inventories are stated at the lower of cost or net realizable value. Cost is determined using the first-in, first-out ("FIFO") method. Adjustments to reduce the cost of inventory to its net realizable value, if required, are made for estimated excess or obsolete balances. Cost includes depreciation, labor, material, and overhead costs, including product and process technology costs while determining costs. Determining net realizable value of inventories involves numerous judgements, including projecting future average selling prices, sales volumes, and costs to complete products in work in process inventories.

We make inventory purchases and commitments to meet future shipment schedules based on forecasted demand for our products. The business environment in which we operate is subject to rapid changes in technology and customer demand. We perform a detailed assessment of inventory each period, which includes a review of, among other factors, demand requirements, product life cycle and development plans, component cost trends, product pricing, product expiration, and quality issues. Based on our analysis, we record adjustments to inventory for potentially excess, obsolete, or impaired goods, when appropriate, to report inventory at net realizable value. Inventory adjustments may be required if actual demand, component costs, supplier arrangements, or product life cycles differ from our estimates. Any such adjustments would result in a charge to our results of operations.

Business Combinations

Under the acquisition method of accounting, we allocate the fair value of the total consideration transferred to the tangible and identifiable intangible assets acquired and liabilities assumed based on their estimated fair values on the date of acquisition. The fair values assigned, defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between willing market participants, are based on estimates and assumptions determined by management. These valuations require us to make estimates and assumptions, especially with respect to intangible assets. We record the excess consideration over the aggregate fair value of tangible and intangible assets, net of liabilities assumed, as goodwill. Costs that we incur to complete the business combination, such as legal and other professional fees, are expensed as they are incurred.

In connection with certain acquisitions, contingent consideration can be earned by the sellers upon completion of certain future performance milestones. In these cases, a liability is recorded on the acquisition date for an estimate of the acquisition date fair value of the contingent consideration. Changes in the fair value of contingent consideration subsequent to the acquisition date are recognized in operating expenses in our consolidated statements of operations and comprehensive (loss) income.

loss.

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We typically use the discounted cash flow method to value our acquired intangible assets. This method requires significant management judgment to forecast future operating results and utilizes significant assumptions such as assumed revenue growth rates, projections, discount rates and obsolescence factors. The estimates we use to value and amortize intangible assets are consistent with the plans and estimates that we use to manage our business and are based on available historical information and industry estimates and averages. If the subsequent actual results and updated projections of the underlying business activity change compared with the assumptions and projections used to develop these values, we could experience impairment charges. In addition, we have estimated the economic lives of certain acquired assets and these lives are used to calculate depreciation and amortization expense. If our estimates of the economic lives change, depreciation or amortization expense could be accelerated or extended. We capitalize in-process research and development (IPR&D), which is considered indefinite lived until the completion or abandonment of the associated research and development efforts. Upon reaching the end of the relevant research and development project (i.e., upon commercialization), the IPR&D asset is amortized over its estimated useful life. If the relevant research and development project is abandoned, the IPR&D asset is expensed in the period of abandonment.

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If the initial accounting for a business combination is incomplete by the end of a reporting period that falls within the measurement period, we report provisional amounts in our financial statements. During the measurement period, we adjust the provisional amounts recognized at the acquisition date to reflect new information obtained about facts and circumstances that existed as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of that date. We record these adjustments to the provisional amounts with a corresponding offset to goodwill. Any adjustments identified after the measurement period are recorded in the consolidated statements of income.

operations and comprehensive loss.

We acquired \$11.4 million of finite-lived intangible assets, \$400.0 million \$55.0 million of IPR&D, and \$410.0 million \$52.3 million of goodwill in connection with the acquisitions acquisition of Omniome and Circulomics Apton Biosystems, Inc. in the third quarter of 2021.

2023.

Goodwill and Intangible Assets with Indefinite Lives — Impairment Assessment

Goodwill and other intangible assets with indefinite useful lives (i.e., IPR&D) are not amortized, however they are tested annually for impairment, in the second and fourth quarter of our fiscal year, respectively, and whenever events or changes in circumstances indicate that it is more likely than not that the fair value is less than the carrying value. Events that

would indicate impairment and trigger an interim impairment test include, but are not limited to, unexpected adverse business conditions, economic factors, unanticipated technological changes or competitive activities, loss of key personnel and acts by governments or courts.

We perform our goodwill impairment analysis at the reporting unit level. We have one reporting unit, which aligns with our reporting structure and availability of discrete financial information. During the goodwill impairment review, we assess qualitative factors to determine whether it is more likely than not that the fair value of our reporting unit is less than the carrying amount, including goodwill. The qualitative factors include, but are not limited to, macroeconomic conditions, industry and market considerations, and our overall financial performance. If, after assessing the totality of these qualitative factors, we determine that it is not more likely than not that the fair value of our reporting unit is less than the carrying amount, then no additional assessment is deemed necessary. Otherwise, we proceed to compare the estimated fair value of the reporting unit with the carrying value, including goodwill. If the carrying amount of the reporting unit exceeds the fair value, we record an impairment loss based on the difference. If a quantitative assessment is performed, the evaluation includes management estimates of cash flow projections based on internal future projections and/or use of a market approach by looking at market values of comparable companies. Key assumptions include, but are not limited to, revenue and operating income growth rates, discount rates and other factors. We consider peer revenues and earnings trading multiples from companies that have operational and financial characteristics that are similar to the asset under measurement and estimated weighted-average costs of capital. Different assumptions from those made in our analysis could materially affect projected cash flows and the evaluation of assets for impairment. We also consider our market capitalization as a part of our analysis. We may elect to bypass the qualitative assessment in a period and proceed to perform the quantitative goodwill impairment test.

During the IPR&D impairment review, we assess qualitative factors to determine whether it is more likely than not that the fair value of the IPR&D is less than the carrying amount. The qualitative factors include, but are not limited to, macroeconomic conditions, industry-specific conditions, and company-specific conditions. If, after assessing the totality of these qualitative factors, we determine that it is not more likely than not that the fair value of the IPR&D is less than the carrying amount, then no additional assessment is deemed necessary. Otherwise, we proceed to compare the estimated fair value of the IPR&D with the carrying value. If the carrying

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amount of the IPR&D exceeds the fair value, we record an impairment loss based on the difference. If a quantitative assessment is performed, the evaluation includes management estimates of cash flow projections based on internal future projections. Key assumptions include, but are not limited to, revenue and operating income projections, revenue growth rates, discount rates and other factors. We consider peer revenues and earnings trading multiples from companies that have operational and financial characteristics that are similar to the asset under measurement and estimated weighted-average costs of capital. Different assumptions from those made in our analysis could materially affect projected cash flows and the evaluation of assets for impairment. We may elect to bypass the qualitative assessment in a period and proceed to perform the quantitative impairment test.

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Intangible Assets and Other Long-Lived Assets — Impairment Assessment

We perform regular reviews to determine if any event has occurred that may indicate that the carrying values of our intangible assets with finite lives and other long-lived assets are impaired. If indicators of impairment exist, we assess the recoverability of the affected assets by determining whether their carrying amounts exceed their undiscounted expected future cash flows. If the affected assets are not recoverable, we estimate the fair value of the assets and record an impairment loss if the carrying value exceeds the fair value. Factors that may indicate potential impairment include a significant decline in our stock price and market capitalization compared to net book value, significant changes in the ability of an asset to generate positive cash flows and the pattern of utilization of a particular asset.

In order to estimate the fair values of identifiable intangible assets with finite lives and other long-lived assets, we estimate the present value of future cash flows from those assets. The key assumptions that we use in our discounted cash flow model are the amount and timing of estimated future cash flows to be generated by the asset over an extended period of time and a rate of return that considers the relative risk of achieving the cash flows, the time value of money, and other factors that a willing market participant would consider. Significant judgment is required to estimate the amount and timing of future cash flows and the relative risk of achieving those cash flows.

Assumptions and estimates about future values and remaining useful lives are complex and often subjective. They can be affected by a variety of factors, including external factors such as industry and economic trends, and internal factors such as changes in our business strategy and our internal forecasts.

Contingent Consideration

In connection with the acquisition of Omniome in the third quarter of 2021, we entered into an arrangement where we **are were** obligated to pay \$200 million in cash and equity dependent upon the achievement of a milestone event upon the first commercial shipment of products developed from our acquired sequencing technology. **In the third quarter of 2023, we commenced customer shipments of the Onso short-read sequencing instrument. The milestone payment associated with PacBio's acquisition of Omniome was triggered in September 2023 once both the Onso instrument and related consumables had been shipped to one customer. Consequently, we paid the former Omniome security holders milestone consideration of an aggregate of approximately \$100.9 million in cash and approximately 9.0 million shares of our common stock in October 2023.**

In connection with the acquisition of Apton, we entered into an arrangement where we are obligated to pay former holders of Apton's outstanding equity interests \$25.0 million upon the achievement of \$50 million in revenue associated with a high throughput sequencer using Apton's technology, provided that the milestone event occurs prior to the 5-year anniversary of the closing date of the acquisition, which we may elect to pay in cash, shares of our common stock or a combination of cash and shares of our common stock. See [Note 2. Business Acquisitions](#) for further information.

The contingent consideration liability was measured at fair value as of the acquisition date and is remeasured periodically at each reporting date, with changes in fair value recorded as change in fair value of contingent consideration in the **statement consolidated statements of operations. The operations and comprehensive loss. For the Omniome contingent consideration, the initial measurement and post-acquisition remeasurement require required** estimates and assumptions using a scenario-based method that considers a range of potential outcomes of milestone achievement dates and assigned probabilities of occurrence for each outcome. Outcomes **are were** discounted to present value, which **is was** then

weighted by the probability of each scenario to determine the total fair value of the contingent consideration payment as of each reporting period. This method requires significant management judgment, including the probability of achieving certain future milestones and discount rates. For the Apton contingent consideration, the initial measurement and post-acquisition remeasurement required estimates and assumptions using a Monte Carlo Simulation to estimate the volatility and systematic relative

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risk of revenues subject to sales milestone payments and discounting the associated cash payment amounts to their present values using a credit-risk-adjusted interest rate to determine the total fair value of the contingent consideration payment as of each reporting period. This method requires significant management judgment, including risk-adjusted forecasted revenues for products and services leveraging Apton's technology and an estimated credit spread. Future changes in our estimates could result in expenses or gains. Refer to [Note 5. Financial Instruments](#) for further discussion on valuation assumptions.

Recent Accounting Pronouncements

Please see [Note 1. Organization and Significant Accounting Policies](#), subsection titled "Recent Accounting Pronouncements", in Part II, Item 8 of this Annual Report on Form 10-K for information regarding applicable recent accounting pronouncements.

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ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Interest Rate and Market Risk

Our investment portfolio is exposed to market risk from changes in interest rates. The goals of our investment policy are preservation of capital, fulfillment of liquidity needs and fiduciary control of cash and cash equivalents and investments. We also seek to maximize income from our investments without assuming significant risk. To achieve our goals, we maintain a portfolio of cash equivalents and investments in a variety of securities of high credit quality. The securities in our investment portfolio are not leveraged, are classified as available for sale and are, due to their short-term nature, subject to minimal interest rate risk. The fair market value of our fixed rate securities may be adversely impacted by increases in interest rates while income earned may decline as a result of decreases in interest rates. A hypothetical 100 basis-point (one percentage point) increase or decrease in interest rates compared to rates on [December 31, 2022](#) [December 31, 2023](#) would have affected the fair value of our investment portfolio by approximately [\\$2.5 million](#) [\\$2.7 million](#).

The 2030 Notes were recorded at fair value as of the closing date of the Exchange Transaction, less debt issuance costs, on our consolidated balance sheets. We carry our convertible senior notes remaining 2028 Notes at the principal amount, less unamortized debt issuance costs, on our Consolidated Balance Sheets, consolidated balance sheets. Because the notes 2030 Notes and 2028 Notes have a fixed annual interest rate rates of 1.375% and 1.50%, respectively, we do not have any economic interest rate exposure or financial statement risk associated with changes in interest rates. The fair value of the notes, however, may fluctuate when interest rates and the market price of our stock changes. See [Note 7. Convertible Senior Notes](#) in Part II, Item 8 of this Annual Form 10-K for additional information.

Foreign Exchange Risk

Our revenue, expense, and capital purchasing activities are primarily transacted in U.S. dollars; however, a portion of our operations is conducted in foreign currencies. As a result, we have foreign exchange exposures relating to non-U.S. dollar denominated cash flows and monetary assets and liabilities that are denominated in currencies other than U.S. dollars. The value of the amounts is exposed to changes in currency exchange rates from the time the transactions are originated, until the time the cash settlement is converted into U.S. dollars. Our foreign currency exposure is primarily concentrated in the Euro. A 10% strengthening of the U.S. dollar exchange rate against all currencies with which we have exposure, after taking into account offsetting positions at [December 31, 2022](#) [December 31, 2023](#) would have resulted in a [\\$1.3 million](#) [\\$0.9 million](#) decrease in the carrying amounts of those net assets. Actual gains and losses in the future may differ materially from these hypothetical gains and losses based on changes in the timing and amount of foreign currency exchange rate movements and our actual exposure. Our international operations are subject to risks typical of international operations, including, but not limited to, differing economic conditions, changes in political climate, differing tax structures, other regulations and restrictions, and foreign exchange rate volatility.

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ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

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Report of Independent Registered Public Accounting Firm**Firm**

To the Stockholders and the Board of Directors of Pacific Biosciences of California, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Pacific Biosciences of California, Inc. (the Company) as of **December 31, 2022** **December 31, 2023** and **2021, 2022**, the related consolidated statements of operations and comprehensive **(loss) income loss**, stockholders' equity and cash flows for each of the three years in the period ended **December 31, 2022** **December 31, 2023**, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at **December 31, 2022** **December 31, 2023** and **2021, 2022**, and the results of its operations and its cash flows for each of the three years in the period ended **December 31, 2022** **December 31, 2023**, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of **December 31, 2022** **December 31, 2023**, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated **February 28, 2023** **February 28, 2024**, expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter Matters

The critical audit **matter matters** communicated below **is a matter are matters** arising from the current period audit of the financial statements that **was were** communicated or required to be communicated to the audit committee and that: (1) **relates relate** to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of critical audit **matter matters** does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing **a separate opinion opinions** on the critical audit **matter matters** or on the **account accounts** or **disclosure disclosures** to which **it relates. they relate.**

Revenue recognition - Identification of performance obligations and allocation of contract consideration**Description of the Matter**

For the year ended December 31, 2022 December 31, 2023, the Company recognized revenue of \$128.3 million \$200.5 million, including \$108.7 million \$183.9 million of product revenue, which consists primarily of instrument sales and related consumables. As described in Note 1 to the consolidated financial statements, instrument sales are generally sold the Company may enter into contracts with customers that includes a combination of promised products and services, resulting in a bundled arrangement and commonly include the instrument, instrument accessories, training, and consumables. For bundled arrangements the containing multiple performance obligations. The Company identifies a performance obligation for each promise to transfer to the customer, a product or service that is distinct. The consideration for bundled arrangements is allocated between each performance obligation based on its individual standalone selling price, which is estimated by the Company, using historical sales data, as well as management judgment.

The Company enters into, or periodically modifies, revenue contracts with non-standard terms, requiring management to evaluate whether these non-standard terms represent a performance obligation. For example, the Company may offer specified discounts on current components of the bundled arrangements products within an arrangement and on future purchase options, for which historical information may not be available. As part of the Company's identification of performance obligations and the resulting determination of the allocation of contract consideration, the Company considers if these specified discounts represent a material right when compared to the estimated standalone selling price and, therefore, a performance obligation to be included in the allocation of the contract value.

Auditing management's identification of the performance obligations and the resulting determination of the allocation of contract consideration in certain contracts involved a higher degree of judgment due to the subjective nature of identifying certain performance obligations and the related determination of standalone selling price when it is not based on historical information.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design, and tested the operating effectiveness of the Company's internal controls addressing management's identification of performance obligations and allocation of contract consideration, including standalone selling price determination.

Our audit procedures included, among others, reading executed contracts for a sample of arrangements and evaluating whether terms of the contracts (including specified discounts on current and future purchase options) resulted in additional performance obligations. Additionally, we tested the completeness and accuracy of the information used in management's allocation of contract consideration, including the data incorporated in underlying calculations to determine standalone selling price.

Business combination - Valuation of intangible asset

Description of the Matter

As described in Note 2 to the consolidated financial statements, the Company completed its acquisition of Apton Biosystems, Inc. during 2023. The transaction was accounted for as a business combination, and the Company recorded an indefinite-lived intangible asset of \$55.0 million.

Auditing the Company's accounting for the acquisition was challenging because the determination of the fair value of the identified intangible asset, which consisted of in-process research and development (IPR&D), required management to make certain subjective estimates and assumptions. The Company used an income approach to measure the intangible asset. The valuation of the intangible asset is subject to higher estimation uncertainty due to management's judgments in determining significant assumptions, which included certain components of the revenue projection and the discount rate. A change in these significant assumptions could have a significant effect on the fair value of the intangible asset.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of controls addressing the identified audit risk. For example, we tested controls over management's review of the significant assumptions used to develop the fair value estimate of the intangible asset. We also tested management's controls to validate that data used in the fair value estimate was complete and accurate.

To test the estimated fair value of the intangible asset, we performed audit procedures that included, among others, evaluating the Company's valuation model with the assistance of valuation specialists, performing sensitivity analyses to determine which assumptions had the greatest impact on the overall determination of value, and testing the completeness and accuracy of the underlying data used to develop the assumptions. We also evaluated the assumptions by comparing them to market and economic trends, historical results of the Company's business and other guideline companies within the same industry.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2011.

San Mateo, California

February 28, 2023

2024

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PACIFIC BIOSCIENCES OF CALIFORNIA, INC.
Consolidated Balance Sheets

	December 31,			
	December 31,		December 31,	
			(in thousands, except per share amounts)	
(in thousands, except per share amounts)	2022	2021	2023	2022
Assets				
Current assets				
Current assets				
Current assets				
Cash and cash equivalents				

Cash and cash equivalents		
Cash and cash equivalents	\$ 325,089	\$ 460,725
Investments	447,229	583,675
Accounts receivable, net	18,786	24,241
Inventory, net	50,381	24,599
Prepaid expenses and other current assets	10,289	7,394
Short-term restricted cash	300	500
Total current assets	852,074	1,101,134
Property and equipment, net	41,580	32,504
Operating lease right-of-use assets, net	39,763	46,617
Long-term restricted cash	2,922	4,592
Intangible assets, net	410,245	410,979
Goodwill	409,974	409,974
Other long-term assets	10,528	1,170
Total assets	\$ 1,767,086	\$ 2,006,970
Liabilities and Stockholders' Equity		
Current liabilities		
Current liabilities		
Current liabilities		
Accounts payable		
Accounts payable		
Accounts payable	\$ 12,028	\$ 11,002
Accrued expenses	32,596	36,261
Deferred revenue, current	30,498	10,977
Operating lease liabilities, current	8,886	7,710
Other liabilities, current	7,233	5,759
Contingent consideration liability, current	172,094	—
Total current liabilities	263,335	71,709
Deferred revenue, non-current	1,794	25,049
Contingent consideration liability, non-current	—	169,717
Operating lease liabilities, non-current	41,070	49,970
Convertible senior notes, net, non-current	896,683	896,067
Other liabilities, non-current	1,300	3,471
Total liabilities	1,204,182	1,215,983
Commitments and contingencies		
Commitments and contingencies		
Commitments and contingencies		
Stockholders' equity		
Stockholders' equity		
Stockholders' equity		
Preferred stock, \$0.001 par value:		
Preferred stock, \$0.001 par value:		
Preferred stock, \$0.001 par value:		
Authorized 50,000 shares; No shares issued or outstanding	—	—
Authorized 50,000 shares; No shares issued or outstanding		
Authorized 50,000 shares; No shares issued or outstanding		
Common stock, \$0.001 par value:		
Authorized 1,000,000 shares; issued and outstanding 226,505 and 220,978 shares at December 31, 2022 and December 31, 2021, respectively	227	221
Authorized 1,000,000 shares; issued and outstanding 267,744 and 226,505 shares at December 31, 2023 and December 31, 2022, respectively		
Authorized 1,000,000 shares; issued and outstanding 267,744 and 226,505 shares at December 31, 2023 and December 31, 2022, respectively		
Authorized 1,000,000 shares; issued and outstanding 267,744 and 226,505 shares at December 31, 2023 and December 31, 2022, respectively		
Additional paid-in capital	2,099,782	2,009,945
Accumulated other comprehensive loss	(4,765)	(1,087)
Accumulated other comprehensive income (loss)		

Accumulated deficit	(1,532,340)	(1,218,092)
Total stockholders' equity	562,904	790,987
Total liabilities and stockholders' equity	\$ 1,767,086	\$ 2,006,970

See accompanying [notes](#) to the consolidated financial statements.

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PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Consolidated Statements of Operations and Comprehensive (Loss) Income

(in thousands, except per share amounts)	Years Ended December 31,		
	2022	2021	2020
Revenue:			
Product revenue	\$ 108,699	\$ 113,505	\$ 65,424
Service and other revenue	19,605	17,008	13,469
Total revenue	128,304	130,513	78,893
Cost of Revenue:			
Cost of product revenue	60,932	56,358	35,424
Cost of service and other revenue	13,899	14,989	10,903
Amortization of intangible assets	733	306	—
Loss on purchase commitment	3,705	—	—
Total cost of revenue	79,269	71,653	46,327
Gross profit	49,035	58,860	32,566
Operating Expense:			
Research and development	193,000	112,899	64,152
Sales, general and administrative	160,854	124,124	72,799
Merger-related expenses	—	31,129	—
Change in fair value of contingent consideration	2,377	1,143	—
Total operating expense	356,231	269,295	136,951
Operating loss	(307,196)	(210,435)	(104,385)
Gain from Reverse Termination Fee from Illumina	—	—	98,000
(Loss)/Gain from Continuation Advances from Illumina	—	(52,000)	34,000
Interest expense	(14,690)	(12,530)	(267)
Other income, net	7,638	93	2,055
(Loss) income before benefit from income taxes	(314,248)	(274,872)	29,403
Benefit from income taxes	—	(93,649)	—
Net (loss) income	(314,248)	(181,223)	29,403
Other comprehensive (loss) income:			
Unrealized (loss) gain on investments	(3,678)	(1,172)	80
Comprehensive (loss) income	\$ (317,926)	\$ (182,395)	\$ 29,483
Net (loss) income per share:			
Basic	\$ (1.40)	\$ (0.89)	\$ 0.18
Diluted	\$ (1.40)	\$ (0.89)	\$ 0.17
Weighted average shares outstanding used in calculating			
net (loss) income per share			
Basic	224,550	204,136	165,187
Diluted	224,550	204,136	174,970

See accompanying [notes](#) to the consolidated financial statements.

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PACIFIC BIOSCIENCES OF CALIFORNIA, INC.
Consolidated Statements of Stockholders' Equity

Operations and Comprehensive Loss

(in thousands)	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2019	153,119	\$ 153	\$ 1,120,999	\$ 5	\$ (1,066,240)	\$ 54,917
Net income	—	—	—	—	29,403	29,403
Other comprehensive gain	—	—	—	80	—	80
ASC 326 adoption effect	—	—	—	—	(32)	(32)
Issuance of common stock in conjunction with equity plans	9,819	10	46,350	—	—	46,360
Issuance of common stock from Underwritten Public Equity Offerings, net of issuance costs	29,356	29	187,201	—	—	187,230
Share-based compensation expense	—	—	17,533	—	—	17,533
Balance at December 31, 2020	192,294	\$ 192	\$ 1,372,083	\$ 85	\$ (1,036,869)	\$ 335,491
Net loss	—	—	—	—	(181,223)	(181,223)
Other comprehensive loss	—	—	—	(1,172)	—	(1,172)
Issuance of common stock in conjunction with equity plans	8,557	9	31,797	—	—	31,806
Issuance of common stock in Private Placement, net of issuance costs	11,215	11	294,834	—	—	294,845
Issuance of common stock in acquisition of Omniome	8,912	9	237,876	—	—	237,885
Share-based compensation expense	—	—	73,355	—	—	73,355
Balance at December 31, 2021	220,978	\$ 221	\$ 2,009,945	\$ (1,087)	\$ (1,218,092)	\$ 790,987
Net loss	—	—	—	—	(314,248)	(314,248)
Other comprehensive loss	—	—	—	(3,678)	—	(3,678)
Issuance of common stock in conjunction with equity plans	5,527	6	11,224	—	—	11,230
Share-based compensation expense	—	—	78,613	—	—	78,613
Balance at December 31, 2022	226,505	\$ 227	\$ 2,099,782	\$ (4,765)	\$ (1,532,340)	\$ 562,904

(in thousands, except per share amounts)	Years Ended December 31,		
	2023	2022	2021
Revenue:			
Product revenue	\$ 183,872	\$ 108,699	\$ 113,505
Service and other revenue	16,649	19,605	17,008
Total revenue	200,521	128,304	130,513
Cost of Revenue:			
Cost of product revenue	127,568	60,932	56,358
Cost of service and other revenue	14,754	13,899	14,989
Amortization of acquired intangible assets	1,983	733	306
Loss on purchase commitment	3,436	3,705	—
Total cost of revenue	147,741	79,269	71,653
Gross profit	52,780	49,035	58,860
Operating Expense:			
Research and development	187,170	193,000	112,899
Sales, general and administrative	169,818	160,854	124,124
Merger-related expenses	9,042	—	31,129
Change in fair value of contingent consideration	15,060	2,377	1,143
Amortization of acquired intangible assets	6,157	—	—
Total operating expense	387,247	356,231	269,295
Operating loss	(334,467)	(307,196)	(210,435)

Loss from Continuation Advances from Illumina	—	—	(52,000)
Loss on extinguishment of debt	(2,033)	—	—
Interest expense	(14,343)	(14,690)	(12,530)
Other income, net	32,684	7,638	93
Loss before benefit from income taxes	(318,159)	(314,248)	(274,872)
Benefit from income taxes	(11,424)	—	(93,649)
Net loss	(306,735)	(314,248)	(181,223)
Other comprehensive income (loss):			
Unrealized gain (loss) on investments	4,984	(3,678)	(1,172)
Comprehensive loss	<u>\$ (301,751)</u>	<u>\$ (317,926)</u>	<u>\$ (182,395)</u>
Net loss per share:			
Basic	<u>\$ (1.21)</u>	<u>\$ (1.40)</u>	<u>\$ (0.89)</u>
Diluted	<u>\$ (1.21)</u>	<u>\$ (1.40)</u>	<u>\$ (0.89)</u>
Weighted average shares outstanding used in calculating net loss per share			
Basic	<u>253,629</u>	<u>224,550</u>	<u>204,136</u>
Diluted	<u>253,629</u>	<u>224,550</u>	<u>204,136</u>

See accompanying [notes](#) to the consolidated financial statements.

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PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Consolidated Statements of **Cash Flows**

Stockholders' Equity

(in thousands)	Years Ended December 31,		
	2022	2021	2020
Cash flows from operating activities			
Net (loss) income	\$ (314,248)	\$ (181,223)	\$ 29,403
Adjustments to reconcile net loss to net cash used in operating activities			
Loss (gain) from Continuation Advances	—	52,000	(34,000)
Depreciation	9,480	7,199	6,428
Amortization of intangibles	913	381	—
Amortization of right-of-use assets	6,925	4,005	2,876
Amortization of debt discount and financing costs	640	539	129
Share-based compensation	78,613	73,355	17,533
Amortization of premium and accretion of discount on marketable securities, net	(244)	4,011	(107)
Change in the estimated fair value of contingent consideration	2,377	1,143	—
Inventory provision	6,027	678	527
Loss on disposition of equipment	278	54	—
Deferred income taxes	—	(93,649)	—
Changes in assets and liabilities			
Accounts receivable, net	5,455	(7,166)	(1,603)
Inventory, net	(33,906)	(13,109)	(1,623)
Prepaid expenses and other assets	(12,324)	(1,024)	(1,063)
Accounts payable	1,025	6,363	(5,072)

Accrued expenses	(3,651)	15,320	4,102
Deferred revenue	(3,734)	25,736	729
Operating lease liabilities	(7,724)	(4,990)	(3,802)
Other liabilities	887	(803)	5,046
Net cash (used in) provided by operating activities	(263,211)	(111,180)	19,503
Cash flows from investing activities			
Purchase of property and equipment	(16,750)	(5,931)	(1,039)
Purchase of intangible assets	(179)	—	—
Cash paid for purchase of Circulomics, net of cash acquired	—	(28,560)	—
Cash paid for purchase of Omniome, net of cash acquired	—	(291,233)	—
Purchase of investments	(442,788)	(988,046)	(373,283)
Sales of investments	—	212,734	1,400
Maturities of investments	575,800	422,505	153,600
Net cash provided by (used in) in investing activities	116,083	(678,531)	(219,322)
Cash flows from financing activities			
Continuation Advances	—	(52,000)	34,000
Proceeds from issuance of Convertible Senior Notes, net of issuance costs	—	895,536	—
Proceeds from issuance of common stock under equity offerings, net of issuance costs	—	294,845	187,479
Proceeds from issuance of common stock from equity plans	11,230	31,806	46,360
Notes payable principal payoff	(1,608)	(361)	(16,000)
Other	—	(245)	—
Net cash provided by financing activities	9,622	1,169,581	251,839
Net (decrease) increase in cash, cash equivalents, and restricted cash	(137,506)	379,870	52,020
Cash, cash equivalents, and restricted cash at beginning of period	465,817	85,947	33,927
Cash, cash equivalents, and restricted cash at end of period	\$ 328,311	\$ 465,817	\$ 85,947
Cash and cash equivalents at end of period	325,089	460,725	81,611
Restricted cash at end of period	3,222	5,092	4,336
Cash, cash equivalents, and restricted cash at end of period	\$ 328,311	\$ 465,817	\$ 85,947
Supplemental disclosure of cash flow information			
Interest paid	\$ 14,049	\$ 6,928	\$ 491
Supplemental disclosure of non-cash investing and financing activities			
Inventory transferred to property and equipment	\$ 2,812	\$ 2,586	\$ 1,097
Property and equipment transferred to inventory	\$ (715)	\$ (383)	\$ (919)
Right-of-use asset and liability additions and modifications	\$ —	\$ 2,576	\$ —
Issuance of common stock in acquisition of Omniome	\$ —	\$ 237,885	\$ —

	Common Stock		Additional	Accumulated	Other	Accumulated	Total
(in thousands)	Shares	Amount	Paid-in Capital		Comprehensive Income (Loss)	Deficit	Stockholders' Equity
Balance at December 31, 2020	192,294	\$ 192	\$ 1,372,083	\$	85	\$ (1,036,869)	\$ 335,491
Net loss	—	—	—		—	(181,223)	(181,223)
Other comprehensive loss	—	—	—		(1,172)	—	(1,172)
Issuance of common stock in conjunction with equity plans	8,557	9	31,797		—	—	31,806
Issuance of common stock in Private Placement, net of issuance costs	11,215	11	294,834		—	—	294,845
Issuance of common stock in acquisition of Omniome	8,912	9	237,876		—	—	237,885
Share-based compensation expense	—	—	73,355		—	—	73,355
Balance at December 31, 2021	220,978	\$ 221	\$ 2,009,945	\$	(1,087)	\$ (1,218,092)	\$ 790,987
Net loss	—	—	—		—	(314,248)	(314,248)
Other comprehensive loss	—	—	—		(3,678)	—	(3,678)
Issuance of common stock in conjunction with equity plans	5,527	6	11,224		—	—	11,230

Share-based compensation expense	—	—	78,613	—	—	78,613
Balance at December 31, 2022	226,505	\$ 227	\$ 2,099,782	\$ (4,765)	\$ (1,532,340)	\$ 562,904
Net loss	—	—	—	—	(306,735)	(306,735)
Other comprehensive income	—	—	—	4,984	—	4,984
Issuance of common stock following milestone achievement	8,988	9	84,752	—	—	84,761
Issuance of common stock in acquisition of Apton	6,121	6	76,636	—	—	76,642
Issuance of common stock in connection with Apton liquidity event bonus plan	169	—	2,111	—	—	2,111
Issuance of common stock from Underwritten Public Equity Offering, net of issuance costs	20,125	20	189,180	—	—	189,200
Issuance of common stock in conjunction with equity plans	5,836	6	15,313	—	—	15,319
Share-based compensation expense	—	—	72,118	—	—	72,118
Balance at December 31, 2023	267,744	\$ 268	\$ 2,539,892	\$ 219	\$ (1,839,075)	\$ 701,304

See accompanying [notes](#) to the consolidated financial statements.

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PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Consolidated Statements of Cash Flows

(in thousands)	Years Ended December 31,		
	2023	2022	2021
Cash flows from operating activities			
Net loss	\$ (306,735)	\$ (314,248)	\$ (181,223)
Adjustments to reconcile net loss to net cash used in operating activities			
Loss (gain) from Continuation Advances	—	—	52,000
Depreciation	11,463	9,480	7,199
Amortization of intangible assets	8,261	913	381
Amortization of right-of-use assets	6,810	6,925	4,005
Share-based compensation	72,118	78,613	73,355
Merger-related compensation expense	3,395	—	—
Loss on extinguishment of debt	2,033	—	—
Amortization of premium and accretion of discount on marketable securities, net	(12,840)	(244)	4,011
Change in the estimated fair value of contingent consideration	15,060	2,377	1,143
Inventory provision	10,584	6,027	678
Deferred income taxes	(11,424)	—	(93,649)
Other	1,059	918	593
Changes in assets and liabilities			
Accounts receivable, net	(17,829)	5,455	(7,166)
Inventory, net	(13,841)	(33,906)	(13,109)
Prepaid expenses and other assets	(8,984)	(12,324)	(1,024)
Accounts payable	206	1,025	6,363
Accrued expenses	13,103	(3,651)	15,320
Deferred revenue	(10,420)	(3,734)	25,736
Operating lease liabilities	(8,759)	(7,724)	(4,990)

Contingent consideration liability	(14,882)	—	—
Other liabilities	2,449	887	(803)
Net cash used in operating activities	(259,173)	(263,211)	(111,180)
Cash flows from investing activities			
Purchase of property and equipment	(8,843)	(16,750)	(5,931)
Purchase of intangible assets	—	(179)	—
Cash paid for purchases of acquired entities, net of cash acquired	(102)	—	(319,793)
Purchase of investments	(756,567)	(442,788)	(988,046)
Sales of investments	595	—	212,734
Maturities of investments	769,521	575,800	422,505
Net cash provided by (used in) in investing activities	4,604	116,083	(678,531)
Cash flows from financing activities			
Continuation Advances	—	—	(52,000)
Proceeds from issuance of Convertible Senior Notes, net of issuance costs	—	—	895,536
Proceeds from issuance of common stock under equity offerings, net of issuance costs	189,200	—	294,845
Proceeds from issuance of common stock from equity plans	15,319	11,230	31,806
Payment of debt issuance costs	(7,375)	—	—
Payment of contingent consideration	(86,411)	—	—
Notes payable principal payoff	(1,842)	(1,608)	(361)
Other	—	—	(245)
Net cash provided by financing activities	108,891	9,622	1,169,581
Net (decrease) increase in cash, cash equivalents, and restricted cash	(145,678)	(137,506)	379,870
Cash, cash equivalents, and restricted cash at beginning of period	328,311	465,817	85,947
Cash, cash equivalents, and restricted cash at end of period	\$ 182,633	\$ 328,311	\$ 465,817
Cash and cash equivalents at end of period	179,911	325,089	460,725
Restricted cash at end of period	2,722	3,222	5,092
Cash, cash equivalents, and restricted cash at end of period	\$ 182,633	\$ 328,311	\$ 465,817
Supplemental disclosure of cash flow information			
Interest paid	\$ 15,687	\$ 14,049	\$ 6,928
Supplemental disclosure of non-cash investing and financing activities			
Inventory transferred to property and equipment	\$ 3,984	\$ 2,812	\$ 2,586
Property and equipment transferred to inventory	\$ (7,022)	\$ (715)	\$ (383)
Right-of-use asset and liability additions and modifications	\$ —	\$ —	\$ 2,576
Issuance of common stock in acquisition of Apton and Omniome	\$ 76,642	\$ —	\$ 237,885
Issuance of common stock in connection with Apton liquidity event bonus plan	\$ 2,111	\$ —	\$ —
Convertible Senior Notes exchange	\$ 441,000	\$ —	\$ —
Issuance of common stock following milestone achievement	\$ 84,761	\$ —	\$ —

See accompanying [notes](#) to the consolidated financial statements.

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Notes to Consolidated Financial Statements

NOTE 1. ORGANIZATION AND SIGNIFICANT ACCOUNTING POLICIES

Business Overview

We are a life science technology company that is designing, developing, and manufacturing advanced sequencing solutions that enable scientists and clinical researchers to improve their understanding of the genome and ultimately, resolve genetically complex problems. Our products and technology under development stem from two highly differentiated core technologies focused on accuracy, quality, and completeness, which include our **existing** HiFi long-read sequencing technology and our **emerging short-read** Sequencing by Binding (SBB[®]) technology. Our products address solutions across a broad set of applications including human **genomics, genetics**, plant and animal sciences, infectious disease and microbiology, oncology, and other emerging applications. Our focus is on **providing creating some of the world's most advanced sequencing systems to provide** our customers with advanced sequencing technologies with higher throughput the most complete and improved workflows that we believe will enable dramatic advancements in routine healthcare. **accurate view of genomes, transcriptomes, and epigenomes.** Our customers include academic and governmental research institutions, commercial testing and service laboratories, genome centers, public health labs, hospitals and clinical research institutes, contract research organizations (CROs), pharmaceutical companies, and agricultural companies.

References in this report to "PacBio," "we," "us," the "Company," and "our" refer to Pacific Biosciences of California, Inc. and its consolidated subsidiaries.

Basis of Presentation and Consolidation

Our consolidated financial statements have been prepared in conformity with accounting principles generally accepted in the United States, or U.S. GAAP, as set forth in the Financial Accounting Standards Board, or FASB, Accounting Standards Codification, or ASC. The consolidated financial statements include the accounts of Pacific Biosciences and our wholly owned subsidiaries. All intercompany transactions and balances have been eliminated. Certain prior period amounts have been reclassified to conform to the current period presentation.

Use of Estimates

The preparation of financial statements in conformity with GAAP requires us to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes to the financial statements. On an ongoing basis, we evaluate our significant estimates including, but not limited to, the valuation of inventory, the **determination of stand-alone selling prices for revenue recognition**, the fair value of contingent consideration, the valuation of acquired intangible assets, the fair value of certain equity awards, the useful lives assigned to long-lived assets, the computation of provisions for income taxes, **the borrowing rate used in calculating the operating lease right-of-use assets and operating lease liabilities**, the probability associated with variable payments under partnership development agreements, and the valuations related to our convertible senior notes. While the extent of the potential impact of the current macroeconomic conditions and ongoing **COVID-19 pandemic** on our business is highly uncertain, we considered information available related to assumptions and estimates used to determine the results reported and asset valuations as of **December 31, 2022 December 31, 2023**. Actual results could differ materially from these estimates.

Functional Currency

The U.S. dollar is the functional currency of our international operations. We remeasure foreign subsidiaries monetary assets and liabilities to the U.S. dollar and record net gains or losses from remeasurement in other income, net, in the consolidated **statement statements** of operations and comprehensive **(loss) income**.

loss.

Cash, Cash Equivalents, Restricted Cash, and Investments

We consider all highly liquid investments purchased with an original maturity of 90 days or less to be cash equivalents. Cash equivalents may be comprised of money market funds, certificates of deposit, commercial paper, corporate bonds and notes, and government agencies' securities.

We classify our investments in debt securities as available-for-sale and report the investments at fair value in current assets. We evaluate our available-for-sale investments in unrealized loss positions and assess whether the unrealized loss is credit-related. Unrealized gains and losses that are not credit-related are recognized in accumulated other comprehensive **income (loss) income** in stockholders' equity. Realized gains and losses, expected credit losses, as well as interest income, on available-for-sale securities are also reported in other income, net. The cost used in the determination of gains and losses of securities sold is based on the specific identification method. The cost of marketable securities is adjusted for the amortization of premiums and discounts to expected maturity. Premium and discount amortization is recorded in other income, net.

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Our investment portfolio at any point in time contains investments in cash deposits, money market funds, commercial paper, corporate debt securities, and U.S. government and agency securities with high credit ratings. We have established guidelines regarding diversification and maturities of investments with the objectives of maintaining safety and liquidity, while maximizing yield.

Restricted cash includes cash that is not readily available for use in the Company's operating activities. Restricted cash is primarily comprised of cash pledged under letters of credit.

Concentration and Other Risks

Financial instruments that potentially subject us to credit risk consist principally of interest-bearing investments and trade receivables. We maintain cash, cash equivalents, and investments with various major financial institutions. The counterparties to the agreements relating to our investment securities consist of various major corporations, financial institutions, municipalities, and government agencies of high credit standing. At **December 31, 2022 December 31, 2023**, most of our cash was deposited with U.S. financial institutions. Our investment policy generally restricts the amount of credit exposure to any one issuer. There is no limit to the percentage of the portfolio that may be maintained in securities issued by the U.S. Treasury and U.S. Government Agencies, or other securities fully backed by U.S. Treasury or Government agencies. We have not experienced significant credit losses from financial institutions.

Our trade receivables are derived from revenue to customers and distributors located in the United States and other countries. We perform credit evaluations of our customers' financial condition and, generally, require no collateral from our customers. The allowance for credit losses is based on our assessment of the collectability of customer accounts. We regularly review our trade receivable receivables including consideration of factors such as historical experience, the age of the accounts receivable balances, customer creditworthiness, customer industry, and current and forecasted economic conditions that may affect a customer's ability to pay. We have not experienced any significant credit losses to date.

Although we have historically not experienced significant credit losses, our exposure to credit losses may increase if our customers are adversely affected by changes in economic pressures or uncertainty associated with local or global economic recessions, disruption associated with the current COVID-19 pandemic, or other customer-specific factors.

For the year ended December 31, 2023, no single customer accounted for 10% or greater of our total revenue. For the years ended December 31, 2022, and 2021, and 2020, one customer accounted for approximately 12%, 13%, and 14% 13% of our total revenue, respectively.

As of December 31, 2022 December 31, 2023 and 2021, 2022, 49% and 57% and 53% of our accounts receivable were from domestic customers, respectively. As of December 31, 2023, one customer represented approximately 10% of our net accounts receivable. As of December 31, 2022, one customer represented approximately 10% of our net accounts receivable. As of December 31, 2021, no customer represented 10% or greater of our net accounts receivable.

We currently purchase several key parts and components used in the manufacture of our products from a limited number of suppliers. Generally, we have been able to obtain an adequate supply of such parts and components but in certain instances have incurred additional costs to secure a supply of constrained material. An extended interruption in the supply of parts and components currently obtained from our suppliers could adversely affect our business and consolidated financial statements.

Inventory, Net

Inventories are stated at the lower of cost or net realizable value on a first-in, first-out ("FIFO") method. Adjustments to reduce the cost of inventory to its net realizable value, if required, are made for estimated excess or obsolete balances. Cost includes depreciation, labor, material, and overhead costs, including product and process technology costs while determining costs. Determining net realizable value of inventories involves numerous judgements, including projecting future average selling prices, sales volumes, and costs to complete products in work in process inventories.

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We make inventory purchases and commitments to meet future shipment schedules based on forecasted demand for our products. The business environment in which we operate is subject to rapid changes in technology and customer demand. We perform a detailed assessment of inventory each period, which includes a review of, among other factors, demand requirements, product life cycle and development plans, component cost trends, product pricing, product expiration, and quality issues. Based on our analysis, we record adjustments to inventory for potentially excess, obsolete, or impaired goods, when appropriate, to report inventory at net realizable value. Inventory adjustments may be required if actual demand, component costs, supplier arrangements, or product life cycles differ from our estimates. Any such adjustments would result in a charge to our results of operations.

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Property and Equipment, Net

Property and equipment are stated at cost, reviewed regularly for impairment, and depreciated over the estimated useful lives of the assets, using the straight-line method. Leasehold improvements are depreciated over the shorter of the lease term or the estimated useful life of the related asset. Major improvements are capitalized, while maintenance and repairs are expensed as incurred. Transfers of assets between property and equipment, net, and inventory are transferred at standard cost and recognized at carrying value.

Estimated useful lives of the major classes of property and equipment are as follows:

	Estimated Useful Lives
	3 to 10
Leasehold improvements	years
	3 to 5
Lab equipment	years
	3 to 5
Computer equipment	years
	3
Computer software	years
	3 to 5
Furniture and fixtures	years

Operating Leases

We record operating lease right-of-use assets and liabilities on our Consolidated Balance Sheets consolidated balance sheets for all leases with a term of more than 12 months. The operating lease right-of-use assets and liabilities are calculated as the present value of remaining minimum lease payments over the remaining lease term using our estimated secured incremental borrowing rates at the commencement date. Lease payments included in the measurement of the lease liability comprise the fixed rent per the term of the Lease. Operating lease expense is recognized on a straight-line basis over the lease term, with variable lease payments, such as common area maintenance fees, recognized in the period incurred.

Business Combinations

Under the acquisition method of accounting, we allocate the fair value of the total consideration transferred to the tangible and identifiable intangible assets acquired and liabilities assumed based on their estimated fair values on the date of acquisition. These valuations require us to make estimates and assumptions, especially with respect to intangible assets. We record the excess consideration over the aggregate fair value of tangible and intangible assets, net of liabilities assumed, as goodwill. Costs that we incur to complete the business combination, such as legal and other professional fees, are expensed as they are incurred.

In connection with certain acquisitions, contingent consideration can be earned by the sellers upon completion of certain future performance milestones. In these cases, a liability is recorded on the acquisition date for an estimate of the acquisition date fair value of the contingent consideration. These estimates require significant management judgment, including probabilities of achieving certain future milestones. Changes in the fair value of the contingent consideration subsequent to the acquisition date are recognized in operating expense in our consolidated statements of operations and comprehensive (loss) income.

loss.

If the initial accounting for a business combination is incomplete by the end of a reporting period that falls within the measurement period, we report provisional amounts in our financial statements. During the measurement period, we adjust the provisional amounts recognized at the acquisition date to reflect new information obtained about facts and circumstances that existed as of the acquisition date that, if known, would have affected the measurement of the amounts recognized as of that date. We record these adjustments to the provisional amounts with a corresponding offset to goodwill. Any adjustments identified after the measurement period are recorded in the consolidated statements of income.

operations and comprehensive loss.

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Goodwill, Intangible Assets, and Other Long-Lived Assets

Assets acquired, including intangible assets and capitalized in-process research and development ("IPR&D"), and liabilities assumed are measured at fair value as of the acquisition date. Goodwill, which has an indefinite useful life, represents the excess of cost over fair value of the net assets acquired. Intangible assets acquired in a business combination that are used for IPR&D activities are considered indefinite lived until the completion or abandonment of the associated research and development efforts. Upon reaching the end of the relevant research and development project (i.e., upon commercialization), the IPR&D asset is assessed for impairment and then amortized over its estimated useful life. If the relevant research and development project is abandoned, the IPR&D asset is expensed in the period of abandonment.

Goodwill and IPR&D are not amortized; however, they are reviewed for impairment at least annually. We perform annual impairment testing of goodwill in the second quarter of each year, and or more frequently if indicators of potential impairment exist. We generally perform annual impairment testing of IPR&D in the fourth quarter of each year, or more frequently if indicators of potential impairment exist.

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We perform our goodwill impairment analysis at the reporting unit level. We have one reporting unit, which aligns with our reporting structure and availability of discrete financial information. During the goodwill impairment review, we assess qualitative factors to determine whether it is more likely than not that the fair values of our reporting unit is less than the carrying amount, including goodwill. The qualitative factors include, but are not limited to, macroeconomic conditions, industry and market considerations, and our overall financial performance. If, after assessing the totality of these qualitative factors, we determine that it is not more likely than not that the fair value of our reporting unit is less than the carrying amount, then no additional assessment is deemed necessary. Otherwise, we proceed to compare the estimated fair value of the reporting unit with the carrying value, including goodwill. If the carrying amount of the reporting unit exceeds the fair value, we record an impairment loss based on the difference. We may elect to bypass the qualitative assessment in a period and proceed to perform the quantitative goodwill impairment test.

During the IPR&D impairment review, we assess qualitative factors to determine whether it is more likely than not that the fair value of the IPR&D is less than the carrying amount. The qualitative factors include, but are not limited to, macroeconomic conditions, industry-specific conditions, and company-specific conditions. If, after assessing the totality of these qualitative factors, we determine that it is not more likely than not that the fair value of the IPR&D is less than the carrying amount, then no additional assessment is deemed necessary. Otherwise, we proceed to compare the estimated fair value of the IPR&D with the carrying value. If the carrying amount of the IPR&D exceeds the fair value, we record an impairment loss based on the difference. We may elect to bypass the qualitative assessment in a period and proceed to perform the quantitative impairment test.

Finite-lived intangibles assets include our acquired developed technology and customer relationships. We capitalize finite-lived intangibles assets and generally amortize them on a straight-line basis over the estimated useful lives. We regularly review the carrying amount and useful lives of our finite-lived assets to determine whether indicators of impairment may exist which warrant adjustments to carrying values or estimated useful lives. If indicators of impairment exist, an impairment test is performed to assess the recoverability of the affected assets by determining whether the carrying amount of such assets exceeds the undiscounted expected future cash flows. If the affected assets are not recoverable, we

estimate the fair value of the assets and record an impairment loss if the carrying value of the assets exceeds the fair value. Factors that may indicate potential impairment include a significant decline in our stock price and market capitalization compared to the net book value, significant changes in the ability of a particular asset to generate positive cash flows for our strategic business objectives, and the pattern of utilization of a particular asset.

Revenue Recognition

Our revenue is generated primarily from the sale of products and services. Product revenue primarily consists of sales of our instruments and related consumables; service and other revenue consist primarily of revenue earned from product maintenance agreements.

We account for a contract with a customer when there is a legally enforceable contract between us and the customer, the rights of the parties are identified, the contract has commercial substance, and collectability of the contract consideration is probable. Revenues are recognized when control of the promised goods or services is transferred to our customers, or services are performed, in an amount that reflects the consideration we expect to be entitled to in exchange for those goods or services.

Our instrument sales are generally sold in

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We may enter into contracts with customers that include a bundled arrangement and commonly include the instrument, instrument accessories, training, and consumables. For such bundled arrangements, we account for individual combination of promised products and services, separately if they are distinct, that is, if a resulting in arrangements containing multiple performance obligations. We determine whether each product or service is separately identifiable distinct, in order to identify the performance obligations in the contract and allocate the contract transaction price among the distinct performance obligations. A performance obligation is considered distinct from other items obligations in a contract when it provides a benefit to the bundled package and if a customer can benefit from it either on its own or together with other resources that are readily available to the customer. Installation services are considered distinct from customer and is separately identified in the instrument contract. We consider a performance obligation satisfied once we have transferred control of a good or service to the customer, meaning the customer has the ability to use and obtain the benefit of the good or service. Therefore, instrument revenue is recognized upon transfer of control of the asset to the customer, which is generally upon delivery for sales made to our non-distributor customers and upon shipment for sales made to our distributor customers.

The consideration for bundled arrangements contracts with multiple performance obligations is allocated between separate performance obligations based on their individual standalone selling price. We determine the best estimate of standalone selling price using average selling prices over a 12-month period combined with an assessment of current market conditions. If the standalone selling price is not directly observable, we rely on estimates by considering multiple factors including, but not limited to, overall market conditions, including geographic or regional specific factors, internal costs, profit objectives, pricing practices, and other observable inputs. We recognize revenues as performance obligations are satisfied by transferring control of the product or service to the customer or over the term of a product maintenance agreement with a customer. Our revenue arrangements generally do not provide a right of return. Revenue is recorded net of discounts and sales taxes collected on behalf of governmental authorities.

Certain of our agreements provide options to customers which can be exercised at a future date, such as the option to purchase our product at discounted prices, among others. In accounting for customer options, we determine whether an option is a material right and this requires us to exercise significant judgment. If a contract provides the customer an option

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to acquire additional goods or services at a discount that exceeds the range of discounts that we typically give for that product or service for the same class of customer, or if the option provides the customer certain additional goods or services for free, the option may be considered a material right. If the contract gives the customer the option to acquire additional goods or services at their normal standalone selling prices, we would likely determine that the option is not a material right and, therefore, account for it as a separate performance obligation when the customer exercises the option. If the standalone selling price of the option is not directly observable, an estimated standalone selling price is utilized which considers adjustments for discounts that the customer could receive without exercising the option and the likelihood that the option will be exercised. We may also utilize the alternative approach to estimate the standalone selling price, available pursuant to the applicable accounting guidance, to the extent we conclude the applicable criteria for using the alternative approach has been met. We update the transaction price for expected consideration, subject to constraint, each reporting period if our estimate of future goods to be ordered by customers change.

Additionally, we generally provide a one-year warranty on instruments. We accrue the cost of the assurance warranty when revenue of the instrument is recognized. Employee sales commissions are generally recorded as selling, general, and administrative expense when incurred as the amortization period for such costs, if capitalized, would have been one year or less.

Cost of Revenue

Cost of revenue reflects the direct cost of product components, third-party manufacturing services, and our internal manufacturing overhead and customer service infrastructure costs incurred to produce, deliver, maintain, and support our instruments, consumables, and services.

Manufacturing overhead is predominantly comprised of labor and facility costs. We capitalize manufacturing overhead into inventory based on a standard cost model that approximates actual costs.

Service costs include the direct costs of components used in support, repair and maintenance of customer instruments as well as the cost of personnel, materials, shipping and support infrastructure necessary to support our installed customer base.

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Research and Development

Research and development expense consists primarily of expenses for personnel engaged in the development of our core technology, the design and development of our future products and current product enhancements. These expenses also include prototype-related expenditures, development equipment and supplies, partner development costs, facilities costs, and other related overhead. We expense research and development costs during the period in which the costs are incurred. We defer and capitalize non-refundable advance payments made for research and development activities until the related goods are received or the related services are rendered.

Credit Losses

Trade accounts receivable

The allowance for credit losses is based on our assessment of the collectability of customer accounts. We regularly review the allowance by considering factors such as the age of the accounts receivable balances, customer creditworthiness, customer industry, and current and forecasted economic conditions that may affect a customer's ability to pay. Credit loss expense was immaterial for the years ended **December 31, 2022**, **December 31, 2023**, **2022**, and 2021.

Available-for-sale debt securities

Our investment portfolio **at any point in time** contains investments in cash deposits, money market funds, commercial paper, corporate debt securities and U.S. government and agency securities. We regularly assess whether our securities in an unrealized loss position are credit related. The credit-related portion of unrealized losses, and any subsequent improvements, are recorded in interest income. Unrealized losses that are not credit related are included in accumulated other comprehensive **income**, **income (loss)**. The unrealized losses on our investments are mainly attributable to government securities, including U.S. government and U.S. agency bond securities, impacted by movements in market rates and not due to issuer credit risk. We have the ability to hold and do not intend to sell the investments in unrealized loss positions before the recovery of their amortized cost bases.

Although we have historically not experienced significant credit losses, our exposure to credit losses may increase if our customers are adversely affected by changes in economic pressures or uncertainty associated with local or global economic recessions, disruptions associated with the evolution of **the COVID-19 pandemic**, **or other epidemics or pandemics**, or other customer-specific factors.

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Income Taxes

We account for income taxes under the asset and liability method, which requires, among other things, that deferred income taxes be provided for temporary differences between the tax bases of our assets and liabilities and the amounts reported in the financial statements. In addition, deferred tax assets are recorded for the future benefit of utilizing net operating losses and research and development credit carryforwards. The effect of a change in tax rates on the deferred tax assets and liabilities is recognized in the provision for income taxes in the period that includes the enactment date. A full valuation allowance is provided against our net deferred tax assets as it is more likely than not that the deferred tax assets will not be fully realized.

We regularly review our positions taken relative to income taxes. To the extent our tax positions are more likely than not going to result in additional taxes, we accrue the estimated amount of tax related to such uncertain positions.

Share-based Compensation

We **account** **recognize share-based compensation expense** for **share-based payments using a fair-value based method for costs related to all** share-based payments, including stock options, restricted **stock units**, **performance** stock units and stock issued under our employee stock purchase plan ("**ESPP**" ("**ESPP**"), **based on the grant-date fair value**. We estimate the fair value of **share-based payment awards that are** stock options and **issued under our ESPP on the date of grant** using an option-pricing model. See [Note 10, Stockholders' Equity](#) for further information regarding share-based compensation.

Other Comprehensive **Income (Loss) Income**

Other comprehensive **income (loss)** **income** is comprised of unrealized **gains (losses)** **gains** on our investment securities.

Shipping and Handling

Costs related to shipping and handling are included in cost of revenues for all periods presented.

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Earnings per Share

Basic net (loss) income loss per share is computed by dividing net (loss) income loss by the weighted-average number of shares of common stock outstanding during the period. Diluted net (loss) income loss per share is computed using the weighted-average number of shares of common stock outstanding and potential shares assuming the dilutive effect of outstanding stock options, restricted stock units, and common stock issuable pursuant to our ESPP, using the treasury stock method.

Recent Accounting Pronouncements

Recently Adopted Accounting Standards

There are no accounting standards updates ("ASUs") that have been recently adopted and are applicable to our consolidated financial statements.

Accounting Pronouncements Pending Adoption

In October 2021, the FASB issued ASU Accounting Standards Update ("ASU") No. 2021-08, *Business Combinations (Topic 805): Accounting for Contract Assets and Contract Liabilities from Contracts with Customers*. This ASU provides specific guidance on how to recognize contract assets and contract liabilities related to revenue contracts with customers acquired in a business combination. This amendment improves comparability for both the recognition and measurement of acquired revenue contracts with customers at the date of and after a business combination. We adopted this ASU on January 1, 2023. The adoption of this guidance did not have a material effect on our consolidated financial statements.

Accounting Pronouncements Pending Adoption

In December 2023, the FASB issued ASU 2023-09, *Income Taxes (Topic 740): Improvements to Income Tax Disclosures*. This ASU requires entities to expand its existing income tax disclosures, specifically related to the rate reconciliation and income taxes paid. This authoritative guidance will be effective for us in fiscal year 2025, with early adoption permitted. The Company is currently evaluating the first quarter impact of 2023. The adoption of this guidance is the ASU but does not expected to have a expect any material effect on our consolidated financial statements. impacts upon adoption.

NOTE 2. BUSINESS ACQUISITIONS

Apton Biosystems

On August 2, 2023, we acquired Apton Biosystems, Inc. ("Apton"), a California-based genomics company focused on developing a high throughput short-read sequencer using highly differentiated optics and image processing, paired with novel clustering and chemistry (the "Apton acquisition").

In connection with the Apton acquisition, all outstanding equity securities of Apton were cancelled in exchange for shares of our common stock with a fair value of \$76.6 million, cash of \$0.2 million, and contingent consideration with a preliminary estimated fair value of \$18.5 million. Excluded from consideration transferred was \$1.3 million attributable to accelerated share-based compensation expense. The fair value of the 6,121,571 common shares issued was determined based on the closing market price of our common stock on the acquisition date.

In connection with the Apton acquisition, contingent consideration of \$25.0 million, which we may elect to pay in cash, shares of our common stock or a combination of cash and shares of our common stock, is due upon the achievement of a milestone, defined as the achievement of \$50.0 million in revenue associated with Apton's technology, provided that the milestone event occurs prior to the 5-year anniversary of the closing date of the acquisition. At this time, the number of shares, if any, to be issued in connection with the achievement of the specified milestone is not known and will be calculated based on the daily volume-weighted average price of our common stock for the twenty trading days ending on and including the fifth trading day immediately prior to the occurrence of the specified milestone. Upon achievement of the milestone, we may pay cash in lieu of our common stock to ensure that the issuance of our common stock does not exceed 19.9% of our outstanding shares of common stock then outstanding.

The contingent consideration is accounted for as a liability at fair value, with changes during each reporting period recognized in our consolidated statements of operations and comprehensive loss. The fair value of the contingent consideration liability is calculated, with the assistance from a third-party valuation firm, using a Monte Carlo Simulation to estimate the volatility and systematic relative risk of revenues subject to sales milestone payments and discounting the associated cash payment amounts to their present values using a credit-risk-adjusted interest rate.

We allocated the consideration transferred to the identifiable assets acquired and liabilities assumed based on preliminary estimates of their respective fair values at the date of the completion of the Apton acquisition, and such allocation is subject to adjustment for up to one year after the close of the acquisition as additional

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information is obtained. The major classes of assets and liabilities to which we have allocated the total fair value of the consideration transferred, based on the preliminary estimated fair values were as follows (in thousands):

Cash and cash equivalents	\$	97
In-process research and development		55,000
Goodwill		52,287
Other assets, current		153
Deferred income tax liability		(11,338)
Liabilities assumed		(2,191)
Total consideration transferred	\$	94,008

The purchase price allocation is preliminary, primarily due to the pending finalization of review of various tax attributes. We continue to collect information regarding certain estimates and assumptions, including potential liabilities and contingencies. We will record adjustments to the fair value of the assets acquired, liabilities assumed and goodwill within the twelve months measurement period, if necessary. During the year ended December 31, 2023, we recorded a measurement period adjustment of \$1.6 million to decrease goodwill, and a corresponding \$2.0 million increase in intangible assets and \$0.4 million decrease in the deferred tax liability on the consolidated balance sheets, and a \$0.7 million increase to our benefit from income taxes on the consolidated statements of operations and comprehensive loss. The measurement period adjustment was due to new information that became available to us upon the completion of the valuation assessment of the in-process research and development and the tax provision.

We incurred costs related to the Apton acquisition of approximately \$9.0 million during the year ended December 31, 2023, which are included in merger-related expenses on the consolidated statement of operations and comprehensive loss. Merger-related expenses include \$2.8 million relating to a liquidity event bonus plan that was treated as a separate transaction and included the issuance of 168,621 shares of common stock that were issued with a fair value of \$2.1 million based on the closing market price of our common stock on the acquisition date. As a result, the total shares issued in connection with the Apton acquisition were 6.3 million shares of common stock.

The excess of the value of consideration paid over the aggregate fair value of those net assets has been recorded as goodwill. We recognized goodwill of \$52.3 million, based on preliminary estimates, which is primarily attributable to the synergies expected to occur from the integration of Apton and is not deductible for income tax purposes. We preliminarily allocated \$55.0 million of the purchase price to acquired in-process research and development ("IPR&D"). The fair value of the IPR&D was determined, with the assistance of a third-party valuation firm, using an income approach based on a forecast of expected future cash flows. Expected future cash flows utilize significant assumptions such as assumed revenue projections and discount rate.

Omniome, Inc.

On September 20, 2021, we completed our acquisition of Omniome, Inc. ("Omniome"), a San Diego-based company, to obtain their proprietary short-read DNA sequencing platform capable of delivering high accuracy (the "Omniome acquisition").

In connection with the Omniome acquisition, all outstanding equity securities of Omniome were cancelled in exchange for approximately ~~\$315.7 million~~ \$315.7 million in cash, 8,911,580 shares of our common stock with a fair value of ~~\$249.4 million~~ \$249.4 million and contingent consideration with a fair value of ~~\$168.6 million~~ \$168.6 million. The fair value of the 8,911,580 common shares issued was determined based on the closing market price of PacBio's common shares on the acquisition date.

In addition, approximately ~~\$18.9 million~~ \$18.9 million, comprised of ~~\$7.4 million~~ \$7.4 million of cash, 226,811 shares of our common stock with a fair value of ~~\$6.3 million~~ \$6.3 million, and ~~\$5.2 million~~ \$5.2 million related to contingent consideration, was accounted for as a one-time ~~post acquisition~~ post-acquisition share-based compensation expense. This share-based compensation expense was due to accelerated vesting of Omniome stock awards in connection with the acquisition.

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In connection with the acquisition the contingent consideration of ~~\$200 million~~ \$200 million (composed of ~~\$100 million~~ \$100 million in cash and ~~\$100 million~~ \$100 million in shares of our common stock) is due upon the achievement of a milestone, defined as the first commercial shipment to a customer of a nucleotide sequencing platform, comprising both an instrument and related consumables, that utilizes SBB technology. The number of shares of stock to be issued will be determined using the volume-weighted average of the trading prices of our common stock for the twenty trading days ending with and including the trading day that is two days immediately prior to the achievement of the milestone. Of the ~~\$100 million~~ \$100 million in shares of our common stock to be issued as part of the milestone, ~~\$4.1 million~~ \$4.1 million was attributable to stock options issued by PacBio in replacement of Omniome's unvested options as part of the transaction. Upon achievement of the milestone, shares will be issued not in excess of an amount equal to 19.9% of our outstanding shares of common stock on the date of closing (prior to the issuance of any shares issued in connection with the transaction or the related private placement), less 11,500,000 shares.

The contingent consideration is accounted for as a liability at fair value, with changes during each reporting period recognized in our Consolidated Statements of Operations and Comprehensive Loss. The fair value of the contingent consideration liability is calculated, with the assistance from a third-party valuation firm, using a scenario-based method that considers a range of possible outcomes and their assigned probabilities of occurrence. The potential outcomes are discounted to present value at a discount rate equal to the sum of the term-matched risk-free-interest rate plus PacBio's credit spread. On September 20, 2023, we achieved the commercial milestone in connection with the acquisition of Omniome. See

[Note 5, Financial Instruments](#) for additional information on amounts paid and shares issued to former Omniome securityholders during the year ended December 31, 2023.

Total consideration transferred for the acquisition is as follows (in thousands):

Total cash paid	\$315,703
Fair value of share consideration	249,435
Fair value of contingent consideration	168,574
Less: Share-based compensation expense excluded from consideration transferred	(18,923)
Total consideration transferred	\$714,789

The acquisition was accounted for as a business combination and, accordingly, the total fair value of the consideration transferred was allocated to the tangible and intangible assets acquired and liabilities assumed based on their fair values on the acquisition date. As of December 31, 2021, the major classes of assets and liabilities to which we have allocated the total fair value of the consideration transferred were as follows (in thousands):

Cash and cash equivalents	\$ 15,338
Property and equipment, net	6,123
Operating lease right-of-use assets, net	18,095
In-process research and development ("IPR&D")	400,000
Goodwill	390,665
Other assets, non-current	3,203
Deferred income tax liability	(91,814)
Liabilities assumed	(26,821)
Total consideration transferred	\$714,789

During the year ended December 31, 2021, we recorded a measurement period adjustment of ~~\$1.6 million~~ \$1.6 million to decrease goodwill and a corresponding ~~\$0.4 million~~ \$0.4 million to decrease the deferred tax liability on the Consolidated Balance Sheet, and a ~~\$1.2 million~~ \$1.2 million decrease to our benefit from income taxes on the Consolidated Statements of Operations and Comprehensive (Loss) Income. The measurement period adjustment was due to new information that became available to us upon the completion of the IRC Section 382 Tax Study, where we identified additional net operating losses that are available to us from acquired assets. Refer to *Note 9 – Income Taxes*, in Part II, Item 8 of the [Annual Report on Form 10-K for the year ended December 31, 2021](#) for more information. There were no measurement period adjustments recorded in the year ended December 31, 2022.

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The goodwill recognized was primarily attributable to the assembled workforce and synergies that are expected to occur from the integration of Omniome and is not deductible for income tax purposes.

We incurred costs related to the Omniome acquisition of approximately ~~\$12.0 million~~ \$12.0 million during the twelve months ended December 31, 2021, which are included in merger-related costs on the Consolidated Statement of Operations and Comprehensive (Loss) Income. No significant merger-related costs were incurred during the twelve months ended December 31, 2022.

The following unaudited pro forma financial information presents combined results of operations for each of the periods presented as if Omniome had been acquired as of the beginning of 2020, giving effect on a pro forma basis to the purchase accounting adjustments such as ~~\$12.0 million~~ \$12.0 million of PacBio acquisition-related costs, ~~\$18.9 million~~ \$18.9 million of share-based compensation expense related to acceleration of certain Omniome stock options not attributable to pre-combination service, and a ~~\$91.0 million~~ \$91.0 million one-time income tax benefit from the reduction of our deferred tax asset valuation allowance resulting from the Omniome acquisition, as well as a pro forma adjustment to reflect ~~\$16.7 million~~ \$16.7 million of Omniome's acquisition-related costs.

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The unaudited pro forma information presented below is for informational purposes only and is not necessarily indicative of the consolidated results of the combined business had the acquisition actually occurred at the beginning of 2020 or the results of future operations of the combined business.

The following table summarizes the unaudited pro forma financial information:

	Years Ended December 31,	
	2021	2020
(in thousands, except per share amounts)		
Pro forma total revenue	\$ 130,513	\$ 78,893
Pro forma net (loss) income	\$ (278,451)	\$ 17,510

Pro forma net (loss) income per share - basic and diluted	\$	(1.27)	\$	0.09
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Our consolidated financial statements include the results of operations for Omniome beginning September 20, 2021. Revenues of \$0 and a net loss of \$15.6 million \$15.6 million from the acquired Omniome business have been included in our Consolidated Statement of Operations and Comprehensive (Loss) Income for the twelve months ended December 31, 2021.

Circulomics, Inc.

On July 20, 2021, we acquired Circulomics Inc. ("Circulomics"), a Maryland-based biotechnology company focused on delivering highly differentiated sample preparation products that enable genomic workflows (the "Circulomics acquisition").

We paid \$29.5 million \$29.5 million in cash in exchange for all outstanding shares of common stock of Circulomics. We allocated the consideration transferred to the identifiable assets acquired and liabilities assumed based on their respective fair values at the date of the completion of the Circulomics acquisition. The major classes of assets and liabilities to which we have allocated the total fair value of the consideration transferred were as follows (in thousands):

Cash and cash equivalents	\$	987
Property and equipment, net		214
Intangible assets		11,360
Goodwill		19,309
Other assets, non-current		467
Deferred income tax liability		(2,672)
Liabilities assumed		(118)
Total consideration transferred	\$	29,547

The excess of the value of consideration paid over the aggregate fair value of those net assets has been recorded as goodwill. We recognized goodwill of \$19.3 million, \$19.3 million, which is primarily attributable to the synergies expected from capabilities in extraction and sample preparation and is not deductible for income tax purposes. We recorded \$11.4 million \$11.4 million for the fair value of acquired intangible assets, which consists of developed technology and customer relationships.

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NOTE 3. INVITAE COLLABORATION

On June 24, 2022, we entered into an Amended and Restated Development and Commercialization Agreement (the "Amended and Restated Agreement") with Invitae Corporation ("Invitae"). The Amended and Restated Agreement amended and restated the existing Development and Commercialization Agreement, effective as of January 12, 2021, as amended by Amendment No. 1 to Development and Commercialization Agreement, entered into on June 3, 2021, by and between us and Invitae (together, the "Original Agreement"). Unless otherwise agreed in writing or terminated in accordance with the Amended and Restated Agreement, the term of the Amended and Restated Agreement shall continue until June 30, 2028 ("Term").

Pursuant to the Original Agreement, Invitae provided certain funding to us to develop products relating to production-scale high-throughput sequencing ("Program Products"). If Program Products were to become commercially available, Invitae had the right to purchase the Program Products at preferred pricing.

Under the Amended and Restated Agreement, we will continue to receive feedback, input and insight from Invitae in connection with the intended development of our new sequencing systems; however, such feedback will not be contractually required, and Invitae has no contractual right to participate in decisions regarding the development program for such new sequencing systems. Our development plans for such new sequencing systems will be at our discretion and pursuant to our own internal processes and programs. Invitae will not be contractually obligated to reimburse us for development costs under the Amended and Restated Agreement. There can be no assurances that the in-development sequencing systems will continue to be developed, be successfully developed or become available for commercial sale.

In consideration of the non-refundable payments received from Invitae pursuant to the Original Agreement of \$23.5 million, we will provide Invitae with credits in connection with Invitae's anticipated purchase of certain currently available and in-development sequencing systems (instruments, consumables and consumables service contracts). The credits will expire on June 30, 2025 ("Credit Expiration Date"). Subject to certain conditions, Invitae will also be entitled to most favored pricing for the Company's Sequel IIe systems and certain in-development systems through the Term.

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We and Invitae may terminate the Amended and Restated Agreement if the other party remains in material breach of the Amended and Restated Agreement following a cure period to remedy the material breach.

The Amended and Restated Agreement **is was** deemed a contract modification and accounted for on a prospective basis in accordance with ASC Topic 606. We will recognize proportionate amounts of the transaction price, including payments made by Invitae to us pursuant to the Original Agreement, in revenue as the remaining performance obligations are **satisfied, satisfied**, which is when Invitae places purchase orders for certain **currently available and in-development** sequencing platforms and the associated goods **or services** are delivered. Any remaining unused credits will be recognized when they expire.

During the year ended December 31, 2022,

Invitae purchased certain **currently available** instruments and consumables under the terms of the Amended and Restated Agreement, for which **\$10.5 million** and **\$3.7 million** of revenue was recognized as product revenue **during the years ended December 31, 2023 and 2022, respectively**, on the **Consolidated Statements consolidated statements** of **Operations operations** and **Comprehensive (Loss) Income** under the terms of the Amended and Restated Agreement.

comprehensive loss.

As of **December 31, 2022** **December 31, 2023**, **\$21.4 million** **\$8.0 million** of deferred revenue, current, and **\$2.9 million of deferred revenue, non-current**, is recorded on the **Consolidated Balance Sheet consolidated balance sheet** relating to all future performance obligations under the Amended and Restated Agreement.

NOTE 4. TERMINATION OF MERGER WITH ILLUMINA

On November 1, 2018, we entered into an Agreement and Plan of Merger (as amended, the "Illumina Merger Agreement") with Illumina, Inc. ("Illumina") and FC Ops Corp., a wholly owned subsidiary of Illumina ("Illumina Merger Sub"). On January 2, 2020, we, Illumina and Illumina Merger Sub, entered into an agreement to terminate the Merger Agreement (the "Termination Agreement").

Continuation Advances from Illumina

As part of the Termination Agreement, Illumina paid us cash payments ("Continuation Advances") totaling \$52 million. Up to the full \$52.0 million of Continuation Advances paid to us were repayable without interest to Illumina if, within two years of March 31, 2020, we entered into, or consummated a Change of Control Transaction or raised at least \$100 million in a single equity or debt financing (that may have multiple closings), with the amount repayable dependent on the amount raised by us.

Resulting from the issuance and sale of \$900 million of 1.50% Convertible Senior Notes due February 15, 2028, **\$52.0 million** **\$52.0 million** of Continuation Advances were paid without interest to Illumina in February 2021 and recorded a

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non-operating expense in the **Consolidated Statements consolidated statements** of **Operations operations** and **Comprehensive (Loss) Income comprehensive loss** for the year ended December 31, 2021.

NOTE 5. FINANCIAL FINANCIAL INSTRUMENTS

Fair Value of Financial Instruments

Fair value is the exchange price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

The fair value hierarchy established under GAAP requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. The three levels of inputs that may be used to measure fair value are as follows:

- • Level 1: quoted prices in active markets for identical assets or liabilities;
- • Level 2: inputs other than Level 1 that are observable, either directly or indirectly, such as quoted prices in active markets for similar assets or liabilities, quoted prices for identical or similar assets or liabilities in markets that are not active, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities; and
- • Level 3: unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

We consider an active market as one in which transactions for the asset or liability occurs with sufficient frequency and volume to provide pricing information on an ongoing basis. Conversely, we view an inactive market as one in which there are few transactions for the asset or liability, the prices are not current, or price quotations vary substantially either over time or among market makers. Where appropriate, our non-performance risk, or that of our counterparty, is considered in determining the fair values of liabilities and assets, respectively.

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We classify our cash deposits and money market funds within Level 1 of the fair value hierarchy because they are valued using bank balances or quoted market prices. We classify our investments as Level 2 instruments based on market pricing and other observable inputs. We did not classify any of our investments within Level 3 of the fair value hierarchy.

Assets and liabilities measured at fair value are classified in their entirety based on the lowest level input that is significant to the fair value measurement. Our assessment of the significance of a particular input to the entire fair value measurement requires management to make judgments and consider factors specific to the asset or liability.

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The following table sets forth the fair value of our financial assets and liabilities that were measured on a recurring basis as of December 31, 2022, December 31, 2023 and December 31, 2021, respectively:

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Contingent consideration	\$	—	\$	—	\$	172,094	\$	172,094	\$	—	\$	—	\$	169,717	\$	169,717
Liabilities																
Liabilities																
Contingent consideration - Omniome acquisition																
Contingent consideration - Omniome acquisition																
Contingent consideration - Omniome acquisition																
Contingent consideration - Apton acquisition																
Total liabilities measured at fair value	\$	—	\$	—	\$	172,094	\$	172,094	\$	—	\$	—	\$	169,717	\$	169,717

We classify contingent consideration, which was incurred in connection with the acquisition of **Omniome**, within Level 3 as factors used to develop the estimate of fair value include unobservable inputs that are not supported by market activity and are significant to the fair value.

Estimates and assumptions used in the Monte Carlo simulation include risk-adjusted forecasted revenues for products and services leveraging Apton's technology and an estimated credit spread.

We estimate the fair value of the contingent consideration liability by discounting based on the probability-weighted outcomes simulated revenue of the Company through the 5-year anniversary of the closing date of the acquisition. As of December 31, 2023, the key input used in the determination of the fair value included projected revenues of the Company relating to present value using an estimate of our borrowing rate the high-throughput short-read products and the risk-free rate. The potential outcomes of milestone achievement dates are within the period from June 30, 2023 to June 30, 2025. services leveraging Apton's technology. A decrease in the probability of an earlier scenario within this range projected revenues would result in a decrease in the fair value of the liability. The discount rates used are the sum of the U.S. risk-free rate and the estimated subordinated credit spread for B- and B credit rating, which ranges from 10.1% 7.8% to 10.5% 8.2%. Changes in our estimated subordinated credit spread can result in changes in the fair value of the contingent consideration liability, where a lower credit spread may result in an increased liability valuation.

On September 20, 2023, we achieved the commercial milestone in connection with the acquisition of Omniome. Consequently, former Omniome securityholders were entitled to receive as milestone consideration, among other things, an aggregate of approximately \$100.9 million in cash and approximately 9.0 million shares of our common stock, representing \$95.9 million divided by the volume-weighted average of the trading prices of our common stock for the twenty trading days ending with and including the trading day that was two days

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immediately prior to the achievement of the milestone. The \$95.9 million represents the \$100.0 million that was to be paid in shares of our common stock offset by \$4.1 million attributable to stock options issued by PacBio in replacement of Omniome's unvested options as part of the transaction, pursuant to the terms of the Omniome merger agreement.

Following the achievement of the commercial milestone, \$101.3 million of the contingent consideration, which includes certain payroll taxes, was paid during the year ended December 31, 2023. Additionally, 8,988,391 shares were issued at a value of \$84.8 million to the former Omniome securityholders.

As a result of the achievement of the milestone, the contingent consideration liability incurred in connection with the acquisition of Omniome was no longer considered a Level 3 liability at December 31, 2023. There were no transfers between Level 1, Level 2, or Level 3 assets or liabilities reported at fair value on a recurring basis for the year ended December 31, 2023, and our valuation techniques did not change compared to the prior year.

Changes in the estimated fair value of the contingent consideration liability for the year ended **December 31, 2022** December 31, 2023 were as follows:

(in thousands)	Level 3	
Beginning balance as of December 31, 2021 December 31, 2022	\$ 169,717	172,094
Additions	18,450	
Change in estimated fair value	15,060	2,377
Achievement of milestone	(186,054)	
Ending balance as of December 31, 2022 December 31, 2023	\$ 172,094	19,550


Changes to the fair value are recorded as the Change in fair value of contingent consideration in the **Consolidated Statement** consolidated statement of **Operations** operations and **Comprehensive (Loss) Income**.

comprehensive loss.

The following table summarizes our cash, cash equivalents, restricted cash, and investments:

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(in thousands)	Cost	gains	losses	Value	(in thousands)	Amortized Cost	Gross unrealized gains	Gross unrealized losses	Fair Value
Cash and cash equivalents:									
Cash and money market funds									
Cash and money market funds									
Cash and money market funds	\$ 327,316	\$ —	\$ —	\$ 327,316					
Commercial paper	133,190	—	(5)	133,185					
U.S. government & agency securities	225	—	—	224					
Total cash and cash equivalents	460,731	—	(5)	460,725					
Investments:									
Commercial paper									
Commercial paper									
Commercial paper	187,705	—	(73)	187,632					
Corporate debt securities	8,964	9	(5)	8,968					
U.S. government & agency securities	388,088	1	(1,014)	387,075					
Total investments	584,757	10	(1,092)	583,675					
Total cash, cash equivalents, and investments	\$ 1,045,488	\$ 10	\$ (1,097)	\$ 1,044,400					
Short-term restricted cash	\$ 500	\$ —	\$ —	\$ 500					
Short-term restricted cash									
Short-term restricted cash									
Long-term restricted cash	\$ 4,592	\$ —	\$ —	\$ 4,592					

The following table summarizes the contractual maturities of our cash equivalents and available-for-sale investments, excluding money market funds, as of **December 31, 2022** **December 31, 2023**:

(in thousands)	Fair Value
Due in one year or less	\$ 564,752 465,181
Due after one year through 5 years	96,063 69,930
Total investments	\$ 634,682 561,244

Actual maturities may differ from contractual maturities because issuers may have the right to call or prepay obligations without call or prepayment penalties.

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Investment income included in other income, net on the consolidated statement of operations and comprehensive loss was \$32.8 million and \$9.2 million for the years ended December 31, 2023 and 2022, respectively.

NOTE 6. BALANCE SHEET COMPONENTS

Inventory, Net

Inventory, net, consisted of the following components:

December 31,					
December 31,					December 31,
(in thousands)	2022	2021	(in thousands)	2023	2022
Purchased materials	\$ 24,139	\$ 7,993			
Work in process	14,062	8,611			
Finished goods	12,180	7,995			

Inventory, net

\$	50,381	\$	24,599
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Property and Equipment, Net

Property and equipment, net, consisted of the following components:

December 31,			December 31,	
December 31,			December 31,	
(in thousands)	2022	2021	(in thousands) 2023	2022
Laboratory equipment and machinery	\$ 38,998	\$ 31,534		
Leasehold improvements	34,129	31,114		
Computer equipment	18,438	15,059		
Software	6,879	5,578		
Furniture and fixtures	3,426	3,202		
Construction in progress	4,698	2,303		
Total	106,568	88,790		
Less: Accumulated depreciation	(64,988)	(56,286)		
Property and equipment, net	\$ 41,580	\$ 32,504		

Construction in progress consists of capitalizable costs that have been incurred for the construction of long-lived assets and is primarily comprised of amounts that will be classified as lab equipment.

Depreciation expense during the years ended December 31, 2022, December 31, 2023, 2022, and 2021 and 2020 was \$11.5 million, \$9.5 million, and \$7.2 million, and \$6.4 million, respectively.

Goodwill and intangible Assets**Goodwill**

As of December 31, 2022, December 31, 2023 and 2021, 2022, the goodwill balance was \$462.3 million and \$410.0 million, respectively. Goodwill preliminarily increased by \$52.3 million, due to the Apton acquisition, of which \$11.3 million relates to a deferred income tax liability. Goodwill is reviewed for impairment at least annually during the second quarter, or more frequently if an event occurs indicating the potential for impairment. We performed our annual assessment for goodwill impairment in the second quarter of 2022, 2023, noting no impairment.

Acquired Intangible Assets

Intangible assets include acquired IPR&D of \$400 million \$55.0 million as a result of the Omniome Apton acquisition in September 2021, August 2023. As of December 31, 2022, December 31, 2023, the research and development project had not been completed or abandoned and, therefore, the IPR&D intangible asset is not currently subject to amortization. During the year ended December 31, 2023, acquired IPR&D of \$400.0 million as a result of the Omniome acquisition in September 2021 was completed and became subject to amortization. IPR&D is reviewed for impairment at least annually, or more frequently if an event occurs indicating the potential for impairment. We performed our annual assessment for IPR&D impairment in the fourth third quarter of 2022, 2023, noting no impairment.

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In addition to IPR&D, we had the following acquired definite-lived intangible assets as of December 31, 2022, December 31, 2023 (in thousands, except years):

	Estimated Useful Life (in years)	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	
	Estimated Useful Life (in years)				Estimated Useful Life (in years)
Developed technology	15	\$ 11,179	\$ (1,039)	\$ 10,140	
Customer relationships	2	360	(255)	105	
Total		\$ 11,539	\$ (1,294)	\$ 10,245	

Amortization expense of intangibles was \$8.3 million, \$0.9 million and \$0.4 million \$0.4 million for the years ended December 31, 2022, December 31, 2023, 2022, and 2021, respectively. We had no For the years ended December 31, 2023, 2022, and 2021 amortization expense of intangibles in cost of revenue was \$2.0 million, \$0.7 million, and

\$0.3 million, respectively. For the years ended December 31, 2023, 2022, and 2021, amortization expense of intangibles in operating expenses was \$6.3 million, \$0.2 million, and \$0.1 million, respectively.

Amortization of intangible assets is included within our cost of revenue if the costs and expenses related to the intangible assets are attributable to revenue generating activities. Amortization expense for intangible assets that are not directly related to sales generating activities are amortized to operating expenses. For developed technology intangible assets that are utilized in both revenue generating activities and in research and development activities, we allocate the year ended December 31, 2020.

amortization expense between cost of revenue and operating expenses. The definite-lived intangible assets are amortized using the straight-line method over their estimated useful lives.

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The estimated future amortization expense of acquisition-related intangible assets with definite lives is estimated as follows (in thousands):

2023	\$	853
2024		745
2025		745
2026		745
2027		746
2028 and thereafter		6,411
2028		
2029 and thereafter		
Total	\$	10,245

Accrued Expenses

Accrued expenses consisted of the following components:

	December 31,		December 31,	
	December 31,		December 31,	
(in thousands)	2022	2021	(in thousands) 2023	2022
Salaries and benefits	\$ 17,432	\$ 25,282		
Accrued interest payable	5,100	5,100		
Accrued purchase commitments	3,705	—		
Accrued product development costs	2,326	1,936		
Accrued professional services and legal fees	1,005	1,640		
Inventory accrual	332	108		
Warranty accrual	1,651	594		
Other	1,045	1,601		
Accrued expenses	\$ 32,596	\$ 36,261		

Product Warranties

We generally provide a one-year warranty on instruments. In addition, we provide a limited warranty on consumables. At the time revenue is recognized, an accrual is established for estimated warranty costs based on historical experience as well as anticipated product performance. We periodically review the warranty reserve for adequacy and adjust the warranty accrual, if necessary, based on actual experience and estimated

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costs to be incurred. Warranty expense is recorded as a component of cost of product revenue. There were no material changes in estimates for the periods presented below.

Changes in the reserve for product warranties were as follows:

Years Ended December 31,

	Years Ended December 31,		Years Ended December 31,
	2022	2021	(in thousands) 2023 2022
(in thousands)			
Balance at beginning of period	\$ 594	\$ 161	
Additions charged to cost of product revenue	3,199	2,120	
Repairs and replacements	(2,142)	(1,687)	
Balance at end of period	\$ 1,651	\$ 594	

Deferred Revenue

As of **December 31, 2022** **December 31, 2023**, we had a total of **\$32.3 million** **\$21.9 million** of deferred revenue, **\$30.5 million** **\$16.3 million** of which was recorded as deferred revenue, current and primarily relates to future performance obligations under the Amended and Restated Agreement with Invitae, as described in [Note 3. Invitae Collaboration](#), as well as deferred service contract revenues. The deferred revenue, non-current balance of **\$1.8 million** **\$5.6 million** primarily relates to future performance obligations under the Amended and Restated Agreement with Invitae and deferred service contract revenues and is scheduled to be recognized in the next **6** **5** years. The deferred revenue, non-current balance includes \$2.9 million that was reclassified from deferred revenue, current to deferred revenue, non-current following receipt of a non-cancellable order from Invitae during the year ended December 31, 2023 for partial utilization of the available credits, which is expected to be recognized in revenue after 12 months from December 31, 2023. Revenue recorded in the year ended **December 31, 2022** **December 31, 2023** includes **\$13.0 million** **\$18.9 million** of previously deferred revenue that was included in deferred revenue, current as of **December 31, 2021** **December 31, 2022**.

Term Loans

In connection with the acquisition of Omniome, we acquired \$1.3 million in short-term debt and \$3.0 million in long-term debt relating to a term loan facility that Omniome obtained in April 2020. Borrowings on the term loan facility were used to fund Omniome's purchases of equipment, which serves as collateral. Each term loan has a term of 43 months and bears a fixed interest rate of approximately 17% annually. The fee for the elective option to prepay all, but not less than all, of the borrowed amounts at any time after the 24th month and before the 43rd month after the commencement date, is 4% of the outstanding loan balance. Payments are made in equal monthly installments including principal and interest.

As of **December 31, 2022** **December 31, 2023**, the carrying value of term loans outstanding was **\$2.3 million**. The related long-term portion of \$0.5 million was recorded as part of other liabilities, non-current and the short-term portion of \$1.8 million was, recorded as part of other liabilities, current on the Consolidated Balance Sheet. consolidated balance sheet. The interest expense was **\$0.6 million** **\$0.3 million** for the year ended **December 31, 2022** **December 31, 2023**, which was included as part of interest expense in the Consolidated Statement consolidated statements of Operations operations and Comprehensive (Loss) Income.

comprehensive loss.

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As of **December 31, 2022** **December 31, 2023**, the future principal payments remaining on term loans was the following:

(in thousands)		
2023	\$	1,842
2024		
2024		
2024		490
Total	\$	2,332

Other Liabilities, Current

Other liabilities, current, consisted of the following components:

	December 31,		December 31,
	2022	2021	(in thousands) 2023 2022
(in thousands)			
Accrued Employee Stock Purchase Plan	\$ 3,638	\$ 3,598	
Short-term loan	1,842	1,608	
Other	1,753	553	
Other liabilities, current	\$ 7,233	\$ 5,759	

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NOTE 7. CONVERTIBLE SENIOR NOTES

On February 9, 2021,

2030 Convertible Senior Notes

In June 2023, we entered into an investment a privately negotiated exchange agreement with a holder of our outstanding 1.50% Convertible Senior Notes due 2028 (the "Investment Agreement") with SB Northstar LP (the "Purchaser" "2028 Notes"), a subsidiary of SoftBank Group Corp., relating pursuant to the issuance and sale to the Purchaser of \$900 million which we issued \$441.0 million in aggregate principal amount of our 1.50% 1.375% Convertible Senior Notes due 2030 (the "Notes" "2030 Notes"), in exchange for \$441.0 million principal amount of the 2028 Notes (the "Exchange Transaction"), pursuant to exemptions from registration under the Securities Act of 1933, as amended, and the rules and regulations thereunder. The 2030 Notes were issued on February 16, 2021 June 30, 2023.

The 2030 Notes are governed by an indenture (the "Indenture" "2030 Indenture") between the Company and U.S. Bank Trust Company, National Association, as trustee. The 2030 Notes bear interest at a rate of 1.50% 1.375% per annum. Interest on the 2030 Notes is payable semi-annually in arrears on February June 15 and August December 15, and commenced commencing on August 15, 2021 December 15, 2023. The 2030 Notes will mature on February 15, 2028 December 15, 2030, subject to earlier conversion, redemption or repurchase.

The 2030 Notes are convertible at the option of the holder at any time until the second scheduled trading day prior to the maturity date, including in connection with a redemption by the Company. The 2030 Notes are convertible into shares of our common stock based on an initial conversion rate of 22.9885 46.5116 shares of common stock per \$1,000 principal amount of the 2030 Notes (which is equal to an initial conversion price of \$43.50 \$21.50 per share) share of common stock, in each case subject to customary anti-dilution and other adjustments as a result of certain extraordinary transactions. Upon conversion of the 2030 Notes, we may elect to settle such conversion obligation in shares of our common stock, cash or a combination of shares of our common stock and cash.

On or after February 20, 2026 June 20, 2028, the 2030 Notes will be redeemable by the Company in the event that the closing sale price of our common stock has been at least 150% of the conversion price then in effect for at least 20 trading days (whether or not consecutive) during any 30 consecutive trading day period (including the last trading day of such period) ending on, and including, the trading day immediately preceding the date on which we provide the redemption notice at a redemption price of 100% of the principal amount of such 2030 Notes, plus accrued and unpaid interest up to, but excluding, the redemption date.

With certain exceptions, upon

Upon the occurrence of a change of control of Fundamental Change (as defined in the Company or the failure of our common stock to be listed on certain stock exchanges (a "Fundamental Change") 2030 Indenture), the holders of the 2030 Notes may require that we repurchase all or part of the principal amount of the 2030 Notes at a purchase price equal to 100% of par the principal amount of the notes to be repurchased, plus any accrued and unpaid interest up to, but excluding, the fundamental change repurchase date, and all unpaid interest from the fundamental change repurchase date thereon, but excluding, the maturity date.

The 2030 Indenture includes customary "events of default," which may result in the acceleration of the maturity of the 2030 Notes under the 2030 Indenture. The 2030 Indenture also includes customary covenants for convertible notes of this type.

To the extent we elect, the sole remedy for an event of default relating to our failure to comply with certain of our reporting obligations shall, for the first 360 calendar days after the occurrence of such an event of default, consist exclusively of the right to receive additional interest on the 2030 Notes at a rate equal to (i) 0.25% per annum of the principal amount of the 2030 Notes outstanding for each day during the first 180 calendar days of the 360-day period after the occurrence of such an event of default during which such event of default is continuing (or, if earlier, the date on which such event of default is cured or waived) and (ii) 0.50% per annum of the principal amount of the 2030 Notes outstanding for each day from, and including, the 181st calendar day to, and including, the 360th calendar day after the occurrence of such an event of default during which such event of default is continuing (or, if earlier, the date on which such event of default is cured or waived as provided for in the 2030 Indenture). On the 361st day after such event of default (if the event of default relating to our failure to comply with its obligations is not cured or waived prior to such 361st day), the 2030 Notes shall be subject to acceleration as provided for in the 2030 Indenture.

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The 2030 Notes are accounted for in accordance with the authoritative guidance for convertible debt instruments that may be settled in cash upon conversion. Under ASU 2020-06, the guidance requires that debt with an embedded conversion feature is accounted for in its entirety as a liability and no portion of the proceeds from the issuance of the convertible debt instrument is accounted for as attributable to the conversion feature unless the conversion feature is required to be accounted for separately as an embedded derivative or the conversion feature results in a substantial premium. The conversion feature of the 2030 Notes is not accounted for as an embedded derivative because it is considered to be indexed to our common stock, and the 2030 Notes were not issued at a substantial premium; therefore, the 2030 Notes are accounted for in their entirety as a

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liability. Because we may elect to settle any conversions entirely in shares, and because settlement in shares is the default settlement method, the liability is classified as non-current.

The requirement to repurchase the 2030 Notes, including unpaid interest to the maturity date in the event of a Fundamental Change, is considered a put option for certain periods requiring bifurcation under ASC 815 – *Derivatives and Hedging*. However, given the low probability of such a Fundamental Change occurring during the applicable periods, the value of the embedded derivative is immaterial.

The additional interest feature in the event of our failure to comply with certain reporting obligations is also considered an embedded derivative requiring bifurcation under ASC 815. However, due to the nature and terms of the reporting obligations, the value of the embedded derivative is immaterial.

The Exchange Transaction was accounted for as an extinguishment driven by the change in fair value of the embedded conversion option. We recorded a loss on extinguishment of debt of approximately \$2.0 million in connection with the Exchange Transaction during the year ended December 31, 2023, which represents the difference between the fair value and the principal amount of the 2030 Notes of the debt at the modification date, plus unamortized debt issuance costs of \$1.5 million related to the respective portion of the 2028 Notes.

We incurred issuance costs related to the 2030 Notes of approximately \$7.3 million, which were recorded as debt issuance costs and are presented as a reduction to the 2030 Notes on our consolidated balance sheets and are amortized to interest expense using the effective interest method over the term of the 2030 Notes, resulting in an effective interest rate of 1.6%. We also paid accrued but unpaid interest of \$2.5 million on the 2028 Notes in connection with the Exchange Transaction on June 30, 2023.

We did not receive any cash proceeds from the Exchange Transaction. In exchange for issuing the 2030 Notes pursuant to the Exchange Transaction, we received and cancelled the exchanged 2028 Notes. Following the closing of the Exchange Transaction, \$459.0 million in aggregate principal amount of 2028 Notes remained outstanding with terms unchanged.

The net carrying amount of the liability for the 2030 Notes is included as convertible senior notes, net, non-current in the consolidated balance sheets as follows (in thousands):

	December 31,	
	2023	2022
Principal amount	\$ 441,000	\$ —
Unamortized debt premium	\$ 524	\$ —
Unamortized debt issuance costs	\$ (6,907)	\$ —
Net carrying amount	\$ 434,617	\$ —

Interest expense for the 2030 Notes for the years ended December 31, 2023, 2022, and 2021 was as follows:

(in thousands)	Years Ended December 31,		
	2023	2022	2021
Contractual interest expense	\$ 3,032	\$ —	\$ —
Amortization of debt issuance costs	463	—	—
Total interest expense	\$ 3,495	\$ —	\$ —

As of December 31, 2023, the estimated fair value (Level 2) of the 2030 Notes was \$410.5 million. The fair value of the 2030 Notes is estimated using a binomial lattice model that is primarily affected by the trading price of our common stock, market interest rates and volatility.

2028 Convertible Senior Notes

On February 9, 2021, we entered into an investment agreement (the "Investment Agreement") with SB Northstar LP (the "Purchaser"), a subsidiary of SoftBank Group Corp., relating to the issuance and sale to the Purchaser of \$900.0 million in aggregate principal amount of the 2028 Notes. The 2028 Notes were issued on February 16, 2021. As discussed above, in June 2023 we completed an exchange of \$441.0 million in aggregate principal amount of our 2028 Notes for \$441.0 million aggregate principal amount of the 2030 Notes, leaving approximately \$459.0 million in aggregate principal amount of 2028 Notes outstanding.

The 2028 Notes are governed by an indenture (the "2028 Indenture") between the Company and U.S. Bank National Association, as trustee. The 2028 Notes bear interest at a rate of 1.50% per annum. Interest on the

2028 Notes is payable semi-annually in arrears on February 15 and August 15 and commenced on August 15, 2021. The 2028 Notes will mature on February 15, 2028, subject to earlier conversion, redemption, or repurchase.

The 2028 Notes are convertible at the option of the holder at any time until the second scheduled trading day prior to the maturity date, including in connection with a redemption by the Company. The 2028 Notes are convertible into shares of our common stock based on an initial conversion rate of 22.9885 shares of common stock per \$1,000 principal amount of the 2028 Notes (which is equal to an initial conversion price of \$43.50 per share of common stock), in each case subject to customary anti-dilution and other adjustments as a result of certain extraordinary transactions. Upon conversion of the 2028 Notes, we may elect to settle such conversion obligation in shares of our common stock, cash or a combination of shares of our common stock and cash.

On or after February 20, 2026, the 2028 Notes will be redeemable by the Company in the event that the closing sale price of our common stock has been at least 150% of the conversion price then in effect for at least 20 trading days (whether or not consecutive) during any 30 consecutive trading day period (including the last trading day of such period)

ending on, and including, the trading day immediately preceding the date on which we provide the redemption notice at a redemption price of 100% of the principal amount of such 2028 Notes, plus accrued and unpaid interest up to, but excluding, the redemption date.

Upon the occurrence of a Fundamental Change (as defined in the 2028 Indenture), the holders of the 2028 Notes may require that we repurchase all or part of the principal amount of the 2028 Notes at a purchase price of par plus unpaid interest up to, but excluding, the maturity date.

The 2028 Indenture includes customary "events of default," which may result in the acceleration of the maturity of the 2028 Notes under the 2028 Indenture. The 2028 Indenture also includes customary covenants for convertible notes of this type.

To the extent we elect, the sole remedy for an event of default relating to our failure to comply with certain of our reporting obligations shall, for the first 360 calendar days after the occurrence of such an event of default, consist exclusively of the right to receive additional interest on the 2028 Notes at a rate equal to (i) 0.25% per annum of the principal amount of the 2028 Notes outstanding for each day during the first 180 calendar days of the 360-day period after the occurrence of such an event of default during which such event of default is continuing (or, if earlier, the date on which such event of default is cured or waived) and (ii) 0.50% per annum of the principal amount of the 2028 Notes outstanding for each day from, and including, the 181st calendar day to, and including, the 360th calendar day after the occurrence of such an event of default during which such event of default is continuing (or, if earlier, the date on which such event of default is cured or waived as provided for in the 2028 Indenture). On the 361st day after such event of default (if the event of default relating to our failure to comply with its obligations is not cured or waived prior to such 361st day), the 2028 Notes shall be subject to acceleration as provided for in the 2028 Indenture.

The 2028 Notes are accounted for in accordance with the authoritative guidance for convertible debt instruments that may be settled in cash upon conversion. Under ASU 2020-06, the guidance requires that debt with an embedded conversion feature is accounted for in its entirety as a liability and no portion of the proceeds from the issuance of the convertible debt instrument is accounted for as attributable to the conversion feature unless the conversion feature is required to be accounted for separately as an embedded derivative or the conversion feature results in a substantial premium. The conversion feature of the 2028 Notes is not accounted for as an embedded derivative because it is considered to be indexed to our common stock, and the 2028 Notes were not issued at a premium; therefore, the 2028 Notes are accounted for in their entirety as a liability. Because we may elect to settle any conversions entirely in shares, and because settlement in shares is the default settlement method, the liability is classified as non-current.

The requirement to repurchase the 2028 Notes including unpaid interest to the maturity date in the event of a Fundamental Change is considered a put option for certain periods requiring bifurcation under ASC 815 – *Derivatives and Hedging*. However, given the low probability of a Fundamental Change occurring during the applicable periods, the value of the embedded derivative is immaterial.

The additional interest feature in the event of our failure to comply with certain reporting obligations is also considered an embedded derivative requiring bifurcation under ASC 815. However, due to the nature and terms of the reporting obligations, the value of the embedded derivative is immaterial.

We incurred issuance costs related to the 2028 Notes of approximately \$4.5 million, which were recorded as debt issuance cost and are presented as a reduction to the 2028 Notes on our Consolidated Balance Sheets consolidated balance sheets and

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are amortized to interest expense using the effective interest method over the term of the 2028 Notes, resulting in an effective interest rate of 1.6%.

As of December 31, 2022, the

The net carrying amount of the liability for the 2028 Notes is recorded included as convertible senior notes, net, non-current in the Consolidated Balance Sheets consolidated balance sheets as follows (in thousands):

Principal amount	\$	900,000
Unamortized debt issuance costs		(3,317)
Net carrying amount	\$	896,683

	December 31,	
	2023	2022
Principal amount	\$ 459,000	\$ 900,000
Unamortized debt issuance costs	(1,374)	(3,317)
Net carrying amount	\$ 457,626	\$ 896,683

Interest expense for the 2028 Notes was as follows for the years ended December 31, 2022 December 31, 2023, 2021, 2022, and 2020:

2021:

	Years Ended December 31,			(in thousands)	Years Ended December 31,	
	2022	2021	2020		2023	2022
Contractual interest expense	\$ 13,500	\$ 11,812	\$ -			

Amortization of debt issuance costs	617	532	
Total interest expense	\$ 14,117	\$ 12,344	\$

As of **December 31, 2022** **December 31, 2023**, the estimated fair value (Level 2) of the **2028** Notes was **\$604.8 million** **\$395.4 million**. The fair value of the Notes is estimated using a pricing model that is primarily affected by the trading price of our common stock and market interest rates.

NOTE 8. COMMITMENTS AND CONTINGENCIES

Leases

We record operating lease right-of-use assets and liabilities on our **Consolidated Balance Sheets** **consolidated balance sheets** for all leases with a term of more than 12 months. In connection with the acquisition of Omniome, we acquired \$18.1 million in right-of-use assets and liabilities on our **Consolidated Balance Sheets**, **consolidated balance sheets**. The operating lease right-of-use assets and liabilities are calculated as the present value of remaining minimum lease payments over the remaining lease term using our estimated secured incremental borrowing rates at the commencement date. Lease payments included in the measurement of the lease liability comprise the fixed rent per the term of the Lease. All of our leases are operating leases. Lease payments comprise the base rent per the term of the Lease. Lease expense for these leases is recognized on a straight-line basis over the lease term, with variable lease payments, such as common area maintenance fees, recognized in the period those payments are incurred.

We often have options to renew lease terms for buildings. In addition, certain lease arrangements may be terminated prior to their original expiration date at our discretion. We evaluate renewal and termination options at the lease commencement date to determine if we are reasonably certain to exercise the option on the basis of economic factors.

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As of **December 31, 2022** **December 31, 2023**, the maturities of our operating lease liabilities were as follows:

(in thousands)

2023	\$	11,955
2024		
2024		
2024		12,018
2025		12,279
2026		12,392
2027		9,930
2028		
Thereafter		—
Total undiscounted operating lease payments		58,574
Less: imputed interest		(8,618)
Present value of operating lease liabilities	\$	49,956
Balance Sheet Classification		
Balance Sheet Classification		
Balance Sheet Classification		
Operating lease liabilities, current		
Operating lease liabilities, current		
Operating lease liabilities, current	\$	8,886
Operating lease liabilities, non-current		41,070
Total operating lease liabilities	\$	49,956

We use our incremental borrowing rate to determine the present value of lease payments, as the implicit rates in our leases are not readily determinable. The weighted-average discount rate used to measure our operating lease liabilities was **6.7%** **6.8%**. The weighted-average remaining lease term for our operating leases as of **December 31, 2022** **December 31, 2023** was **4.7** **3.8** years.

Cash Flows

Cash paid for amounts included in the present value of operating lease liabilities was **\$11.2 million** **\$12.1 million** and **\$8.2 million** **\$11.2 million** for the years ended **December 31, 2022** **December 31, 2023** and **2021**, **2022**, respectively, and were included in operating cash flow.

flows.

Operating Lease Costs

Operating lease costs were \$10.5 million \$10.4 million and \$7.2 million \$10.5 million for the years ended December 31, 2022 December 31, 2023 and 2021, 2022, respectively.

Contingencies

We may become involved in legal proceedings, claims and assessments from time to time in the ordinary course of business. We accrue liabilities for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated.

We do not believe that the ultimate outcome of any such pending matters is probable or reasonably estimable, or that these matters will have a material adverse effect on our business; however, the results of litigation and claims are inherently unpredictable. Regardless of the outcome, litigation can have an adverse impact on us because of litigation and settlement costs, diversion of management resources, and other factors.

Please see subsection titled [Legal Proceedings](#), in Part I, Item 3 of this Annual Report on Form 10-K.

Indemnification

Pursuant to Delaware law and agreements entered into with each of our directors and officers, we may have obligations, under certain circumstances, to hold harmless and indemnify each of our directors and officers against losses suffered or incurred by the indemnified party in connection with their service to us, and judgments, fines, settlements and expenses related to claims arising against such directors and officers to the fullest extent permitted under Delaware law, our bylaws and our certificate of incorporation. We also enter and have entered into indemnification agreements with our directors and officers that may require us to indemnify them against liabilities that arise by reason of their status or service as directors or officers, except as prohibited by applicable law. In addition, we may have obligations to hold harmless and indemnify third parties involved with our fundraising efforts and their respective affiliates, directors, officers, employees, agents or other representatives against any and all losses, claims, damages and liabilities related to claims arising against such parties pursuant to the terms of agreements entered into between such third parties and us in

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connection with such fundraising efforts. To the extent that any such indemnification obligations apply to the lawsuits described above, any associated expenses incurred are included within the related accrued litigation expense amounts. No additional liability associated with such indemnification obligations has been recorded as of December 31, 2022 December 31, 2023.

Purchase Commitments

In the normal course of business, we enter into agreements to purchase goods or services or license intellectual property, certain of which are not cancelable cancellable without penalty. For those agreements with variable terms, we do not estimate the total obligation beyond any minimum quantities or pricing as of the reporting date. Licensing agreements under which we commit to ongoing minimum royalty payments, some of which are subject to adjustment, may be terminated under certain circumstances.

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Our purchase orders and contractual obligations are approximately \$145.7 million \$109.9 million as of December 31, 2022 December 31, 2023, which consist of open purchase orders and contractual obligations in the ordinary course of business, including commitments with contract manufacturers and suppliers for which we have not received the goods or services. A majority of these purchase obligations are due within a year. Although open purchase orders are considered enforceable and legally binding, the terms generally allow us the option to cancel, reschedule and adjust our requirements based on our business needs prior to the delivery of goods or performance of services.

We recognized a loss on purchase commitment of \$3.7 million \$3.4 million for the year ended December 31, 2022 December 31, 2023, which was recorded as part of accrued expenses on the Consolidated Balance Sheet consolidated balance sheet and is included in the aforementioned purchase orders and contractual obligations amount. The purchase commitment loss is based on an estimate of future excess inventory related to a supply agreement with a third-party vendor, for which we do not expect to have related sales.

We have a long-term supply agreement, which was amended in October 2022 (the "Supply Agreement"), for the purchase of certain products with a semiconductor manufacturer ("Supplier"). The Supply Agreement provides for minimum purchase commitments through 2026 on our part in exchange for guaranteed capacity at Supplier. We are responsible for providing certain materials to allow our Supplier to perform its obligations under the contract.

We paid our Supplier a deposit of \$9.0 million in November 2022 and will pay an additional deposit of \$6.0 million in 2023, for a total of \$15.0 million (the "Deposit"). The Deposit is fully refundable to us, in accordance with the Supply Agreement, if we meet the minimum volume purchase commitment for the applicable year. As of December 31, 2022 December 31, 2023, \$9.0 million \$3.0 million related to the Deposit was included in prepaid expenses and other current assets in the consolidated balance sheets and \$12.0 million related to the Deposit was included in other long-term assets in the Consolidated Balance Sheets, consolidated balance sheets, as we believe it is probable the minimum volume purchase commitment level will be achieved.

NOTE 9. INCOME TAXES

We are subject to income taxes both in the United States and certain states foreign jurisdictions in which we operate, and we use estimates in determining our provisions for income taxes. Significant management judgment is required in determining our provision for income taxes, deferred tax assets and liabilities, and valuation allowances recorded against net deferred tax assets in accordance with U.S. GAAP. These estimates and judgments occur in the calculation of tax credits, benefits, and deductions, and in the calculation of certain tax assets and liabilities, which arise from differences in the timing of recognition of revenue and expense for tax and financial statement purposes, as well as the interest

and penalties related to uncertain tax positions. Significant changes to these estimates may result in an increase or decrease to our tax provision in the current or subsequent period.

We assess all material positions taken in any income tax return, including all significant uncertain positions, in all tax years that are still subject to assessment or challenge by relevant taxing authorities. Assessing an uncertain tax position begins with the initial determination of the position's sustainability and is measured at the largest amount of benefit that is greater than 50% likely of being realized upon ultimate settlement. As of each balance sheet date, unresolved uncertain tax positions must be reassessed, and we will determine whether the factors underlying the sustainability assertion have changed and the amount of the recognized tax benefit is still appropriate.

We account for Global Intangible Low-taxed Income as a period cost.

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During the years ended December 31, 2022, December 31, 2023, 2022, and 2021 and 2020 income/(loss) income before taxes from U.S. operations were (\$318.9) million, (\$315.7) million, and (\$275.4) million, and \$28.9 million, respectively, and income income/(loss) before taxes from foreign operations was \$1.8 million \$0.7 million, \$0.8 million \$1.8 million, and \$0.6 million \$0.8 million, respectively.

Provision (Benefit) for Income Taxes

The provision (benefit) for income taxes consists of the following (in thousands):

	Years ended December 31,		
	2023	2022	2021
Total Current	\$ —	\$ —	\$ —
Deferred:			
Federal	(9,956)	—	(83,742)
State	(1,468)	—	(9,907)
Foreign	—	—	—
Total Deferred	(11,424)	—	(93,649)
(Benefit) Provision for Income Taxes	\$ (11,424)	\$ —	\$ (93,649)

Income tax provision (benefit) related to continuing operations differ from the amounts computed by applying the statutory income tax rate of 21% to pretax income or loss as follows:

	Years ended December 31,		
	2022	2021	2020
Statutory tax rate	21.0 %	21.0 %	21.0 %
State tax rate, net of federal benefit	4.4	5.5	(8.3)
Change in valuation allowance	(25.1)	(4.9)	6.3
Tax credits	2.2	2.5	(3.6)
Share-based compensation	(2.2)	10.9	(15.2)
Merger Expenses	-	(0.9)	-
Other	(0.4)	(0.1)	(0.2)
Total	(0.1)%	34.0 %	0.0 %

	Years ended December 31,		
	2023	2022	2021
Statutory tax rate	21.0 %	21.0 %	21.0 %
State tax rate, net of federal benefit	3.0	4.4	5.5
Change in valuation allowance	(20.0)	(25.1)	(4.9)
Tax credits	2.0	2.2	2.5
Share-based compensation	(2.1)	(2.2)	10.9
Merger Expenses	(0.1)	—	(0.9)
Other	(0.2)	(0.4)	(0.1)
Total	3.6 %	(0.1)%	34.0 %

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Deferred income taxes reflect the net tax effects of loss and credit carry forwards and temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of our deferred tax assets for federal and state income taxes are as follows (in thousands):

	December 31,			December 31,
	2022	2021		2022
	December 31,			December 31,
	2023	2022		2023
Deferred tax assets:				
Net operating loss carryforwards				
Net operating loss carryforwards				
Net operating loss carryforwards	\$ 400,629	\$ 378,035		
Research and development credits	71,526	60,672		
Capitalized research and experimental expenses	34,863	—		
Accruals and reserves	18,417	10,822		
Cancellation of indebtedness income and interest expense				
Share-based compensation	17,117	12,838		
Operating lease liability	11,537	13,105		
Total deferred tax assets	554,089	475,472		
Less: Valuation allowance	(445,574)	(366,940)		
Total deferred tax assets:	108,515	108,532		
Intangibles	(98,931)	(97,345)		
Fixed assets	(1,262)	(1,523)		
Operating lease right-of-use assets	(9,157)	(10,502)		
Total deferred tax liabilities	(109,350)	(109,370)		
Net deferred tax assets	\$ (835)	\$ (838)		
Deferred tax liabilities, net				

At December 31, 2022 December 31, 2023, we maintained a full valuation allowance against all of our net deferred tax assets that which totaled \$445.6 million \$525.7 million, including net operating loss carryforwards and research and development credits of \$400.6 million \$435.5 million and \$71.5 million \$83.9 million, respectively.

A valuation allowance is recorded when it is more likely than not that all or some portion of the deferred income tax assets will not be realized. We regularly assess the need for a valuation allowance against our deferred income tax assets by considering both positive and negative evidence related to whether it is more likely than not that our deferred income tax assets will be realized. In evaluating our ability to recover our deferred income tax assets within the jurisdiction from which they arise, we consider all available positive and negative evidence, including scheduled reversals of deferred income tax liabilities, projected future taxable income, tax-planning strategies, and results of recent operations. A deferred income tax benefit of \$11.4 million for the year ended December 31, 2023, is related to the release of the valuation allowance for deferred tax assets due to the recognition of deferred tax liabilities in connection with the Apton acquisition. We maintain a valuation allowance on the net deferred tax assets of our U.S. entities as we have concluded that it is more likely than not that we will not realize our deferred tax assets. Accordingly, this benefit from income taxes is reflected on our Consolidated Statements consolidated statements of Operations operations and Comprehensive (Loss) Income comprehensive loss for the year ended December 31, 2022 December 31, 2023.

For the year ended December 31, 2023, the Company's valuation allowance increased to \$525.7 million, primarily because of an increase in our net operating losses, credits, and capitalized research and experimental expenses that were fully offset by a valuation allowance. For the year ended December 31, 2022, our the Company's valuation allowance increased to \$445.6 million, primarily because of an increase in our net operating losses, credits, and capitalized research and experimental expenses that were fully offset by a valuation allowance. For the year ended December 31, 2021, our valuation allowance increased to \$366.9 million, primarily because of an increase in our net operating losses, credits, and acquisition of deferred tax assets that were fully offset by a valuation allowance.

As of December 31, 2022 December 31, 2023, we had a net operating loss carryforward for federal income tax purposes of approximately \$1,573.8 million \$1,709.3 million, of which \$774.9 million will begin \$788.1 million is subject to expire expiration beginning in 2024 if not utilized. 2024. We had a total state net operating loss carryforward of approximately \$1,071.8 million \$1,171.8 million, which are subject to annual expirations. Utilization of some of the federal and state net operating loss and credit carryforwards are subject to annual limitations due to the "change of ownership" provisions of the Internal Revenue Code of 1986 and similar state provisions. The annual limitations may result in the expiration of net operating losses and credits before utilization.

We have federal credits of approximately \$47.2 million \$57.7 million, which will begin to expire in 2024 if not utilized and state research credits of approximately \$42.6 million \$49.8 million, which have no expiration date. These tax credits are subject to the same limitations discussed above.

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As of December 31, 2022 December 31, 2023, our total unrecognized tax benefit was \$10.4 million \$14.6 million. A reconciliation of the beginning and ending unrecognized tax benefit balance is as follows (in thousands):

Balance as of December 31, 2019 December 31, 2020	\$ 21,979	5,954
Increase in balance related to tax positions taken in prior year		189
Increase in balance related to tax positions taken during current year		2,192
Balance as of December 31, 2021		8,335
Decrease in balance related to tax positions taken in prior year	(10)	(17,255)
Increase in balance related to tax positions taken during current year	2,085	1,230
Balance as of December 31, 2020 December 31, 2022	10,410	5,954
Increase in balance related to tax positions taken in prior year	2,044	189
Increase in balance related to tax positions taken during current year	2,100	2,192
Balance as of December 31, 2021 December 31, 2023		8,335
Decrease in balance related to tax positions taken in prior year	(10)	
Increase in balance related to tax positions taken during current year	2,085	
Balance as of December 31, 2022	\$10,410	14,554

Our practice is to recognize interest and and/or penalties related to income tax matters in income tax expense. As of both December 31, 2022 December 31, 2023 and 2021, 2022, we had no accrued interest or penalties due to our net operating losses available to offset any tax adjustment. If total unrecognized tax benefits were realized in the future, it would not result in any tax benefit as we currently have a full valuation allowance. We file U.S. federal and various state income tax returns. For U.S. federal and state income tax purposes, the statute of limitations currently remains open for the years ending December 31, 2019 December 31, 2020 to present and December 31, 2018 December 31, 2019 to present, respectively. In addition, all of the net operating losses and research and development credit carryforwards that may be utilized in future years may be subject to examination. We are not currently under examination by income tax authorities in any jurisdiction.

NOTE 10. STOCKHOLDERS' EQUITY

Preferred Stock

Our Certificate of Incorporation, as amended and restated in October 2010 in connection with the closing of our initial public offering, authorizes us to issue 1,000,000,000 shares of \$0.001 par value common stock and 50,000,000 shares of \$0.001 par value preferred stock. As of December 31, 2022 December 31, 2023 and 2021, 2022, there were no shares of preferred stock issued or outstanding.

Common Stock

Common stockholders are entitled to dividends when and if declared by our board of directors. There have been no dividends declared to date. The holder of each share of common stock is entitled to one vote.

Underwritten Public Equity Offerings

In August 2020, we entered into an underwriting agreement, relating to the public offering of 19,430,000 shares of our common stock, \$0.001 par value per share, at a price to the public of \$4.47 per share. Under the terms of the underwriting agreement, we also granted the underwriters a 30-day option to purchase up to an additional 2,914,500 shares of our common stock, which was subsequently exercised in full, and the offering including the sale of shares of common stock subject to the underwriters' option, closed in August 2020. In total, we sold 22.3 million 22.3 million shares of our common stock. We paid a commission equal to 6% of the gross proceeds from the sale of shares of our common stock. The total net proceeds to us from the offering after deducting the underwriting discount were approximately \$93.9 million, \$93.9 million, excluding approximately \$0.3 million \$0.3 million of offering expenses.

In November 2020, we entered into an underwriting agreement, relating to the public offering of 6,096,112 shares of our common stock, \$0.001 par value per share, at a price to the public of \$14.25 per share. Under the terms of the underwriting agreement, we also granted the underwriters a 30-day option to purchase up to an additional 914,416 shares of our common stock, which was subsequently exercised in full, and the offering including the sale of shares of common stock subject to the underwriters' option, closed in November 2020. In total, we sold 7.0 million 7.0 million shares of our common stock. We paid a commission equal to 6% of the gross proceeds from the sale of shares of our common stock. The total net proceeds to us from the offering after

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deducting the underwriting discount were approximately \$93.9 million, \$93.9 million, excluding approximately \$0.3 million of offering expenses.

In total, for the year ended December 31, 2020 December 31, 2021, we issued 29.4 million shares of our common stock through our two underwritten public offerings with an average offering price of \$6.40. The total net proceeds to us from the two offerings, after deducting the underwriting commission and offering expenses, were approximately \$187.2 million.

In January 2023, we entered into an underwriting agreement, relating to the public offering of 17.5 million shares of our common stock, \$0.001 par value per share, at a price to the public of \$10.00 per share. Under the terms of the underwriting agreement, we also granted the underwriters a 30-day option to purchase up to an additional 2.6 million shares of our common stock, which was subsequently exercised in full, and the offering, including the sale of shares of common stock subject to the underwriters' option, closed in January 2023. In total, we sold 20.1 million shares of our common stock. We paid a commission equal to 5.75% of the gross proceeds from the sale of shares of our common stock. The total net proceeds to us from the offering after deducting the underwriting discount were approximately \$189.7 million, excluding approximately \$0.5 million of offering expenses.

Private Placement of Common Stock

On July 19, 2021, in connection with the Omniome acquisition, we entered into a purchase agreement with certain qualified institutional buyers and institutional accredited investors, pursuant to which we agreed to sell an aggregate of 11,214,953 shares of common stock, at a price of \$26.75 per share, for aggregate gross proceeds of approximately \$300 million, \$300 million. The transaction closed on September 20, 2021. We registered the private placement shares for resale following the closing of the merger.

Equity Plans

The 2020 Equity Incentive Plan (the "2020 Plan"), the 2020 Inducement Equity Incentive Plan (the "Inducement Plan"), and the 2021 adopted Omniome Equity Incentive Plan of Pacific Biosciences of California, Inc. (the "Omniome Plan") allow for the issuance of stock options, restricted units and awards, and performance-based awards.

On August 4, 2020, stockholders approved the 2020 Plan and reserved 11,000,000 shares of our common stock for issuance pursuant to equity awards granted under the 2020 Plan.

On December 2, 2020, the Board of Directors (the "Board") adopted the Inducement Plan and reserved 2,500,000 shares of our common stock for issuance pursuant to equity awards granted under the Inducement Plan. On April 18, 2021 and November 22, 2021, the Board amended the Inducement Plan to reserve an additional 750,000 and 360,000 shares, respectively.

On September 20, 2021, in connection with the acquisition of Omniome, we adopted the Omniome Equity Incentive Plan of Pacific Biosciences of California, Inc. (the "Omniome Plan"). Under the Omniome Merger Agreement, each unvested option to purchase Omniome common stock, granted under the Omniome Plan held by employees continuing with us, was assumed by PacBio and converted into an option to purchase shares of our common stock. The terms and conditions of the converted options are substantially the same (including vesting and exercisability), except that (A) the assumed options cover shares of PacBio's common stock; (B) the number of shares of our common stock subject to the assumed option is equal to the product of (i) the number of shares of Omniome common stock subject to the corresponding unvested option, multiplied by (ii) the exchange ratio (as defined below), with any resulting fractional share rounded down to the nearest whole share; and (C) the exercise price per share of the assumed options is equal to the quotient of (i) the exercise price per share of the corresponding unvested option to purchase shares of Omniome common stock, divided by (ii) the exchange ratio (as defined below), with any resulting fractional cent rounded up to the nearest whole cent. The exchange ratio was equal to 0.259204639. We reserved 2,494,128 shares of our common stock for issuance pursuant to equity awards under the Omniome Plan.

On May 25, 2022, stockholders approved an amendment to the 2020 Plan, and we reserved an additional 18,000,000 shares of our common stock for issuance pursuant to equity awards granted under the 2020 Plan.

As of December 31, 2022 December 31, 2023, we had 18.9 million 12.8 million shares remaining and available for future issuance under the 2020 Plan, Inducement Plan, and the Omniome Plan.

Stock Options

Time-based stock options

The following table summarizes time-based stock option activity for all of our equity compensation plans for the year ended December 31, 2022 December 31, 2023 (in thousands, except per share amounts):

	Number of shares	Weighted-average exercise price
Outstanding at December 31, 2021	12,159	\$ 11.38

	Number of shares		Weighted- average exercise price
Outstanding at December 31, 2022			
Granted	5,211	\$	10.34
Exercised	(1,052)	\$	3.25
Canceled	(1,603)	\$	19.66
Expired	(97)	\$	24.26
Outstanding at December 31, 2022	14,618	\$	10.60
Outstanding at December 31, 2023			

Performance-based stock options

The following table summarizes performance-based stock option activity for all of our equity compensation plans for the year ended **December 31, 2022** **December 31, 2023** (in thousands, except per share amounts):

	Number of shares		Weighted-average exercise price
Outstanding at December 31, 2021	304	\$	4.71
Outstanding at December 31, 2022			
Granted	—	\$	—
Exercised	—	\$	—
Canceled	(46)	\$	4.71
Outstanding at December 31, 2022	258	\$	4.71
Outstanding at December 31, 2023			

The performance condition was achieved during the year ended December 31, 2023.

The aggregate intrinsic value of the outstanding options presented in the tables above as of December 31, 2023, totaled \$31.8 million, and had a weighted-average remaining contractual life of 5.9 years.

The aggregate intrinsic value of outstanding options represents the total pre-tax intrinsic value (i.e. the difference between \$8.18, \$9.81, our closing stock price on the last trading day of our fourth quarter of **2022** **2023** and the option exercise price multiplied by the number of in-the-money options) that would have been received by the option holders had all option holders exercised their options on **December 31, 2022** **December 31, 2023**. The aggregate intrinsic value changes at each reporting date based on the fair market value of our common stock.

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The aggregate intrinsic value of the outstanding options presented in the table above as of December 31, 2022, totaled \$24.7 million, and had a weighted-average remaining contractual life of 6.7 years.

The vested and exercisable options as of **December 31, 2022** **December 31, 2023**, totaled **9,408,063** **10,039,742** shares, had an aggregate intrinsic value of **\$22.7 million**, **\$30.0 million**, a weighted-average exercise price per share of **\$8.45**, **\$9.70**, and a weighted-average remaining contractual life of **5.4** **5.2** years.

The vested and expected to vest options as of **December 31, 2022** **December 31, 2023**, totaled **14,436,695** **13,026,464** shares, had an aggregate intrinsic value of **\$24.6 million** **\$31.6 million**, a weighted-average exercise price per share of **\$10.61**, **\$10.81**, and a weighted-average remaining contractual life of **6.5** **5.8** years.

The total intrinsic value of stock options exercised during the years ended **December 31, 2022** **December 31, 2023**, **2022**, and **2021** and **2020** was **\$8.8 million**, **\$5.0 million**, and **\$146.1 million**, and **\$63.1 million**, respectively.

The total intrinsic value of options exercised represents the difference between our closing stock price on the exercise date and the option exercise price, multiplied by the number of in-the-money options exercised.

The weighted-average grant-date fair value of all options granted was **\$7.32 in 2023**, **\$5.93 in 2022**, and **\$18.36 in 2021**, and **\$4.14 in 2020**, each determined by the Black-Scholes option valuation method.

Restricted Stock Units

("RSU") and Performance Stock Units ("PSU")

Each Restricted Stock Unit (RSU) represents one equivalent share of our common stock to be issued after satisfying the applicable continued service-based vesting criteria over a specified period. These RSUs are time-based and vest over four years at a rate of 25% annually. The RSUs do not entitle participants to the rights of holders of common stock, such as voting rights, until the shares are issued. The fair value for of these RSUs is

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based on the closing price of our common stock on the date of grant. We measure compensation expense for these RSUs at fair value on the date of grant and recognize the expense over the expected vesting period on a straight-line basis. The RSUs do not entitle participants to the rights of holders of common stock, such as voting rights, until the shares are issued. RSUs that are expected to vest are net of estimated future forfeitures.

We issue PSUs for which the number of shares issuable in the third year of the performance period is based on performance relative to specified revenue targets and continued employment through the vesting period. Maximum achievement of the revenue goal under the PSUs will result in up to 200% of the target number of shares subject to the PSUs to become eligible to vest, while not meeting the minimum achievement of the revenue goal under PSUs will result in no shares subject to the PSUs becoming eligible to vest.

The following table summarizes the RSU time-based RSUs and PSUs activity for the year ended December 31, 2022 (in thousands, except per share amounts) December 31, 2023 (shares in thousands):

	Number of shares	Weighted-average grant date fair value	
RSUs outstanding at December 31, 2021	7,392	\$	19.78
RSUs granted	5,389	\$	10.15
RSUs released	(2,582)	\$	15.19
RSUs forfeited	(1,664)	\$	19.42
Unvested RSUs outstanding at December 31, 2022	8,535	\$	15.16

	Restricted Stock Units (RSUs)	Performance Stock Units (PSUs)	Weighted-average grant date fair value	
			RSU	PSU
Outstanding at December 31, 2022	8,535	—	\$ 15.16	\$ —
Granted	7,141	564	9.67	9.43
Vested	(2,730)	—	14.41	—
Forfeited	(1,638)	(23)	13.86	9.43
Outstanding at December 31, 2023	11,308	541	\$ 12.06	\$ 9.43

The total fair value of shares vested related to RSUs and PSUs during the years ended December 31, 2022 December 31, 2023, 2022, and 2021 and 2020 was \$39.3 million, \$39.2 million, and \$9.2 million, and \$6.3 million, respectively.

The weighted-average grant-date fair value of all RSUs and PSUs granted was \$9.65 in 2023, \$10.15 in 2022, and \$35.33 in 2021, and \$5.18 in 2020.

2021.

Employee Stock Purchase Plan

As of December 31, 2022 December 31, 2023, a total of 25.5 million 29.5 million shares of our common stock have been reserved for issuance under our 2010 Employee Stock Purchase Plan (the "ESPP"). The ESPP permits eligible employees to purchase common stock at a discount through payroll deductions during defined offering periods. Each offering period will generally consist of four purchase periods, each purchase period being approximately six months. The price at which the stock is purchased is equal to the lower of 85% of the fair market value of the common stock at the beginning of an offering period or at the end of a purchase period. Each offering period will generally end and the shares will be purchased twice yearly on March 1 and September 1. If the stock price at the end of the purchase period is lower than the stock price at the beginning of the offering period, that offering period will be terminated and a new offering period will come into place. The ESPP provides for an annual increase to the shares available for issuance at the beginning of each fiscal year equal to the lesser lesser of 2% of the common shares then outstanding, 4,000,000 shares, or an amount determined by the ESPP's administrator.

Pursuant to the terms of the then-in-process Merger Agreement with Illumina, offerings under our 2010 ESPP were suspended after the completion of the purchase period ended March 1, 2019. After the merger with Illumina was terminated in January 2020, we began offerings under the ESPP again starting with the offering period beginning March 1, 2020.

For the years ended December 31, 2022 December 31, 2023, 2022, and 2021, and 2020, 1,735,058 shares, 1,878,168 shares, 1,913,968 shares, and 834,677 1,913,968 shares of common stock were purchased under the ESPP, respectively, respectively. As of December 31, 2022 December 31, 2023, 9,932,505 shares 12,197,447 shares of our common stock remain available for issuance under our ESPP.

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Share-based Compensation

Total share-based compensation expense consists of the following (in thousands):

	Years Ended December 31,			
	2022	2021	2020	
	Years Ended December 31,			Years Ended December 31,
	2023	2022	2021	2021
Cost of revenue	\$ 4,802	\$ 6,126	\$ 2,236	
Research and development	30,676	20,275	7,061	
Sales, general and administrative	43,135	35,403	8,236	
Merger-related expenses - stock-settled	—	6,349	—	
Merger-related expenses - milestone	—	5,202	—	
Share-based compensation	78,613	73,355	17,533	
Merger-related expenses - cash-settled	—	7,373	—	
Total share-based compensation expense	\$ 78,613	\$ 80,728	\$ 17,533	

As of **December 31, 2022**, **December 31, 2023** and **2021**, **2022**, **\$0.6 million** and **\$0.7 million** and **\$0.9 million** of share-based compensation cost was capitalized in inventory, net, on our consolidated balance sheets, respectively.

The tax benefit of share-based compensation expense was immaterial for the years ended **December 31, 2022**, **December 31, 2023**, **2021**, **2022**, and **2020**.

2021.

Determining Fair Value

We estimate the fair value of share options granted using the Black-Scholes valuation method and a single option award approach. This fair value is then amortized on a straight-line basis over the requisite service periods of the awards, which is generally the vesting period. The fair market value of RSU awards granted is the closing price of our shares on the date of grant and is generally recognized as compensation expense on a straight-line basis over the respective vesting period. For shares purchased under our Employee Stock Purchase Plan, or ESPP, we estimate the grant-date fair value, and the resulting share-based compensation expense, using the Black-Scholes option-pricing model.

Expected Term – The expected term used in the Black-Scholes valuation method represents the period that the stock options are expected to be outstanding and is determined based on historical experience of similar awards, giving consideration to the contractual terms of the stock options and vesting schedules.

Expected Volatility – The expected volatility used in the Black-Scholes valuation method is derived from the implied volatility related to our share price over the expected term.

Expected Dividend – We have never paid dividends on our shares and, accordingly, the dividend yield percentage is zero for all periods.

Risk-Free Interest Rate – The risk-free interest rate used in the Black-Scholes valuation method is the implied yield currently available on U.S. Treasury constant maturities issued with a term equivalent to the expected terms.

Stock Options

We estimated the fair value of employee stock options using the Black-Scholes option pricing model. The fair value of employee stock options is **being** amortized on a straight-line basis over the requisite service period of the awards.

When determining the current share prices underlying the stock options for calculating the grant-date fair value, we reference observable market prices of similar or identical instruments in active markets.

The fair value of employee stock options was estimated using the following weighted-average assumptions:

Years Ended December 31,

	Years Ended December 31,				Years Ended December 31,		
	2022	2021	2020		2023	2022	2021
Expected term in years	4.6	2.1 - 4.6	5.0	Expected term in years	4.9	4.6	2.1 - 4.6
Expected volatility	70% - 76%	67% - 80%	70.7%	Expected volatility	77% - 78%	70% - 76%	67% - 80%
Risk-free interest rate	0.41% - 3.66%	0.05% - 1.10%	0.3%	Risk-free interest rate	3.73% - 4.60%	0.41% - 3.66%	0.05% - 1.10%
Dividend yield	—	—	—	Dividend yield	—	—	—
Weighted-average grant date fair value per share	\$ 5.93	\$ 15.53	\$ 7.20				

Cash received from option exercises for the years ended December 31, 2022, December 31, 2023, 2022, and 2021 was \$6.5 million, \$3.4 million and 2020 was \$3.4 million, \$25.4 million and \$43.9 million, respectively.

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ESPP

ESPP

We estimate the fair value of shares to be issued under the ESPP using the Black-Scholes option pricing model. The fair value of shares to be issued under the ESPP was estimated using the following assumptions:

	Years Ended December 31,				Years Ended December 31,		
	2022	2021	2020		2023	2022	2021
Expected term in years	0.5 - 2.0	0.5 - 2.0	0.5 - 2.0	Expected term in years	0.5 - 2.0	0.5 - 2.0	0.5 - 2.0
Expected volatility	70% - 97%	67% - 68%	57% - 71%	Expected volatility	79% - 97%	70% - 97%	67% - 68%
Risk-free interest rate	0.60% - 3.51%	0.1% - 0.2%	0.1%-1.0%	Risk-free interest rate	4.9% - 5.5%	0.6% - 3.5%	0.1% - 0.2%
Dividend yield	—	—	—	Dividend yield	—	—	—
Weighted-average grant date fair value per share	\$ 4.28	\$ 25.07	\$ 1.87				

Cash received through the ESPP for the years ended December 31, 2022, December 31, 2023, 2022, and 2021 and 2020 was \$8.8 million, \$7.8 million, \$6.4 million, and \$2.4 million \$6.4 million, respectively.

As of December 31, 2022, December 31, 2023, \$125.1 million \$101.9 million of total unrecognized compensation expense related to stock options, restricted stock, and ESPP shares was expected to be recognized over a weighted-average period of 2.4 2.2 years.

NOTE 11. NET (LOSS) INCOME LOSS PER SHARE

Basic net (loss) income loss per share and diluted is computed by dividing net (loss) income loss by the weighted average number of shares of common stock outstanding during the period. Diluted net loss per share are presented for is computed using the three years presented.

weighted-average number of shares of common stock outstanding and potential shares assuming the dilutive effect of the convertible senior notes, using the if-converted method, and outstanding equity awards using the treasury stock method.

The following table presents the calculation of weighted-average shares of common stock used in the computations of basic and diluted net (loss) income loss per share amounts presented in the accompanying consolidated statements of operations and comprehensive (loss) income loss (in thousands, except per share amounts):

	Years Ended December 31,		
	2022	2021	2020
Numerator:			
Net (loss) income	\$ (314,248)	\$ (181,223)	\$ 29,403
Denominator:			
Basic			
Weighted-average shares used in computing basic net (loss) income per share	224,550	204,136	165,187
Basic net (loss) income per share	\$ (1.40)	\$ (0.89)	\$ 0.18
Diluted			
Weighted-average shares used in computing basic net (loss) income per share	224,550	204,136	165,187
Add: weighted-average stock options	—	—	6,092
Add: weighted-average restricted stock units	—	—	2,324
Add: weighted-average common stock issuable pursuant to our ESPP	—	—	1,367
Weighted-average shares used in computing diluted net (loss) income per share	224,550	204,136	174,970
Diluted net (loss) income per share	\$ (1.40)	\$ (0.89)	\$ 0.17

	Years Ended December 31,		
	2023	2022	2021
Numerator:			
Net loss	\$ (306,735)	\$ (314,248)	\$ (181,223)
Denominator:			
Basic			
Weighted-average shares used in computing basic net loss per share	253,629	224,550	204,136
Basic net loss per share	\$ (1.21)	\$ (1.40)	\$ (0.89)
Diluted			
Weighted-average shares used in computing diluted net loss per share	253,629	224,550	204,136
Diluted net loss per share	\$ (1.21)	\$ (1.40)	\$ (0.89)

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The following shares issuable upon conversion of the convertible senior notes options and outstanding time-based RSUs, performance-based RSUs, and ESPP shares to purchase common stock equity awards were excluded from the computation of diluted net loss per share for the periods presented because the effect of including such shares would have been antidilutive:

antidilutive (in thousands):

	Years Ended December 31,		
	2022	2021	2020
(in thousands)			
Shares issuable upon conversion of convertible senior notes	20,690	20,690	—
Options to purchase common stock	14,876	12,463	4,908
RSUs with time-based vesting	8,535	7,392	100
RSUs with performance-based vesting	—	—	94
ESPP shares	3,880	1,564	2,890

	Years Ended December 31,		
	2023	2022	2021
(in thousands)			
Shares issuable upon conversion of convertible senior notes	31,063	20,690	20,690

Equity awards	27,246	27,291	21,419
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As described in [Note 2. Business AcquisitionAcquisitions](#), the contingently issuable shares would be due upon the achievement of a milestone. See [Note 10. Stockholders' Equity](#) for detailed information on RSUs with time-based vesting and RSUs with performance-based vesting.

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NOTE 12. SEGMENT AND GEOGRAPHIC INFORMATION

We are organized as, and operate in, one reportable segment: the development, manufacturing, and marketing of an integrated platform for genetic analysis. Our chief operating decision-maker is our Chief Executive Officer. The Chief Executive Officer reviews financial information presented on a consolidated basis for the purposes of evaluating financial performance and allocating resources, accompanied by information about revenue by geographic regions. Our assets are primarily located in the United States of America and not allocated to any specific region, and we do not measure the performance of geographic regions based upon asset-based metrics. Therefore, geographic information is presented only for revenue.

A summary of our revenue by geographic location is as follows:

	Years Ended December 31,			(in thousands)	Years Ended December 31,		
	2022	2021	2020		2023	2022	2021
Americas	\$ 69,561	\$ 64,521	\$ 37,277				
Europe, Middle East, and Africa	22,598	30,271	19,065				
Asia-Pacific	36,145	35,721	22,551				
Total	\$ 128,304	\$ 130,513	\$ 78,893				

A summary of our revenue by category is as follows:

	Years Ended December 31,		
	2022	2021	2020
Instrument revenue	\$ 48,719	\$ 61,324	\$ 34,282
Consumable revenue	59,980	52,181	31,142
Product revenue	108,699	113,505	65,424
Service and other revenue	19,605	17,008	13,469
Total revenue	\$ 128,304	\$ 130,513	\$ 78,893

NOTE 13. SUBSEQUENT EVENTS

On January 27, 2023, the Company issued and sold an aggregate of 20,125,000 shares of the Company's common stock at a purchase price of \$10.00 per share pursuant to an automatic shelf registration statement filed on Form S-3 (File No. 333-249999) with the Securities and Exchange Commission, resulting in aggregate gross proceeds of approximately \$201.3 million.

	Years Ended December 31,		
	2023	2022	2021
Instrument revenue	\$ 120,451	\$ 48,719	\$ 61,324
Consumable revenue	63,421	59,980	52,181
Product revenue	183,872	108,699	113,505
Service and other revenue	16,649	19,605	17,008
Total revenue	\$ 200,521	\$ 128,304	\$ 130,513

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ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our chief executive officer, our chief financial officer, and our principal accounting officer, evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a–15(e) and 15d–15(e) of the Exchange Act) as of the end of the period covered by this Annual Report on Form 10–K. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to our management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives, and management necessarily applies its judgement in evaluating the cost-benefit relationship of possible controls and procedures. Based on this evaluation, our chief executive officer, chief financial officer and our principal accounting officer concluded that our disclosure controls and procedures were effective as of the end of the period covered by this report.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f). Pacific Biosciences of California, Inc.'s internal control over financial reporting is designed to provide reasonable assurance to the Company's management and board of directors regarding the preparation and fair presentation of published financial statements. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Therefore, even those systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation. Management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2022 December 31, 2023. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). Based on our assessment, we concluded that, as of December 31, 2022 December 31, 2023, the Company's internal control over financial reporting was effective based on those criteria.

The Company's internal control over financial reporting as of December 31, 2022 December 31, 2023 has been audited by Ernst & Young & Young LLP, the independent registered public accounting firm who also audited the Company's financial statements. Ernst & Young's & Young's attestation report on the Company's internal control over financial reporting appears on page 91112 hereof.

Changes in Internal Control Over Financial Reporting

There were no material changes in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the year ended December 31, 2022 December 31, 2023, that have materially affected, or were reasonably likely to materially affect, our internal control over financial reporting.

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Report of Independent Registered Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Pacific Biosciences of California, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Pacific Biosciences of California, Inc.'s internal control over financial reporting as of December 31, 2022 December 31, 2023, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Pacific Biosciences of California, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022 December 31, 2023, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the 2022 2023 consolidated financial statements of the Company and our report dated February 28, 2023 February 28, 2024, expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP
San Mateo, California
February 28, 2023

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ITEM 9B. OTHER INFORMATION

None.

Securities Trading Plans of Directors and Executive Officers.

During our last fiscal quarter, no director or officer, as defined in Rule 16a-1(f), adopted or terminated a "Rule 10b5-1 trading arrangement" or a "non-Rule 10b5-1 trading arrangement," each as defined in Item 408 of Regulation S-K.

ITEM 9C.DISCLOSURE REGARDING FOREIGN JURISDICTIONS THAT PREVENT INSPECTIONS

Not applicable.

PART III

ITEM 10.DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Information responsive to this item is incorporated herein by reference to our definitive proxy statement with respect to our 2023 2024 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

ITEM 11.EXECUTIVE COMPENSATION

Information responsive to this item is incorporated herein by reference to our definitive proxy statement with respect to our 2023 2024 Annual Meeting of Stockholder to be filed with the SEC within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

ITEM 12.SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Information responsive to this item is incorporated herein by reference to our 2023 2024 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

ITEM 13.CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Information responsive to this item is incorporated herein by reference to our 2023 2024 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

ITEM 14.PRINCIPAL ACCOUNTANT FEES AND SERVICES

Information responsive to this item is incorporated herein by reference to our 2023 2024 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

PART IV

ITEM 15.EXHIBITS, FINANCIAL STATEMENT SCHEDULES.

- (a) The following documents are filed as part of, or incorporated by reference into, this Annual Report on Form 10-K:
- 1. *Financial Statements*: See Index to Consolidated Financial Statements under Item 8 of this Annual Report on Form 10-K.
 - 2. *Financial Statement Schedules*: All schedules are omitted because they are not required, are not applicable or the information is included in the consolidated financial statements or notes thereto.
 - 3. *Exhibits*: We have filed or incorporated by reference into this Annual Report on Form 10-K, the exhibits listed on the accompanying Exhibit Index immediately below.
- (b) Financial Statement Schedules: See Item 15(a)(2), above.
- (c) Exhibits: Refer to the [Exhibit Index](#) that follows.

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Exhibit Index					Incorporated by reference herein				
Exhibit Number	Description	Form	Exhibit No.	Filing Date	Incorporated by reference herein				
Exhibit Number	Description	Form	Exhibit No.	Filing Date	Exhibit Number	Description	Form	No.	Filing Date
3.1	Amended and Restated Certificate of Incorporation	10-K	3.1	March 23, 2011	3.1	Amended and Restated Certificate of Incorporation	10-K	3.1	March 23, 2011
3.2	Third Amended and Restated Bylaws of Pacific Biosciences of California, Inc.	8-K	3.1	November 7, 2022	3.2	Third Amended and Restated Bylaws of Pacific Biosciences of California, Inc.	8-K	3.1	November 7, 2022

4.1	Specimen Common Stock Certificate	S-1/A	4.1	October 1, 2010	4.1	Specimen Common Stock Certificate	S-1/A	4.1	October 1, 2010
4.2	Description of Registrant's securities registered under Section 12 of the Exchange Act	10-K	4.2	February 28, 2020	4.2	Description of Registrant's securities registered under Section 12 of the Exchange Act	10-K	4.2	February 28, 2020
4.3	Indenture, dated February 16, 2021, between Pacific Biosciences of California, Inc., and U.S. Bank National Association, as Trustee	8-K	4.1	February 17, 2021	4.3	Indenture, dated February 16, 2021, between Pacific Biosciences of California, Inc., and U.S. Bank National Association, as Trustee	10-Q	4.1	August 4, 2023
4.4	Form of 1.50% Convertible Senior Notes due 2028 (included in Exhibit 4.3)	8-K	4.1	February 17, 2021	4.4	Form of 1.50% Convertible Senior Notes due 2028 (included in Exhibit 4.3)	10-Q	4.1	August 4, 2023
10.1+	Form of Director and Executive Officer Indemnification Agreement	S-1	10.1	August 16, 2010					
10.2+	2010 Equity Incentive Plan	S-1	10.4	August 16, 2010					
10.3+	2010 Equity Incentive Plan forms of agreement	10-Q	10.1	May 2, 2018					
10.4+	2010 Employee Stock Purchase Plan and forms of agreement thereunder	S-1	10.5	August 16, 2010					
10.5+	2010 Outside Director Equity Incentive Plan	S-1	10.6	August 16, 2010					
10.6+	2010 Outside Director Equity Incentive Plan forms of agreement	10-Q	10.2	May 2, 2018					
10.7+	2020 Equity Incentive Plan and related forms of agreement, as amended	8-K	10.1	May 26, 2022					
10.8+	Form of Global Stock Option Agreement under the Pacific Biosciences of California, Inc., 2020	8-K	10.2	May 26, 2022					
10.9+	Form of Global Restricted Stock Unit Agreement under the Pacific Biosciences of California, Inc. 2020 Equity Incentive Plan, as amended	8-K	10.3	May 26, 2022					
10.10+	Omniome Equity Incentive Plan of Pacific Biosciences of California, Inc., and related forms of agreement thereunder	10-Q	10.4	November 5, 2021					
10.11+	Pacific Biosciences of California, Inc. 2020 Inducement Equity Incentive Plan, as amended, and forms of agreement thereunder	8-K	10.1	November 19, 2021					
10.12+	Letter Relating to Employment Terms by and between the Registrant and Susan G. Kim effective September 28, 2020	10-Q	10.2	November 3, 2020					
10.13+	Form of Change in Control and Severance Agreement for executive officers	10-K	10.14	February 26, 2021					
10.14+	Letter Relating to Employment Terms by and between the Registrant and Christian O. Henry effective September 14, 2020	10-K	10.15	February 26, 2021					
10.15+	Amended Change in Control and Severance Agreement by and between the Registrant and Christian O. Henry dated February 3, 2021	10-K	10.17	February 26, 2021					
10.16+	Letter Relating to Employment Terms by and between the Registrant and Mark Van Oene effective January 8, 2021	10-K	10.18	February 26, 2021					
10.17+	Lease Agreement by and between the Registrant and Menlo Park Portfolio II, LLC., dated July 22, 2015	10-Q	10.2	August 5, 2015					

10.18†	First Amendment to Lease Agreement by and between the Registrant and Menlo Park Portfolio II, LLC, dated December 23, 2016	10-K	10.50	March 6, 2017	
4.5					4.5 Indenture, dated as of June 30, 2023, by and between Pacific Biosciences of California, Inc. and U.S. Bank Trust Company, National Association, as Trustee 8-K 4.1 June 30, 2023
4.6					4.6 Form of 1.375% Convertible Senior Note due 2030 8-K 4.2 June 30, 2023
10.1+					10.1+ Form of Director and Executive Officer Indemnification Agreement S-1 10.1 August 16, 2010
10.2+					10.2+ 2010 Equity Incentive Plan S-1 10.4 August 16, 2010
10.3+					10.3+ 2010 Equity Incentive Plan forms of agreement 10-Q 10.1 May 2, 2018
10.4+					10.4+ 2010 Employee Stock Purchase Plan and forms of agreement thereunder S-1 10.5 August 16, 2010
10.5+					10.5+ 2010 Outside Director Equity Incentive Plan S-1 10.6 August 16, 2010
10.6+					10.6+ 2010 Outside Director Equity Incentive Plan forms of agreement 10-Q 10.2 May 2, 2018
10.7+					10.7+ 2020 Equity Incentive Plan, as amended 8-K 10.1 May 26, 2022

10.8+	10.8+	Form of Global Stock Option Agreement under the Pacific Biosciences of California, Inc., 2020 Equity Incentive Plan, as amended	8-K	10.2	May 26, 2022
10.9+	10.9+	Form of Global Restricted Stock Unit Agreement under the Pacific Biosciences of California, Inc., 2020 Equity Incentive Plan, as amended	8-K	10.3	May 26, 2022
10.10+	10.10+	Omniome Equity Incentive Plan of Pacific Biosciences of California, Inc., and related forms of agreement thereunder	10-Q	10.4	November 5, 2021
10.11+	10.11+	Pacific Biosciences of California, Inc., 2020 Inducement Equity Incentive Plan, as amended, and forms of agreement thereunder	8-K	10.1	November 19, 2021
10.12+	10.12+	Letter Relating to Employment Terms by and between the Registrant and Susan G. Kim effective September 28, 2020	10-Q	10.2	November 3, 2020
10.13+	10.13+	Form of Change in Control and Severance Agreement for executive officers	10-K	10.14	February 26, 2021

10.14+						10.14+	Letter Relating to Employment Terms by and between the Registrant and Christian O. Henry effective September 14, 2020	10-K	10.15	February 26, 2021
10.15+						10.15+	Amended Change in Control and Severance Agreement by and between the Registrant and Christian O. Henry dated February 3, 2021	10-K	10.17	February 26, 2021
10.16+						10.16+	Letter Relating to Employment Terms by and between the Registrant and Mark Van Oene effective January 8, 2021	10-K	10.18	February 26, 2021
10.17+						10.17+	Lease Agreement by and between the Registrant and Menlo Park Portfolio II, LLC, dated July 22, 2015	10-Q	10.2	August 5, 2015
10.18†						10.18†	First Amendment to Lease Agreement by and between the Registrant and Menlo Park Portfolio II, LLC, dated December 23, 2016	10-K	10.50	March 6, 2017
10.19	Investment Agreement, dated as of February 9, 2021, between Pacific Biosciences of California, Inc. and SB Northstar LP.	8-K	10.1	February 10, 2021		10.19	Investment Agreement, dated as of February 9, 2021, between Pacific Biosciences of California, Inc. and SB Northstar LP.	8-K	10.1	February 10, 2021

10.20††	Exclusive License Agreement by and between the Registrant and Cornell Research Foundation, Inc., dated as of February 1, 2004	S-1/A	10.8	October 22, 2010
10.21+	Letter Relating to Employment Terms by and between the Registrant and Michele Farmer effective May 17, 2021	10-Q	10.2	August 6, 2021
10.22	Agreement and Plan of Merger of Reorganization among Pacific Biosciences of California, Inc., Apollo Acquisition Corp., Apollo Acquisition Sub, LLC, Omniome, Inc. and Shareholder Representative Services, LLC, as securityholder representative, dated as of July 19, 2021	8-K	10.1	July 20, 2021
10.23	Securities Purchase Agreement, dated as of July 19, 2021, by and between Pacific Biosciences of California, Inc., and each of the Investors	8-K	10.2	July 20, 2021
10.24	Registration Rights Agreement, dated as of July 19, 2021, by and between Pacific Biosciences of California, Inc., and each of the Investors	8-K	10.3	July 20, 2021
10.25+	Letter Relating to Employment Terms by and between the Registrant and Jeff Eidel effective August 16, 2022	8-K	99.3	January 24, 2023

10.20††	Exclusive License Agreement by and between the Registrant and Cornell Research Foundation, Inc., dated as of February 1, 2004	S-1/A	10.8	October 22, 2010
10.21+	Letter Relating to Employment Terms by and between the Registrant and Michele Farmer effective May 17, 2021	10-Q	10.2	August 6, 2021

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10.22	Agreement and Plan of Merger of Reorganization among Pacific Biosciences of California, Inc., Apollo Acquisition Corp., Apollo Acquisition Sub, LLC, Omniome, Inc. and Shareholder Representative Services, LLC, as securityholder representative, dated as of July 19, 2021	8-K	10.1	July 20, 2021
10.23	Securities Purchase Agreement, dated as of July 19, 2021, by and between Pacific Biosciences of California, Inc., and each of the Investors	8-K	10.2	July 20, 2021
10.24	Registration Rights Agreement, dated as of July 19, 2021, by and between Pacific Biosciences of California, Inc., and each of the Investors	8-K	10.3	July 20, 2021
10.25+	Letter Relating to Employment Terms by and between the Registrant and Jeff Eidel effective August 16, 2022	8-K	99.3	January 24, 2023
10.26+	Change in Control and Severance Agreement by and between the Registrant and Susan G. Kim effective February 3, 2021	8-K	99.4	January 24, 2023
10.27	Letter Agreement, dated June 23, 2023, between the Company and Chimera Investment LLC	8-K	10.1	June 23, 2023
10.28+	Form of Performance-Based Restricted Stock Unit Award Agreement under the Pacific Biosciences of California, Inc. 2020 Equity Incentive Plan, as amended			Filed herewith
21.1	List of Subsidiaries of the Registrant			Filed herewith
23.1	Consent of Independent Registered Public Accounting Firm			Filed herewith

31.1	Certification of Chief Executive Officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002	Filed herewith
31.2	Certification of Chief Financial Officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002	Filed herewith
32.1*	Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002	Furnished herewith
32.2*	Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002	Furnished herewith
97.1	Compensation Recovery Policy	Filed herewith
101.INS	XBRL Instance Document (the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document)	Filed herewith
101.SCH	XBRL Taxonomy Extension Schema Document	Filed herewith
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document	Filed herewith
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document	Filed herewith
101.LAB	XBRL Taxonomy Extension Labels Linkbase Document	Filed herewith
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document	Filed herewith
104	Cover Page Interactive File (formatted as inline XBRL and contained in Exhibit 101)	Filed herewith

10.26		Change in Control and Severance Agreement by and between the Registrant and Susan G. Kim effective February 3, 2021 Indicates management contract or compensatory plan.	8-K	99.4 January 24, 2023
+				
10.27 †		Confidential treatment has been requested for portions of this exhibit. These portions have been omitted and have been filed separately with the Securities and Exchange Commission.		
††		Certain confidential information contained in this Exhibit was omitted by means of marking such portions with brackets because the identified confidential information (i) is not material and (ii) would be competitively harmful if publicly disclosed.		
‡		The certifications attached as Exhibit 32.1 and 32.2 that accompany this Annual Report on Form 10-K are deemed furnished and not filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of Performance-Based Restricted Stock Unit Award Agreement under the Pacific Biosciences of California, Inc. 2020 Equity Incentive Plan, under the Securities Act of 1933, as amended,	Filed herewith	
21.1	List of Subsidiaries of or the Registrant		Filed herewith	
23.1	Consent of Independent Registered Public Accounting Firm		Filed herewith	
31.1	Certification of Chief Executive Officer pursuant to Securities Exchange Act Rules 13a-14(a) and 15d-14(a), of 1934, as adopted pursuant to Section 302 amended, whether made before or after the date of the Sarbanes-Oxley Act this Annual Report on Form 10-K, irrespective of 2002		Filed herewith	
31.2	Certification of Chief Financial Officer pursuant to Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002		Filed herewith	
32.1*	Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002		Furnished herewith	
32.2*	Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002		Furnished herewith	
101.INS	XBRL Instance Document (the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document)		Filed herewith	
101.SCH	XBRL Taxonomy Extension Schema Document		Filed herewith	
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document		Filed herewith	
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document		Filed herewith	
101.LAB	XBRL Taxonomy Extension Labels Linkbase Document		Filed herewith	
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document		Filed herewith	
104	Cover Page Interactive File (formatted as inline XBRL and any general incorporation language contained in Exhibit 101) such filing.		Filed herewith	
115				
+	Indicates management contract or compensatory plan.			
†	Confidential treatment has been requested for portions of this exhibit. These portions have been omitted and have been filed separately with the Securities and Exchange Commission.			

†† Certain confidential information contained in this Exhibit was omitted by means of marking such portions with brackets because the identified confidential information (i) is not material and (ii) would be competitively harmful if publicly disclosed.

ITEM 16. FORM 10-K SUMMARY

* The certifications attached as Exhibit 32.1 and 32.2 that accompany this Annual Report on Form 10-K are deemed furnished and not filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of Pacific Biosciences of California, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date of this Annual Report on Form 10-K, irrespective of any general incorporation language contained in such filing.

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Signatures

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the Registrant has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized.

Pacific
Biosciences
of
California,
Inc.

Date: February 28, 2023
February 28, 2024

By: _____
/s/ Christian O. Henry
Christian
O. Henry
President
and Chief
Executive
Officer

Date: February 28, 2024
Date: February 28, 2023

By: _____
/s/ Susan G. Kim
By: _____
/s/ SUSAN G. Kim
Susan G. Kim
Chief Financial Officer

Date: February 28, 2024
Date: February 28, 2023

By: _____
/s/ Michele Farmer
Michele Farmer
Vice President and Chief Accounting Officer

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POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Christian O. Henry, Susan G. Kim, Brett Atkins, and Michele Farmer, and each of them, as his or her true and lawful attorney-in-fact and agent, with full power of substitution and resubstitution, for each individual in any and all capacities, to sign any and all amendments to this Annual Report on Form 10-K, and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing

requisite and necessary to be done in connection therewith, as fully for all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them, or the individual's substitute, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this report has been signed by the following persons on behalf of the Registrant in the capacities and on the dates indicated.

Signature	Title	Date
<div>Signature</div>	<div>Title</div>	<div>Date</div>
<div>/s/ Christian O. Henry</div> <div>Christian O. Henry</div>	<div>Director, President and Chief Executive Officer</div> <div>(Principal Executive Officer)</div> <div>Christian O. Henry</div>	<div>February 28, 2023 2024</div>
<div>/s/ Susan G. Kim</div> <div>Susan G. Kim</div>	<div>Chief Financial Officer</div> <div>(Principal Financial Officer)</div>	<div>February 28, 2024</div>
<div>/s/ Michele Farmer</div> <div>Michele Farmer</div>	<div>Vice President and Chief Accounting Officer</div> <div>(Principal Accounting Officer)</div>	<div>February 28, 2023 2024</div>
<div>/s/ John F. Milligan</div> <div>John F. Milligan</div>	<div>Chairman of the Board of Directors</div>	<div>February 28, 2023 2024</div>
<div>/s/ David Botstein</div> <div>David Botstein</div>	<div>Director</div>	<div>February 28, 2023</div>

<u>/s/ William W. Ericson</u>	Director	February 28, 2024	
William W. Ericson	Director		February 28, 2023
<u>/s/ Hannah A. Valantine</u>	Director	February 28, 2024	
Hannah A. Valantine	Director		February 28, 2023
<u>/s/ Randall S. Livingston</u>	Director	February 28, 2024	
Randall S. Livingston	Director		February 28, 2023
<u>/s/ Marshall L. Mohr</u>	Director	February 28, 2024	
Marshall L. Mohr	Director		February 28, 2023
<u>/s/ Kathy Ordoñez</u>	Director	February 28, 2024	
Kathy Ordoñez	Director		February 28, 2023
<u>/s/ Lucy Shapiro</u>	Director	February 28, 2024	
Lucy Shapiro			
<u>/s/ David Meline</u>	Director	February 28, 2023	2024
David Meline			

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4853-9957-6739.4

200% of Target Number of Restricted Stock Units

Schedule:

Schedule:

C.

C.

- 2 -

PARTICIPANT

PACIFIC BIOSCIENCES OF CALIFORNIA,
INC.

Signature

By

Print Name

Title

Residence Address:

- 2 -

EXHIBIT A PARTICIPANT PACIFIC BIOSCIENCES OF CALIFORNIA, INC. Signature By Print Name Title Residence Address:
EXHIBIT A PACIFIC BIOSCIENCES OF CALIFORNIA, INC. 2020 EQUITY INCENTIVE PLAN PERFORMANCE-BASED
RESTRICTED STOCK UNIT AGREEMENT TERMS AND CONDITIONS OF RESTRICTED STOCK UNIT GRANT

1. Grant of Restricted Stock Units. The Company hereby grants to the individual ("Participant") named in the Notice of Grant of Restricted Stock Units of this Award Agreement (the "Notice of Grant") under the Plan an Award of Restricted Stock Units, and subject to all of the terms and conditions of this Award Agreement, including any country-specific provisions set forth in Exhibit B, vesting criteria set forth in Exhibit C, and the Plan, which is incorporated herein by reference. Subject to Section 19(c) of the Plan, in the event of a conflict between the terms and conditions of the Plan and this Award Agreement, the terms and conditions of the Plan shall prevail.

2. **Company's Obligation to Pay.** Each Restricted Stock Unit represents the right to receive a Share on the date it vests. Unless and until the Restricted Stock Units will have vested in the manner set forth in Section 3 or 4, Participant will have no right to payment of any such Restricted Stock Units. Prior to actual payment of any vested Restricted Stock Units, such Restricted Stock Unit will represent an unsecured obligation of the Company, payable (if at all) only from the general assets of the Company.

3. **Vesting Schedule.** 1. Grant of Restricted Stock Units. The Company hereby grants to the individual ("Participant") named in the Notice of Grant of Restricted Stock Units of this Award Agreement (the "Notice of Grant") under the Plan an Award of Restricted Stock Units, and subject to all of the terms and conditions of this Award Agreement, including any country-specific provisions set forth in Exhibit B, vesting criteria set forth in Exhibit C, and the Plan, which is incorporated herein by reference. Subject to Section 19(c) of the Plan, in the event of a conflict between the terms and conditions of the Plan and this Award Agreement, the terms and conditions of the Plan shall prevail. 2. Company's Obligation to Pay. Each Restricted Stock Unit represents the right to receive a Share on the date it vests. Unless and until the Restricted Stock Units will have vested in the manner set forth in Section 3 or 4, Participant will have no right to payment of any such Restricted Stock Units. Prior to actual payment of any vested Restricted Stock Units, such Restricted Stock Unit will represent an unsecured obligation of the Company, payable (if at all) only from the general assets of the Company. 3. Vesting Schedule. Except as provided in Section 4, and subject to Section 5, the Restricted Stock Units awarded by this Award Agreement will vest in accordance with the vesting provisions set forth in the Notice of Grant. Unless specifically provided otherwise in this Award Agreement or other written agreement between Participant and the Company or any applicable Subsidiary of the Company governing the terms of this Award, Restricted Stock Units that are scheduled to vest on a certain date or upon the occurrence of a certain condition will not vest in accordance with any of the provisions of this Award Agreement, unless Participant will have been continuously a Service Provider from the Date of Grant through the applicable vesting date. The Administrator will have the exclusive discretion to determine when Participant no longer is providing services for purposes of determining Service Provider status under this Award of Restricted Stock Units (including without limitation whether Participant will be considered to be providing services while on a leave of absence).

4. **Payment after Vesting.**

(a) **General Rule.** Subject to Section 8, any Restricted Stock Units that vest will be paid to Participant (or in the event of Participant's death, to his or her properly designated beneficiary or estate) in whole Shares. Subject to the provisions of this Section 4, such vested Restricted Stock Units shall be paid in whole Shares as soon as practicable after vesting, but in each such case within sixty (60) days following the vesting date. In no event will Participant be permitted, directly or indirectly, to specify the taxable year of payment of any Restricted Stock Units payable under this Award Agreement.

(b) **Acceleration.**

(i) **Discretionary Acceleration.** 4. Payment after Vesting. (a) General Rule. Subject to Section 8, any Restricted Stock Units that vest will be paid to Participant (or in the event of Participant's death, to his or her properly designated beneficiary or estate) in whole Shares. Subject to the provisions of this Section 4, such vested Restricted Stock Units shall be paid in whole Shares as soon as practicable after vesting, but in each such case within sixty (60) days following the vesting date. In no event will Participant be permitted, directly or indirectly, to specify the taxable year of payment of any Restricted Stock Units payable under this Award Agreement. (b) Acceleration. -2- (i) Discretionary Acceleration. The Administrator, in its discretion, may accelerate the vesting of the balance, or some lesser portion of the balance, of the unvested Restricted Stock Units at any time, subject to the terms of the Plan. If so accelerated, such Restricted Stock Units will be considered as having vested as of the date specified by the Administrator. If Participant is a U.S. taxpayer, the payment of Shares vesting pursuant to this Section 4 in all cases shall be paid at a time or in a manner that is exempt from, or complies with, Section 409A. The prior sentence may be superseded in a future agreement or amendment to this Award Agreement only by direct and specific reference to such sentence. (ii) Notwithstanding anything in the Plan or this Award Agreement or any other agreement (whether entered into before, on or after the Date of Grant) to the contrary, if the vesting of the balance, or some lesser portion of the balance, of the Restricted Stock Units is accelerated in connection with the cessation of Participant's status as an Employee or other Service Provider (provided that such termination is a "separation from service" within the meaning of Section 409A, as determined by the Company), other than due to Participant's death, and if (x) Participant is a U.S. taxpayer and a "specified employee" within the meaning of Section 409A at the time of such termination as a Service Provider and (y) the payment of such accelerated Restricted Stock Units will result in the imposition of additional tax under Section 409A if paid to Participant on or within the six (6) month period following the cessation of Participant's status as a Service Provider, then the payment of such accelerated Restricted Stock Units will not be made until the date six (6) months and one (1) day following the date of cessation of such Participant's status, unless Participant dies following cessation of such Participant's status, in which case, the Restricted Stock Units will be paid in Shares to Participant's estate as soon as practicable following his or her death.

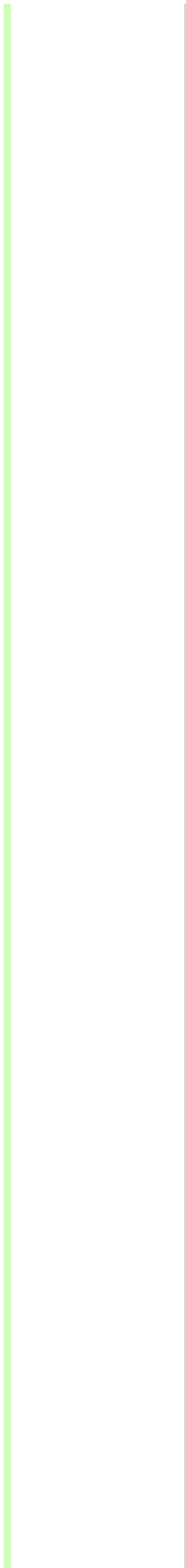
(c) Section 409A. It is the intent of this Award Agreement that it and all payments and benefits to U.S. taxpayers hereunder be exempt from, or comply with, the requirements of Section 409A so that none of the Restricted Stock Units provided under this Award Agreement or Shares issuable thereunder will be subject to the additional tax imposed under Section 409A, and any ambiguities or ambiguous terms herein will be interpreted to be so exempt or to so comply. Each payment payable under this Award Agreement is intended to constitute a separate payment for purposes of Treasury Regulation Section 1.409A-2(b)(2). However, in no event will the Company or any of its Parents or Subsidiaries have any liability, responsibility or obligation to reimburse, indemnify, or hold harmless Participant for any taxes, penalties and interest that may be imposed, or other costs that may be incurred, as a result of Section 409A.

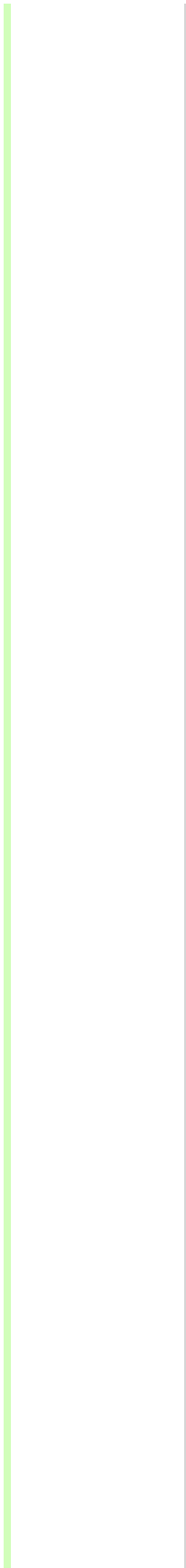
5. Forfeiture Upon Termination as a Service Provider. Unless specifically provided otherwise in this Award Agreement or other written agreement between Participant and the Company or any of its Subsidiaries or Parents, as applicable, if Participant ceases to be a Service Provider for any or no reason, the then-unvested Restricted Stock Units awarded by this Award Agreement will thereupon be forfeited at no cost to the Company and Participant will have no further rights thereunder.

6. Death of Participant. Any distribution or delivery to be made to Participant under this Award Agreement, if Participant is then deceased, will be made to Participant's designated beneficiary (if applicable and to the extent the Administrator has permitted such beneficiary designation with respect to this Award) or, absent a designated beneficiary or if no beneficiary survives Participant, the administrator or executor of Participant's estate. Any such transferee must furnish the Company with (a) written notice of his or her status as transferee, and (b) evidence satisfactory to the Company to



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3- establish the validity of the transfer and compliance with any laws or regulations pertaining to said transfer. 7. Tax Obligations (a) Responsibility for Taxes.

Participant acknowledges that, regardless of any action taken by the Company or, if different, Participant's employer (the "Employer") or any Parent or Subsidiary of the Company to which Participant is providing services (together, the "Service Recipients"), the ultimate liability for any tax and/or social insurance liability obligations and requirements in connection with the Restricted Stock Units, including, without limitation, (i) all federal, state, and local taxes (including Participant's Federal Insurance Contributions Act (FICA) obligations) that are required to be withheld by any Service Recipient or other payment of tax-related items related to Participant's participation in the Plan and legally applicable to Participant, (ii) Participant's and, to the extent required by any Service Recipient, the Service Recipient's fringe benefit tax liability, if any, associated with the grant, vesting, or settlement of the Restricted Stock Units or sale of Shares, and (iii) any other Service Recipient taxes the responsibility for which Participant has, or has agreed to bear, with respect to the Restricted Stock Units (or settlement thereof or issuance of Shares thereunder) (collectively, the "Tax Obligations"), is and remains Participant's sole responsibility and may exceed the amount actually withheld by the applicable Service Recipient(s). Participant further acknowledges that no Service Recipient (A) makes any representations or undertakings regarding the treatment of any Tax Obligations in connection with any aspect of the Restricted Stock Units, including, but not limited to, the grant, vesting or settlement of the Restricted Stock Units, the subsequent sale of Shares acquired pursuant to such settlement and the receipt of any dividends or other distributions, and (B) makes any commitment to and is under any obligation to structure the terms of the grant or any aspect of the Restricted Stock Units to reduce or eliminate Participant's liability for Tax Obligations or achieve any particular tax result. (b) Tax Withholding. Pursuant to such procedures as the Administrator may specify from time to time, the Service Recipient shall withhold the amount required to be withheld for the payment of Tax Obligations. The Administrator, in its sole discretion and pursuant to such procedures as it may specify from time to time, may permit Participant to satisfy such Tax Obligations, in whole or in part (without limitation), if permissible by applicable local law, by (i) paying cash in U.S. dollars, (ii) electing to have the Company withhold otherwise deliverable Shares having a fair market value equal to the minimum amount that is necessary to meet the withholding requirement for such Tax Obligations (or such greater amount as Participant may elect if permitted by the Administrator, if such greater amount would not result in adverse financial accounting consequences), (iii) withholding the amount of such Tax Obligations from Participant's wages or other cash compensation paid to Participant by the applicable Service Recipient(s), (iv) delivering to the Company Shares that Participant owns and that already have vested with a fair market value equal to the Tax Obligations (or such greater amount as Participant may elect if permitted by the Administrator, if such greater amount would not result in adverse financial accounting consequences), (v) selling a sufficient number of such Shares otherwise deliverable to Participant, through such means as the Company may determine in its sole discretion (whether through a broker or otherwise), equal to the minimum amount that is necessary to meet the withholding requirement for such Tax Obligations (or such greater amount as Participant may elect if permitted by the Administrator, if such greater amount would not result in adverse financial accounting consequences), or (v) such other means as the Administrator deems appropriate. Further, if Participant is subject to Tax Obligations in more than -4- one jurisdiction between the Date of Grant and the date of any relevant taxable or tax withholding event, as applicable, Participant acknowledges that the applicable Service Recipient(s) (or former employer, as applicable) may be required to withhold or account for Tax Obligations in more than one jurisdiction. If the Tax Obligations are satisfied by withholding in Shares, for tax purposes, Participant is deemed to have been issued the full number of Shares subject to the vested Restricted Stock Units, notwithstanding that a number of the Shares are held back solely for the purpose of paying the Tax Obligations. If Participant is an officer of the Company within the meaning of Section 16 of the Exchange Act, then the Company will withhold from proceeds of the sale of a sufficient number of Shares otherwise deliverable to Participant to satisfy the Tax Obligations and any associated broker or other fees upon the relevant taxable or tax withholding event, as applicable, and Participant agrees and acknowledges that Participant may not satisfy them by any means other than such sale of Shares, unless required to do so by the Administrator. To the extent the use of such withholding method is problematic under Applicable Laws or has materially adverse accounting consequences, then the Tax Obligations may be satisfied by one or a combination of the methods specified under clauses (i), (ii), (iii) and (v) above. (c) No Representations. Participant has reviewed with his or her own tax advisers the U.S. federal, state, local and non-U.S. tax consequences of this investment and the transactions contemplated by this Award Agreement. With respect to such matters, Participant relies solely on such advisers and not on any statements or representations of the Company or any of its agents, written or oral. Participant understands that Participant (and not the Company) shall be responsible for Participant's own tax liability that may arise as a result of this investment or the transactions contemplated by this Award Agreement. (d) Company's Obligation to Deliver Shares. For clarification purposes, in no event will the Company issue Participant any Shares unless and until arrangements satisfactory to the Administrator have been made for the payment of Participant's Tax Obligations. If Participant fails to make satisfactory arrangements for the payment of such Tax Obligations hereunder at the time any applicable Restricted Stock Units otherwise are scheduled to vest pursuant to Sections 3 or 4 of Participant's Tax Obligations otherwise become due, Participant will permanently forfeit such Restricted Stock Units to which Participant's Tax Obligation relates and any right to receive Shares thereunder and such Restricted Stock Units will be returned to the Company at no cost to the Company. Participant acknowledges and agrees that the Company may refuse to issue or deliver the Shares if such Tax Obligations are not delivered at the time they are due. 8. Rights as Stockholder. Neither Participant nor any person claiming under or through Participant will have any of the rights or privileges of a stockholder of the Company in respect of any Shares deliverable hereunder unless and until certificates representing such Shares (which may be in book entry form) will have been issued, recorded on the records of the Company or its transfer agents or registrars, and delivered to Participant (including through electronic delivery to a brokerage account). After such issuance, recordation and delivery, Participant will have all the rights of a stockholder of the Company with respect to voting such Shares and receipt of dividends and distributions on such Shares. 9. No Guarantee of Continued Service. PARTICIPANT ACKNOWLEDGES AND AGREES THAT THE VESTING OF THE RESTRICTED STOCK UNITS PURSUANT TO THE VESTING SCHEDULE

HEREOF IS EARNED ONLY BY CONTINUING AS A SERVICE -5- PROVIDER, WHICH UNLESS PROVIDED OTHERWISE UNDER APPLICABLE LAW IS AT THE WILL OF THE APPLICABLE SERVICE RECIPIENT AND NOT THROUGH THE ACT OF BEING HIRED, BEING GRANTED THIS RESTRICTED STOCK UNIT AWARD OR ACQUIRING SHARES HEREUNDER, PARTICIPANT FURTHER ACKNOWLEDGES AND AGREES THAT THIS AWARD AGREEMENT, THE TRANSACTIONS CONTEMPLATED HEREUNDER AND THE VESTING SCHEDULE SET FORTH HEREIN DO NOT CONSTITUTE AN EXPRESS OR IMPLIED PROMISE OF CONTINUED ENGAGEMENT AS A SERVICE PROVIDER FOR THE VESTING PERIOD, FOR ANY PERIOD, OR AT ALL, AND SHALL NOT INTERFERE IN ANY WAY WITH PARTICIPANT'S RIGHT OR THE RIGHT OF ANY SERVICE RECIPIENT TO TERMINATE PARTICIPANT'S RELATIONSHIP AS A SERVICE PROVIDER, SUBJECT TO APPLICABLE LAW, WHICH TERMINATION, UNLESS PROVIDED OTHERWISE UNDER APPLICABLE LAW, MAY BE AT ANY TIME, WITH OR WITHOUT CAUSE. 10. Grant is Not Transferable. Except to the limited extent provided in Section 7, this grant and the rights and privileges conferred hereby will not be transferred, assigned, pledged or hypothecated in any way (whether by operation of law or otherwise) and will not be subject to sale under execution, attachment or similar process. Upon any attempt to transfer, assign, pledge, hypothecate or otherwise dispose of this grant, or any right or privilege conferred hereby, or upon any attempted sale under any execution, attachment or similar process, this grant and the rights and privileges conferred hereby immediately will become null and void. 11. Insider Trading Restrictions/Market Abuses. Participant acknowledges that Participant may be subject to insider trading restrictions and/or market abuse laws in applicable jurisdictions, including the United States and Participant's country of residence, which may affect Participant's ability, directly or indirectly, for Participant or for a third party, to acquire or sell, or attempt to sell, Shares or rights to Shares under the Plan during such times as Participant is considered to have "inside information" regarding the Company (as defined by the laws in the applicable jurisdiction, including the United States and Participant's country of residence). Any restrictions under these laws or regulations are separate from and in addition to any restrictions that may be imposed under any applicable Company insider trading policy. Participant acknowledges that it is Participant's responsibility to be compliant with all such requirements and Participant should consult Participant's personal legal advisers to ensure compliance. 12. Foreign Asset/Account Reporting Requirements; Exchange Controls. Participant's country may have certain foreign asset and/or account reporting requirements and exchange controls which may affect Participant's ability to acquire or hold Shares under the Plan or cash received from participating in the Plan (including from any dividends received or sale proceeds arising from the sale of Shares) in a brokerage or bank account outside Participant's country. Participant understands that Participant may be required to report such accounts, assets or transactions to the tax or other authorities in Participant's country. Participant also may be required to repatriate sale proceeds or other funds received as a result of participation in the Plan to Participant's country through a designated bank or broker and/or within a certain time after receipt. In addition, Participant may be subject to tax payment and/or reporting obligations in connection with any income realized under the Plan and/or from the sale of Shares. Participant acknowledges that it is Participant's responsibility to be compliant with all such requirements, and that Participant should consult Participant's personal legal and tax advisers, as applicable, to ensure compliance. -6- 13. Nature of Grant. In accepting this Award of Restricted Stock Units, Participant acknowledges, understands and agrees that: (a) the grant of the Restricted Stock Units is voluntary and occasional and does not create any contractual or other right to receive future grants of restricted stock units, or benefits in lieu of restricted stock units, even if restricted stock units have been granted in the past; (b) all decisions with respect to future restricted stock units or other grants, if any, will be at the sole discretion of the Administrator; (c) Participant is voluntarily participating in the Plan; (d) the Restricted Stock Units and the Shares subject to the Restricted Stock Units are not intended to replace any pension rights or compensation; (e) the Restricted Stock Units and the Shares subject to the Restricted Stock Units, and the income and value of same, are not part of normal or expected compensation for purposes of calculating any severance, resignation, termination, redundancy, dismissal, end-of-service payments, bonuses, long-service awards, holiday pay, pension or retirement or welfare benefits or similar payments; (f) the future value of the Shares underlying the Restricted Stock Units is unknown, indeterminable and cannot be predicted with certainty; (g) for purposes of the Restricted Stock Units, Participant's status as a Service Provider will be considered terminated as of the date Participant is no longer actively providing services to the Company or any Parent or Subsidiary of the Company (regardless of the reason for such termination and whether or not later found to be invalid or in breach of employment laws in the jurisdiction where Participant is a Service Provider or the terms of Participant's employment or service agreement, if any), and unless otherwise expressly provided in this Award Agreement (including by reference in the Notice of Grant to other arrangements or contracts) or determined by the Administrator, Participant's right to vest in the Restricted Stock Units under the Plan, if any, will terminate as of such date and will not be extended by any notice period (e.g., Participant's period of service would not include any contractual notice period or any period of "garden leave" or similar period mandated under employment laws in the jurisdiction where Participant is a Service Provider or the terms of Participant's employment or service agreement, if any, unless Participant is providing bona fide services during such time); the Administrator shall have the exclusive discretion to determine when Participant is no longer actively providing services for purposes of the Restricted Stock Units grant (including whether Participant may still be considered to be providing services while on a leave of absence and consistent with local law); (h) unless otherwise provided in the Plan or by the Administrator in its discretion, the Restricted Stock Units and the benefits evidenced by this Award Agreement do not create any entitlement to have the Restricted Stock Units or any such benefits transferred to, or assumed by, another company nor be exchanged, cashed out or substituted for, in connection with any corporate transaction affecting the Shares; and



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-7- (i) the following provisions apply only if Participant is providing services outside the United States: (i) the Restricted Stock Units and the Shares subject to the Restricted Stock Units are not part of normal or expected compensation or salary for any purpose; (ii) Participant acknowledges and agrees that no Service Recipient shall be liable for any foreign exchange rate fluctuation between Participant's local currency and the United States Dollar that may affect the value of the Restricted Stock Units or of any amounts due to Participant pursuant to the settlement of the Restricted Stock Units or the subsequent sale of any Shares acquired upon settlement; and (iii) no claim or entitlement to compensation or damages shall arise from forfeiture of the Restricted Stock Units resulting from the termination of Participant's status as a Service Provider (for any reason whatsoever whether or not later found to be invalid or in breach of employment laws in the jurisdiction where Participant is a Service Provider or the terms of Participant's employment or service agreement, if any), and in consideration of the grant of the Restricted Stock Units to which Participant is otherwise not entitled, Participant irrevocably agrees never to institute any claim against any Service Recipient, waives his or her ability, if any, to bring any such claim, and releases each Service Recipient from any such claim; if, notwithstanding the foregoing, any such claim is allowed by a court of competent jurisdiction, then, by participating in the Plan, Participant shall be deemed irrevocably to have agreed not to pursue such claim and agrees to execute any and all documents necessary to request dismissal or withdrawal of such claim. 14. No Advice Regarding Grant. The Company is not providing any tax, legal or financial advice, nor is the Company making any recommendations regarding Participant's participation in the Plan, or Participant's acquisition or sale of the Shares underlying the Restricted Stock Units. Participant is hereby advised to consult with his or her own personal tax, legal and financial advisers regarding his or her participation in the Plan before taking any action related to the Plan. 15. Data Privacy. Participant hereby explicitly and unambiguously consents to the collection, use and transfer, in electronic or other form, of Participant's personal data as described in this Award Agreement and any other Restricted Stock Unit grant materials by and among, as applicable, the Service Recipients for the exclusive purpose of implementing, administering and managing Participant's participation in the Plan. If

so accelerated, such Restricted Stock Units will be considered as having vested as of the date specified by the Administrator. If Participant is a U.S. taxpayer, the payment of Shares vesting pursuant to this Section 4 in all cases shall be paid at a time or in a manner that is exempt from, or complies with, Section 409A. The prior sentence may be superseded in a future agreement or amendment to this Award Agreement only by direct and specific reference to such sentence.

(ii) Notwithstanding anything in the Plan or this Award Agreement or any other agreement (whether entered into before, on or after the Date of Grant) to the contrary, if the vesting of the balance, or some lesser portion of the balance, of the Restricted Stock Units is accelerated in connection with the cessation of Participant's status as an Employee or other Service Provider (provided that such termination is a "separation from service" within the meaning of Section 409A, as determined by the Company), other than due to Participant's death, and if (x) Participant is a U.S. taxpayer and a "specified employee" within the meaning of Section 409A at the time of such termination as a Service Provider and (y) the payment of such accelerated Restricted Stock Units will result in the imposition of additional tax under Section 409A if paid to Participant on or within the six (6) month period following the cessation of Participant's status as a Service Provider, then the payment of such accelerated Restricted Stock Units will not be made until the date six (6) months and one (1) day following the date of cessation of such Participant's status, unless Participant dies following cessation of such Participant's status, in which case, the Restricted Stock Units will be paid in Shares to Participant's estate as soon as practicable following his or her death.

(c) Section 409A. It is the intent of this Award Agreement that it and all payments and benefits to U.S. taxpayers hereunder be exempt from, or comply with, the requirements of Section 409A so that none of the Restricted Stock Units provided under this Award Agreement or Shares issuable thereunder will be subject to the additional tax imposed under Section 409A, and any ambiguities or ambiguous terms herein will be interpreted to be so exempt or to so comply. Each payment payable under this Award Agreement is intended to constitute a separate payment for purposes of Treasury Regulation Section 1.409A-2(b)(2). However, in no event will the Company or any of its Parents or Subsidiaries have any liability, responsibility or obligation to reimburse, indemnify, or hold harmless Participant for any taxes, penalties and interest that may be imposed, or other costs that may be incurred, as a result of Section 409A.

5. Forfeiture Upon Termination as a Service Provider. Unless specifically provided otherwise in this Award Agreement or other written agreement between Participant and the Company or any of its Subsidiaries or Parents, as applicable, if Participant ceases to be a Service Provider for any or no reason, the then-unvested Restricted Stock Units awarded by this Award Agreement will thereupon be forfeited at no cost to the Company and Participant will have no further rights thereunder.

6. Death of Participant. Any distribution or delivery to be made to Participant under this Award Agreement, if Participant is then deceased, will be made to Participant's designated beneficiary (if applicable and to the extent the Administrator has permitted such beneficiary designation with respect to this Award) or, absent a designated beneficiary or if no beneficiary survives Participant, the administrator or executor of Participant's estate. Any such transferee must furnish the Company with (a) written notice of his or her status as transferee, and (b) evidence satisfactory to the Company to establish the validity of the transfer and compliance with any laws or regulations pertaining to said transfer.

7. Tax Obligations

(a) Responsibility for Taxes. Participant acknowledges that, regardless of any action taken by the Company or, if different, Participant's employer (the "Employer") or any Parent or Subsidiary of the Company to which Participant is providing services (together, the "Service Recipients"), the ultimate liability for any tax and/or social insurance liability obligations and requirements in connection with the Restricted Stock Units, including, without limitation, (i) all federal, state, and local taxes (including Participant's Federal Insurance Contributions Act (FICA) obligations) that are required to be withheld by any Service Recipient or other payment of tax-related items related to Participant's participation in the Plan and legally applicable to Participant, (ii) Participant's and, to the extent required by any Service Recipient, the Service Recipient's fringe benefit tax liability, if any, associated with the grant, vesting, or settlement of the Restricted Stock Units or sale of Shares, and (iii) any other Service Recipient taxes the responsibility for which Participant has, or has agreed to bear, with respect to the Restricted Stock Units (or settlement thereof or issuance of Shares thereunder) (collectively, the "Tax Obligations"), is and remains Participant's sole responsibility and may exceed the amount actually withheld by the applicable Service Recipient(s). Participant further acknowledges that no Service Recipient (A) makes any representations or undertakings regarding the treatment of any Tax Obligations in connection with any aspect of the Restricted Stock Units, including, but not limited to, the grant, vesting or settlement of the Restricted Stock Units, the subsequent sale of Shares acquired pursuant to such settlement and the receipt of any dividends or other distributions, and (B) makes any commitment to and is under any obligation to structure the terms of the grant or any aspect of the Restricted Stock Units to reduce or eliminate Participant's liability for Tax Obligations or achieve any particular tax result.

(b) **Tax Withholding.** Pursuant to such procedures as the Administrator may specify from time to time, the Service Recipient shall withhold the amount required to be withheld for the payment of Tax Obligations. The Administrator, in its sole discretion and pursuant to such procedures as it may specify from time to time, may permit Participant to satisfy such Tax Obligations, in whole or in part (without limitation), if permissible by applicable local law, by (i) paying cash in U.S. dollars, (ii) electing to have the Company withhold otherwise deliverable Shares having a fair market value equal to the minimum amount that is necessary to meet the withholding requirement for such Tax Obligations (or such greater amount as Participant may elect if permitted by the Administrator, if such greater amount would not result in adverse financial accounting consequences), (iii) withholding the amount of such Tax Obligations from Participant's wages or other cash compensation paid to Participant by the applicable Service Recipient(s), (iv) delivering to the Company Shares that Participant owns and that already have vested with a fair market value equal to the Tax Obligations (or such greater amount as Participant may elect if permitted by the Administrator, if such greater amount would not result in adverse financial accounting consequences), (v) selling a sufficient number of such Shares otherwise deliverable to Participant, through such means as the Company may determine in its sole discretion (whether through a broker or otherwise) equal to the minimum amount that is necessary to meet the withholding requirement for such Tax Obligations (or such greater amount as Participant may elect if permitted by the Administrator, if such greater amount would not result in adverse financial accounting consequences), or (v) such other means as the Administrator deems appropriate. Further, if Participant is subject to Tax Obligations in more than one jurisdiction between the Date of Grant and the date of any relevant taxable or tax withholding event, as applicable, Participant acknowledges that the applicable Service Recipient(s) (or former employer, as applicable) may be required to withhold or account for Tax Obligations in more than one jurisdiction. If the Tax Obligations are satisfied by withholding in Shares, for tax purposes, Participant is deemed to have been issued the full number of Shares subject to the vested Restricted Stock Units, notwithstanding that a number of the Shares are held back solely for the purpose of paying the Tax Obligations. **If Participant is an officer of the Company within the meaning of Section 16 of the Exchange Act, then the Company will withhold from proceeds of the sale of a sufficient number of Shares otherwise deliverable to Participant to satisfy the Tax Obligations and any associated broker or other fees upon the relevant taxable or tax withholding event, as applicable, and Participant agrees and acknowledges that Participant may not satisfy them by any means other than such sale of Shares, unless required to do so by the Administrator.** To the extent the use of such withholding method is problematic under Applicable Laws or has materially adverse accounting consequences, then the Tax Obligations may be satisfied by one or a combination of the methods specified under clauses (i), (ii), (iii) and (v) above.

(c) **No Representations.** Participant has reviewed with his or her own tax advisers the U.S. federal, state, local and non-U.S. tax consequences of this investment and the transactions contemplated by this Award Agreement. With respect to such matters, Participant relies solely on such advisers and not on any statements or representations of the Company or any of its agents, written or oral. Participant understands that Participant (and not the Company) shall be responsible for Participant's own tax liability that may arise as a result of this investment or the transactions contemplated by this Award Agreement.

(d) **Company's Obligation to Deliver Shares.** For clarification purposes, in no event will the Company issue Participant any Shares unless and until arrangements satisfactory to the Administrator have been made for the payment of Participant's Tax Obligations. If Participant fails to make satisfactory arrangements for the payment of such Tax Obligations hereunder at the time any applicable Restricted Stock Units otherwise are scheduled to vest pursuant to Sections 3 or 4 or Participant's Tax Obligations otherwise become due, Participant will permanently forfeit such Restricted Stock Units to which Participant's Tax Obligation relates and any right to receive Shares thereunder and such Restricted Stock Units will be returned to the Company at no cost to the Company. Participant acknowledges and agrees that the Company may refuse to issue or deliver the Shares if such Tax Obligations are not delivered at the time they are due.

8. **Rights as Stockholder.** Neither Participant nor any person claiming under or through Participant will have any of the rights or privileges of a stockholder of the Company in respect of any Shares deliverable hereunder unless and until certificates representing such Shares (which may be in book entry form) will have been issued, recorded on the records of the Company or its transfer agents or registrars, and delivered to Participant (including through electronic delivery to a brokerage account). After such issuance, recordation and delivery, Participant will have all the rights of a stockholder of the Company with respect to voting such Shares and receipt of dividends and distributions on such Shares.

9. No Guarantee of Continued Service. PARTICIPANT ACKNOWLEDGES AND AGREES THAT THE VESTING OF THE RESTRICTED STOCK UNITS PURSUANT TO THE VESTING SCHEDULE HEREOF IS EARNED ONLY BY CONTINUING AS A SERVICE PROVIDER, WHICH UNLESS PROVIDED OTHERWISE UNDER APPLICABLE LAW IS AT THE WILL OF THE APPLICABLE SERVICE RECIPIENT AND NOT THROUGH THE ACT OF BEING HIRED, BEING GRANTED THIS RESTRICTED STOCK UNIT AWARD OR ACQUIRING SHARES HEREUNDER. PARTICIPANT FURTHER ACKNOWLEDGES AND AGREES THAT THIS AWARD AGREEMENT, THE TRANSACTIONS CONTEMPLATED HEREUNDER AND THE VESTING SCHEDULE SET FORTH HEREIN DO NOT CONSTITUTE AN EXPRESS OR IMPLIED PROMISE OF CONTINUED ENGAGEMENT AS A SERVICE PROVIDER FOR THE VESTING PERIOD, FOR ANY PERIOD, OR AT ALL, AND SHALL NOT INTERFERE IN ANY WAY WITH PARTICIPANT'S RIGHT OR THE RIGHT OF ANY SERVICE RECIPIENT TO TERMINATE PARTICIPANT'S RELATIONSHIP AS A SERVICE PROVIDER, SUBJECT TO APPLICABLE LAW, WHICH TERMINATION, UNLESS PROVIDED OTHERWISE UNDER APPLICABLE LAW, MAY BE AT ANY TIME, WITH OR WITHOUT CAUSE.

10. Grant is Not Transferable. Except to the limited extent provided in Section 7, this grant and the rights and privileges conferred hereby will not be transferred, assigned, pledged or hypothecated in any way (whether by operation of law or otherwise) and will not be subject to sale under execution, attachment or similar process. Upon any attempt to transfer, assign, pledge, hypothecate or otherwise dispose of this grant, or any right or privilege conferred hereby, or upon any attempted sale under any execution, attachment or similar process, this grant and the rights and privileges conferred hereby immediately will become null and void.

11. Insider Trading Restrictions/Market Abuses. Participant acknowledges that Participant may be subject to insider trading restrictions and/or market abuse laws in applicable jurisdictions, including the United States and Participant's country of residence, which may affect Participant's ability, directly or indirectly, for Participant or for a third party, to acquire or sell, or attempt to sell, Shares or rights to Shares under the Plan during such times as Participant is considered to have "inside information" regarding the Company (as defined by the laws in the applicable jurisdiction, including the United States and Participant's country of residence). Any restrictions under these laws or regulations are separate from and in addition to any restrictions that may be imposed under any applicable Company insider trading policy. Participant acknowledges that it is Participant's responsibility to be compliant with all such requirements and Participant should consult Participant's personal legal advisers to ensure compliance.

12. Foreign Asset/Account Reporting Requirements; Exchange Controls. Participant's country may have certain foreign asset and/or account reporting requirements and exchange controls which may affect Participant's ability to acquire or hold Shares under the Plan or cash received from participating in the Plan (including from any dividends received or sale proceeds arising from the sale of Shares) in a brokerage or bank account outside Participant's country. Participant understands that Participant may be required to report such accounts, assets or transactions to the tax or other authorities in Participant's country. Participant also may be required to repatriate sale proceeds or other funds received as a result of participation in the Plan to Participant's country through a designated bank or broker and/or within a certain time after receipt. In addition, Participant may be subject to tax payment and/or reporting obligations in connection with any income realized under the Plan and/or from the sale of Shares. Participant acknowledges that it is Participant's responsibility to be compliant with all such requirements, and that Participant should consult Participant's personal legal and tax advisers, as applicable, to ensure compliance.

13. Nature of Grant. In accepting this Award of Restricted Stock Units, Participant acknowledges, understands and agrees that:

(a) the grant of the Restricted Stock Units is voluntary and occasional and does not create any contractual or other right to receive future grants of restricted stock units, or benefits in lieu of restricted stock units, even if restricted stock units have been granted in the past;

(b) all decisions with respect to future restricted stock units or other grants, if any, will be at the sole discretion of the Administrator;

(c) Participant is voluntarily participating in the Plan;

(d) the Restricted Stock Units and the Shares subject to the Restricted Stock Units are not intended to replace any pension rights or compensation;

(e) the Restricted Stock Units and the Shares subject to the Restricted Stock Units, and the income and value of same, are not part of normal or expected compensation for purposes of calculating any severance, resignation, termination, redundancy, dismissal, end-of-service payments, bonuses, long-service awards, holiday pay, pension or retirement or welfare benefits or similar payments;

(f) the future value of the Shares underlying the Restricted Stock Units is unknown, indeterminable and cannot be predicted with certainty;

(g) for purposes of the Restricted Stock Units, Participant's status as a Service Provider will be considered terminated as of the date Participant is no longer actively providing services to the Company or any Parent or Subsidiary of the Company (regardless of the reason for such termination and whether or not later found to be invalid or in breach of employment laws in the jurisdiction where Participant is a Service Provider or the terms of Participant's employment or service agreement, if any), and unless otherwise expressly provided in this Award Agreement (including by reference in the Notice of Grant to other arrangements or contracts) or determined by the Administrator, Participant's right to vest in the Restricted Stock Units under the Plan, if any, will terminate as of such date and will not be extended by any notice period (e.g., Participant's period of service would not include any contractual notice period or any period of "garden leave" or similar period mandated under employment laws in the jurisdiction where Participant is a Service Provider or the terms of Participant's employment or service agreement, if any, unless Participant is providing bona fide services during such time); the Administrator shall have the exclusive discretion to determine when Participant is no longer actively providing services for purposes of the Restricted Stock Units grant (including whether Participant may still be considered to be providing services while on a leave of absence and consistent with local law);

(h) unless otherwise provided in the Plan or by the Administrator in its discretion, the Restricted Stock Units and the benefits evidenced by this Award Agreement do not create any entitlement to have the Restricted Stock Units or any such benefits transferred to, or assumed by, another company nor be exchanged, cashed out or substituted for, in connection with any corporate transaction affecting the Shares; and

(i) the following provisions apply only if Participant is providing services outside the United States:

(i) the Restricted Stock Units and the Shares subject to the Restricted Stock Units are not part of normal or expected compensation or salary for any purpose;

(ii) Participant acknowledges and agrees that no Service Recipient shall be liable for any foreign exchange rate fluctuation between Participant's local currency and the United States Dollar that may affect the value of the Restricted Stock Units or of any amounts due to Participant pursuant to the settlement of the Restricted Stock Units or the subsequent sale of any Shares acquired upon settlement; and

(iii) no claim or entitlement to compensation or damages shall arise from forfeiture of the Restricted Stock Units resulting from the termination of Participant's status as a Service Provider (for any reason whatsoever whether or not later found to be invalid or in breach of employment laws in the jurisdiction where Participant is a Service Provider or the terms of Participant's employment or service agreement, if any), and in consideration of the grant of the Restricted Stock Units to which Participant is otherwise not entitled, Participant irrevocably agrees never to institute any claim against any Service Recipient, waives his or her ability, if any, to bring any such claim, and releases each Service Recipient from any such claim; if, notwithstanding the foregoing, any such claim is allowed by a court of competent jurisdiction, then, by participating in the Plan, Participant shall be deemed irrevocably to have agreed not to pursue such claim and agrees to execute any and all documents necessary to request dismissal or withdrawal of such claim.

14. **No Advice Regarding Grant.** The Company is not providing any tax, legal or financial advice, nor is the Company making any recommendations regarding Participant's participation in the Plan, or Participant's acquisition or sale of the Shares underlying the Restricted Stock Units. Participant is hereby advised to consult with his or her own personal tax, legal and financial advisers regarding his or her participation in the Plan before taking any action related to the Plan.

15. **Data Privacy.** Participant hereby explicitly and unambiguously consents to the collection, use and transfer, in electronic or other form, of Participant's personal data as described in this Award Agreement and any other Restricted Stock Unit grant materials by and among, as applicable, the Service Recipients for the exclusive purpose of implementing, administering and managing Participant's participation in the Plan.

Participant understands that the Company and the Service Recipient may hold certain personal information about Participant, including, but not limited to, Participant's name, home address, email address and telephone number, date of birth, social insurance number, passport or other identification number (e.g., resident registration number), salary, nationality, job title, any Shares or directorships held in the Company, details of all equity awards or any other entitlement to Shares awarded, canceled, exercised, vested, unvested or outstanding in Participant's favor ("Data"), for the exclusive purpose of implementing, administering and managing the Plan. Participant understands that Data may be transferred to a stock plan service provider, as may be selected by the Company in the future, assisting the Company with the implementation, administration and management of the Plan. Participant understands that the recipients of the -8- Data may be located in the United States or elsewhere, and that the recipients' country of operation (e.g., the United States) may have different data privacy laws and protections than Participant's country. Participant understands that if he or she resides outside the United States, he or she may request a list with the names and addresses of any potential recipients of the Data by contacting his or her local human resources representative. Participant authorizes the Company, any stock plan service provider selected by the Company and any other possible recipients which may assist the Company (presently or in the future) with implementing, administering and managing the Plan to receive, possess, use, retain and transfer the Data, in electronic or other form, for the sole purpose of implementing, administering and managing his or her participation in the Plan. Participant understands that Data will be held only as long as is necessary to implement, administer and manage Participant's participation in the Plan. Participant understands if he or she resides outside the United States, he or she may, at any time, view Data, request additional information about the storage and processing of Data, require any necessary amendments to Data or refuse or withdraw the consents herein, in any case without cost, by contacting in writing his or her local human resources representative. Further, Participant understands that he or she is providing the consents herein on a purely voluntary basis. If Participant does not consent, or if Participant later seeks to revoke his or her consent, his or her status as a Service Provider and career with the Service Recipient will not be adversely affected. The only adverse consequence of refusing or withdrawing Participant's consent is that the Company would not be able to grant Participant Restricted Stock Units or other equity awards or administer or maintain such awards. Therefore, Participant understands that refusing or withdrawing his or her consent may affect Participant's ability to participate in the Plan. For more information on the consequences of Participant's refusal to consent or withdrawal of consent, Participant understands that he or she may contact his or her local human resources representative.

16. **Address for Notices.** Any notice to be given to the Company under the terms of this Award Agreement will be addressed to the Company, in care of its Chief Financial Officer at Pacific Biosciences of California, Inc., 1305 O'Brien Drive, Menlo Park, CA 94025, U.S.A., or at such other address as the Company may hereafter designate in writing.

17. **Electronic Delivery and Acceptance.** The Company may, in its sole discretion, decide to deliver any documents related to the Restricted Stock Units awarded under the Plan or future Restricted Stock Units that may be awarded under the Plan by electronic means or require Participant to participate in the Plan by electronic means. Participant hereby consents to receive such documents by electronic delivery and agrees to participate in the Plan through any on-line or electronic system established and maintained by the Company or a third party designated by the Company.

18. **No Waiver.** 16. Address for Notices. Any notice to be given to the Company under the terms of this Award Agreement will be addressed to the Company, in care of its Chief Financial Officer at Pacific Biosciences of California, Inc., 1305 O'Brien Drive, Menlo Park, CA 94025, U.S.A., or at such other address as the Company may hereafter designate in writing. 17. Electronic Delivery and Acceptance. The Company may, in its sole discretion, decide to deliver any documents related to the Restricted Stock Units awarded under the Plan or future Restricted Stock Units that may be awarded under the Plan by electronic means or require Participant to participate in the Plan by electronic means. Participant hereby consents to receive such documents by electronic delivery and agrees to participate in the Plan through any on-line or electronic system established and maintained by the Company or a third party designated by the Company. 18. No Waiver. Either party's failure to enforce any provision or provisions of this Award Agreement shall not in any way be construed as a waiver of any such provision or provisions, nor prevent that party from thereafter enforcing each and every other provision of this Award Agreement. The rights granted both parties herein are cumulative and shall not constitute a waiver of either party's right to assert all other legal remedies available to it under the circumstances. 19. Successors and Assigns. The Company may assign any of its rights under this Award Agreement to single or multiple assignees, and this Award Agreement shall inure to the benefit of the successors and assigns of the Company. Subject to the restrictions on transfer herein set forth, this Award Agreement shall be binding upon Participant and his or her heirs, executors, administrators, -9- successors and assigns. The rights and obligations of Participant under this Award Agreement may be assigned only with the prior written consent of the Company. Subject to the limitation on transferability of this Award contained herein, this Award Agreement will be binding upon and inure to the benefit of the heirs, legatees, legal representatives, successors and assigns of the parties hereto. 20. Additional Conditions to Issuance of Stock. If at any time the Company will determine, in its discretion, that the listing, registration, qualification or

rule compliance of the Shares upon any securities exchange or under any U.S. federal, state, local or non-U.S. law, the tax code and related regulations or under the rulings or regulations of the United States Securities and Exchange Commission or any other governmental regulatory body or the clearance, consent or approval of the United States Securities and Exchange Commission or any other governmental regulatory authority is necessary or desirable as a condition to the issuance of Shares to Participant (or his or her estate) hereunder, such issuance will not occur unless and until such listing, registration, qualification, rule compliance, clearance, consent or approval will have been completed, effected or obtained free of any conditions not acceptable to the Company. Subject to the terms of the Award Agreement and the Plan, the Company shall not be required to issue any certificate or certificates for (or make any entry on the books of the Company or of a duly authorized transfer agent of the Company of) the Shares hereunder prior to the lapse of such reasonable period of time following the date of vesting of the Restricted Stock Units as the Administrator may establish from time to time for reasons of administrative convenience. The Company will make all reasonable efforts to meet the requirements of any such Applicable Laws and to obtain any such registration, qualification, rule compliance, clearance, consent or approval of any such governmental regulatory authority.

21. Language. If Participant has received this Award Agreement or any other document related to the Plan translated into a language other than English and if the meaning of the translated version is different than the English version, the English version will control.

22. Interpretation. The Administrator will have the power to interpret the Plan and this Award Agreement and to adopt such rules for the administration, interpretation and application of the Plan as are consistent therewith and to interpret or revoke any such rules (including, but not limited to, the determination of whether or not any Restricted Stock Units have vested). All actions taken and all interpretations and determinations made by the Administrator in good faith will be final and binding upon Participant, the Company and all other interested persons. Neither the Administrator nor any person acting on behalf of the Administrator will be personally liable for any action, determination or interpretation made in good faith with respect to the Plan or this Award Agreement.

23. Captions. Captions provided herein are for convenience only and are not to serve as a basis for interpretation or construction of this Award Agreement.

24. Amendment, Suspension or Termination of the Plan. By accepting this Award, Participant expressly warrants that he or she has received an Award of Restricted Stock Units under the Plan, and has received, read and understood a description of the Plan. Participant understands that the Plan is discretionary in nature and may be amended, suspended or terminated by the Administrator at any time.

25. Modifications to the Award Agreement. This Award Agreement constitutes the entire understanding of the parties on the subjects covered. Participant expressly warrants that he or she is not accepting this Award Agreement in reliance on any promises, representations, or inducements other than those contained herein. Modifications to this Award Agreement or the Plan can be made only in an express written contract executed by a duly authorized officer of the Company. Notwithstanding anything to the contrary in the Plan or this Award Agreement, the Company reserves the right to revise this Award Agreement as it deems necessary or advisable, in its sole discretion and without the consent of Participant, to comply with Section 409A or to otherwise avoid imposition of any additional tax or income recognition under Section 409A in connection with this Award of Restricted Stock Units. Further, the Company reserves the right to impose other requirements on Participant's participation in the Plan, on this Award of Restricted Stock Units and on any Shares acquired under the Plan, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require Participant to execute any additional agreements or undertakings that may be necessary to accomplish the foregoing.

26. Governing Law; Venue; Severability. This Award Agreement and the Restricted Stock Units are governed by the internal substantive laws, but not the choice of law rules, of the State of California. For purposes of litigating any dispute that arises under these Restricted Stock Units or this Award Agreement, the parties hereby submit to and consent to the jurisdiction of the State of California, and agree that such litigation will be conducted in the courts of San Mateo County, California, or the United States federal courts for the Northern District of California, and no other courts, where this Award Agreement is made and/or to be performed. In the event that any provision of this Award Agreement, including the country-specific provisions set forth in an attachment to this Award Agreement (if any), will be held invalid or unenforceable, such provision will be severable from, and such invalidity or unenforceability will not be construed to have any effect on, the remaining provisions of this Award Agreement.

27. Entire Agreement. The Plan is incorporated herein by this reference. The Plan and this Award Agreement (including the appendices and exhibits referenced herein) constitute the entire agreement of the parties with respect to the subject matter hereof and supersede in their entirety all prior undertakings and agreements of the Company and Participant with respect to the subject matter hereof, and may not be modified adversely to the Participant's interest except by means of a writing signed by the Company and Participant.

28. Country Addendum. The Restricted Stock Unit grant shall be subject to any special terms and conditions set forth in an exhibit, appendix, addendum or other attachment (if any) to this Award Agreement for any country whose laws are applicable to Participant and this Award of Restricted Stock Units (as determined by the Administrator in its sole discretion) (the "Country Addendum"). Moreover, if Participant relocates to one of the countries included in the Country Addendum (if any), the special terms and conditions for such country will apply to Participant, to the extent the Company determines that the application of such terms and conditions is necessary or advisable for legal or administrative reasons. The Country Addendum constitutes part of this Award Agreement. The rights granted both parties herein are cumulative and shall not constitute a waiver of either party's right to assert all other legal remedies available to it under the circumstances.

19. **Successors and Assigns.** The Company may assign any of its rights under this Award Agreement to single or multiple assignees, and this Award Agreement shall inure to the benefit of the successors and assigns of the Company. Subject to the restrictions on transfer herein set forth, this Award Agreement shall be binding upon Participant and his or her heirs, executors, administrators, successors and assigns. The rights and obligations of Participant under this Award Agreement may be assigned only with the prior written consent of the Company. Subject to the limitation on transferability of this Award contained herein, this Award Agreement will be binding upon and inure to the benefit of the heirs, legatees, legal representatives, successors and assigns of the parties hereto.

20. **Additional Conditions to Issuance of Stock.** If at any time the Company will determine, in its discretion, that the listing, registration, qualification or rule compliance of the Shares upon any securities exchange or under any U.S. federal, state, local or non-U.S. law, the tax code and related regulations or under the rulings or regulations of the United States Securities and Exchange Commission or any other governmental regulatory body or the clearance, consent or approval of the United States Securities and Exchange Commission or any other governmental regulatory authority is necessary or desirable as a condition to the issuance of Shares to Participant (or his or her estate) hereunder, such issuance will not occur unless and until such listing, registration, qualification, rule compliance, clearance, consent or approval will have been completed, effected or obtained free of any conditions not acceptable to the Company. Subject to the terms of the Award Agreement and the Plan, the Company shall not be required to issue any certificate or certificates for (or make any entry on the books of the Company or of a duly authorized transfer agent of the Company of) the Shares hereunder prior to the lapse of such reasonable period of time following the date of vesting of the Restricted Stock Units as the Administrator may establish from time to time for reasons of administrative convenience. The Company will make all reasonable efforts to meet the requirements of any such Applicable Laws and to obtain any such registration, qualification, rule compliance, clearance, consent or approval of any such governmental regulatory authority.

21. **Language.** If Participant has received this Award Agreement or any other document related to the Plan translated into a language other than English and if the meaning of the translated version is different than the English version, the English version will control.

22. **Interpretation.** The Administrator will have the power to interpret the Plan and this Award Agreement and to adopt such rules for the administration, interpretation and application of the Plan as are consistent therewith and to interpret or revoke any such rules (including, but not limited to, the determination of whether or not any Restricted Stock Units have vested). All actions taken and all interpretations and determinations made by the Administrator in good faith will be final and binding upon Participant, the Company and all other interested persons. Neither the Administrator nor any person acting on behalf of the Administrator will be personally liable for any action, determination or interpretation made in good faith with respect to the Plan or this Award Agreement.

23. **Captions.** Captions provided herein are for convenience only and are not to serve as a basis for interpretation or construction of this Award Agreement.

24. **Amendment, Suspension or Termination of the Plan.** By accepting this Award, Participant expressly warrants that he or she has received an Award of Restricted Stock Units under the Plan, and has received, read and understood a description of the Plan. Participant understands that the Plan is discretionary in nature and may be amended, suspended or terminated by the Administrator at any time.

25. **Modifications to the Award Agreement.** This Award Agreement constitutes the entire understanding of the parties on the subjects covered. Participant expressly warrants that he or she is not accepting this Award Agreement in reliance on any promises, representations, or inducements other than those contained herein. Modifications to this Award Agreement or the Plan can be made only in an express written contract executed by a duly authorized officer of the Company. Notwithstanding anything to the contrary in the Plan or this Award Agreement, the Company reserves the right to revise this Award Agreement as it deems necessary or advisable, in its sole discretion and without the consent of Participant, to comply with Section 409A or to otherwise avoid imposition of any additional tax or income recognition under Section 409A in connection with this Award of Restricted Stock Units. Further, the Company reserves the right to impose other requirements on Participant's participation in the Plan, on this Award of Restricted Stock Units and on any Shares acquired under the Plan, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require Participant to execute any additional agreements or undertakings that may be necessary to accomplish the foregoing.

26. Governing Law; Venue; Severability. This Award Agreement and the Restricted Stock Units are governed by the internal substantive laws, but not the choice of law rules, of the State of California. For purposes of litigating any dispute that arises under these Restricted Stock Units or this Award Agreement, the parties hereby submit to and consent to the jurisdiction of the State of California, and agree that such litigation will be conducted in the courts of San Mateo County, California, or the United States federal courts for the Northern District of California, and no other courts, where this Award Agreement is made and/or to be performed. In the event that any provision of this Award Agreement, including the country-specific provisions set forth in an attachment to this Award Agreement (if any), will be held invalid or unenforceable, such provision will be severable from, and such invalidity or unenforceability will not be construed to have any effect on, the remaining provisions of this Award Agreement.

27. Entire Agreement. The Plan is incorporated herein by this reference. The Plan and this Award Agreement (including the appendices and exhibits referenced herein) constitute the entire agreement of the parties with respect to the subject matter hereof and supersede in their entirety all prior undertakings and agreements of the Company and Participant with respect to the subject matter hereof, and may not be modified adversely to the Participant's interest except by means of a writing signed by the Company and Participant.

28. Country Addendum. The Restricted Stock Unit grant shall be subject to any special terms and conditions set forth in an exhibit, appendix, addendum or other attachment (if any) to this Award Agreement for any country whose laws are applicable to Participant and this Award of Restricted Stock Units (as determined by the Administrator in its sole discretion) (the "Country Addendum"). Moreover, if Participant relocates to one of the countries included in the Country Addendum (if any), the special terms and conditions for such country will apply to Participant, to the extent the Company determines that the application of such terms and conditions is necessary or advisable for legal or administrative reasons. The Country Addendum constitutes part of this Award Agreement.

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PACIFIC BIOSCIENCES OF CALIFORNIA, INC. 2020 EQUITY INCENTIVE PLAN PERFORMANCE-BASED RESTRICTED STOCK UNIT

AGREEMENT COUNTRY ADDENDUM This Country Addendum includes additional terms and conditions that govern the Award of Restricted Stock Units granted pursuant to the terms and conditions of the Pacific Biosciences of California, Inc. 2020 Equity Incentive Plan (the "Plan") and the Performance-Based Restricted Stock Unit Agreement to which this Country Addendum is attached (the "Award Agreement") to the extent the individual to whom the Restricted Stock Units were granted ("Participant") resides in one of the countries listed below. Capitalized terms used but not defined herein will have the meanings set forth in the Award Agreement or the Plan, as applicable. This Country Addendum also includes information regarding exchange controls and certain other issues of which Participant should be aware with respect to Participant's participation in the Plan. The information is based on the securities, exchange control and other laws in effect in the respective countries as of August 2020. Such laws often are complex and change frequently. As a result, the Company strongly recommends that Participant not rely on the information in this Country Addendum as the only source of information relating to the consequences of Participant's participation in the Plan because the information may be out of date at the time Participant vest in or receives or sells the Shares covered by the Restricted Stock Units. In addition, the information contained herein is general in nature and may not apply to Participant's particular situation and the Company is not in a position to assure Participant of any particular result. Accordingly, Participant is advised to seek appropriate professional advice as to how the relevant laws of Participant's country may apply to Participant's situation. Finally, if Participant is a citizen or resident of a country other than the one in which Participant currently is working or transfers to another country after the grant of the Restricted Stock Units, or is considered a resident of another country for local law purposes, the information contained herein may not be applicable to Participant in the same manner. In addition, the Company, in its sole discretion, shall determine the extent to which the terms and conditions contained herein shall apply to Participant under these circumstances. **Australia Notifications**

Tax Information. Information. The Plan is a plan to which Subdivision 83A-C of the Income Tax Assessment Act 1997 (Cth) applies (subject to the conditions in that Act).

-2- Canada Terms and Conditions

Company's Obligation to Pay. Pay. This provision supplements Section 2 of the Award Agreement:

Notwithstanding any discretion set out in Section 8(d) of the Plan, vested Restricted Stock Units will be paid in Shares and not in cash or a combination of Shares and cash.

Nature of Grant. Grant. This provision replaces Section 13(g) of the Award Agreement:

For purposes of the Award of Restricted Stock Units, Participant's employment or service relationship will be considered terminated as of the date that is the earlier of: (i) the date Participant's employment is terminated, (ii) the date Participant receives notice of termination, and (iii) the date Participant is no longer actively providing services to the Company or any Parent or Subsidiary of the Company (regardless of the reason for such termination and whether or not later found to be invalid or in breach of employment laws in the jurisdiction where Participant is employed or the terms of Participant's employment agreement, if any) and, unless otherwise expressly provided in this Award Agreement or determined by the Company, Participant's right to vest in the Restricted Stock Units will terminate as of such date and will not be extended by any notice period (e.g. (e.g., Participant's period of service would not include any contractual notice period or any period of "garden leave" or similar period mandated under employment laws in the jurisdiction where Participant is employed or the terms of Participant's employment agreement, if any).

The following provisions will apply to Participant if he or she is a resident of Quebec:

Language Consent. Consent. The parties acknowledge that it is their express wish that the Award Agreement, including this Exhibit B, as well as all documents, notices, and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English.

Consentement Relatif à la Langue Utilisée. e. Les parties reconnaissent avoir expressément souhaité que la convention («Award Agreement») ainsi que cette Annexe B, ainsi que tous les documents, avis et procédures judiciaires, exécutés, donnés ou intentés en vertu de, ou liés directement ou indirectement à la présente convention, soient rédigés en langue anglaise.

Data Privacy. Privacy. This provision supplements Section 15 of the Award Agreement:

Participant hereby authorizes the Company and the Company's representatives to discuss with and obtain all relevant information from all personnel, professional or not, involved in the administration and operation of the Plan. Participant further authorizes the Company and the Company's Parent or Subsidiary employing or retaining Participant to disclose and discuss Participant's participation in the Plan with their respective advisers. Participant further authorizes the Company and the Company's Parent or Subsidiary employing or retaining Participant to record such information and to keep such information in Participant's employee file.

Securities Law Information. Information. Participant understands that Participant is permitted to sell Shares -3- acquired pursuant to the Plan through the designated broker appointed under the Plan, if any, provided the sale of the Shares acquired pursuant to the Plan takes place outside of Canada through the facilities of a stock exchange on which the Shares are listed. The Company's common stock are currently traded on the NASDAQ Global Select Market, which is located outside of Canada, under the ticker symbol "PACB" and Shares acquired under the Plan may be sold through this exchange.

Foreign Asset/Account Reporting Information. Information. Foreign specified property, including Shares and rights to Shares (e.g. (e.g., Restricted Stock Units), held by a Canadian resident must be reported annually on Form T1135 (Foreign Income Verification Statement) if the total cost of such foreign specified property exceeds C\$100,000 at any time during the year. If applicable, Form T1135 is due by April 30th of the following year. Restricted Stock Units must be reported – generally at a nil cost – if the C\$100,000 cost threshold is exceeded because of other foreign specified property held by Participant. When Shares are acquired, their cost generally is the adjusted cost base ("ACB") of the Shares. The ACB would ordinarily equal the fair market value of the Shares at the time of acquisition, but if other Shares are owned, this ACB may have to be averaged with the ACB of the other Shares. Participant is responsible for ensuring his or her compliance with any applicable reporting obligations and should speak to his or her personal legal adviser on this matter.

France Terms and Conditions

Type of Restricted Stock Units. Units. The Restricted Stock Units are not intended to qualify for specific tax or social security treatment in France.

Language Consent. Consent. By accepting the Award Agreement providing for the terms and conditions of the grant, Participant confirms having read and understood the documents relating to this grant (the Plan and this Award Agreement) which were provided in English language. Participant accepts the terms of those documents accordingly.

Consentement Relatif à la Langue Utilisée. e. En acceptant le Contrat d'Attribution décrivant les termes et conditions de l'attribution, le Participant confirme avoir lu et compris les documents relatifs à cette attribution (le Plan et ce Contrat d'Attribution) qui ont été communiqués en langue anglaise. Le Participant accepte les termes de ces documents en connaissance de cause.

Notifications

Foreign Asset/Account Reporting Information. Participant may hold Shares acquired under the Plan outside of France provided Participant annually declares all foreign bank and stock accounts, whether open, current, or closed, together with Participant's personal income tax returns.

Germany Notifications

Exchange Control Information.

Information. Cross-border payments in excess of €12,500 must be reported electronically, on a monthly basis, to -4- the Servicezentrum Außenwirtschaftsstatistik, which is the competent federal office of the Deutsche Bundesbank (the German Central Bank) for such notifications in Germany. The Allgemeines Meldeportal Statistik (General (General) Statistics Reporting Portal) can be accessed at www.bundesbank.de. **www.bundesbank.de. Japan Notifications**

Foreign Asset / Account Reporting Information. Participant will be required to report details of any assets held outside of Japan as of December 31st to the extent such assets have a total net fair market value exceeding ¥50,000,000. Such report will be due by March 15th each year. *Participant should consult with his or her personal tax adviser as to whether the reporting obligation applies to him or her and whether the requirement extends to any outstanding Restricted Stock Units, Shares and/or cash acquired under the Plan.*

Netherlands There are no country-specific provisions. **Singapore Notifications**

Securities Law Information. The Award of Restricted Stock Units under the Plan is being made pursuant to the "Qualifying Person" exemption under section 273(1)(f) of the Securities and Futures Act (Chapter 289, 2006Ed.) ("SFA"). The Plan has not been lodged or registered as a prospectus with the Monetary Authority of Singapore. Participant should note that the Restricted Stock Units are subject to section 257 of the SFA and the Participant should not make (i) any subsequent sale of the Shares in Singapore or (ii) any offer of such subsequent sale of the Shares subject to the Restricted Stock Units in Singapore, unless such sale or offer is made more than six (6) months after the Date of Grant or pursuant to the exemptions under Part XIII Division 1 Subdivision (4) (other than section 280) of the SFA. The Company's common stock is traded on the Nasdaq Global Select Market, which is located outside of Singapore, under the ticker symbol "PACB" and Shares acquired under the Plan may be sold through this exchange.

CEO and Director Notification Information. If Participant is the Chief Executive Officer ("CEO") or a director, associate director or shadow director of a Singaporean Parent or Subsidiary, Participant is subject to certain notification requirements under the Singapore Companies Act. Among these requirements is an obligation to notify the Singaporean Parent or Subsidiary in writing when Participant receives an interest in the Company (e.g., Restricted Stock Units or Shares). In addition, Participant must notify the Singaporean Parent or Subsidiary when Participant disposes of an interest in the Company (including when Participant sells Shares acquired at vesting of the Restricted Stock **1 A shadow director is an individual who is not on the board of directors of the Singapore Parent or Subsidiary but who has sufficient control so that the board of directors of the Singapore Parent or Subsidiary acts in accordance with the directions and instructions of the individual.**

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-5- Units). These notifications must be made within two (2) business days of (i) acquiring or disposing of any interest in the Company, (ii) any change in a previously-disclosed interest (e.g., upon vesting of the Restricted Stock Units or when Shares acquired under the Plan are subsequently sold), or (iii) becoming the CEO or a director, associate director or shadow director if such an interest exists at such time.

Switzerland Notifications

Securities Law Information. The Award of Restricted Stock Units under the Plan is considered a private offering in Switzerland and is therefore not subject to registration in Switzerland. Neither this document nor any other materials relating to the Restricted Stock Units constitutes a prospectus as such term is understood pursuant to article 652a of the Swiss Code of Obligations, and neither this document nor any other materials relating to the Restricted Stock Units may be publicly distributed nor otherwise made publicly available in Switzerland. Neither this document nor any other offering or marketing material relating to the Restricted Stock Units has been filed with, approved, or supervised by any Swiss regulatory authority (in particular, the Swiss Financial Market Supervisory Authority (FINMA)).

Information. Information.

Information. Information.

Taxes. Taxes.

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EXHIBIT C PACIFIC BIOSCIENCES OF CALIFORNIA, INC. 2020 EQUITY INCENTIVE PLAN PERFORMANCE-BASED RESTRICTED STOCK UNIT AGREEMENT VESTING CRITERIA

A. General. This Award of performance-based Restricted Stock Units is subject to vesting requirements relating to both Participant's continued status as a Service Provider through a specified date and achievement of specified performance-based criteria (the "Performance Goal"). Any capitalized terms not defined in this Award Agreement will have the meaning ascribed to such term in the Plan.

B. Performance Goal. The Performance Goal will consist of achievement of specified levels of Revenue for Fiscal Year 2025. For purposes of this Award Agreement, "Revenue" will mean all Company GAAP-based revenue under the Company's audited financial statements for Fiscal Year 2025, including any Company GAAP-based revenue derived as a result of corporate transactions of the Company, if any, that occur following the Date of Grant but on or prior to the last day of Fiscal Year 2025 pursuant to which the Company acquires another company (or all or substantially all of the assets of another company, as applicable) (an "Acquisition Transaction"), provided that in the event of an Acquisition Transaction, the Administrator, in its sole discretion, may adjust the revenue to be included as Revenue for Fiscal Year 2025 as it deems necessary or appropriate in order to prevent the enlargement or diminution of benefits provided or intended to be provided under this Award. Any portion of this Award that becomes eligible to vest due to achieving the Performance Goal is referred to as the "Eligible Portion."

If the Company achieves meaning ascribed to such term in the following specified levels Plan. B. Performance Goal. [INSERT PERFORMANCE GOAL] C. Certification, Vesting, and Forfeiture. [INSERT APPLICABLE DETAILS HERE] D. Change in Control. [INSERT TREATMENT ON CHANGE IN CONTROL] E. Maximum Shares That May Vest. In no event will the number of Revenue for Fiscal Year 2025, then a percentage of Shares subject to this Award that vest exceed the Target Maximum Number of Restricted Stock Units (as specified in the Notice of Grant) (the "Target Units") will become the Eligible Portion, as set forth in the table below:

If the Revenue for Fiscal Year 2025 is achieved at the amount determined as:	...then the percentage of the Target Units that become the Eligible Portion is:
Below the Minimum Revenue Threshold	0%
\$250 million	25%
(the "Minimum Revenue Threshold")	
\$350 million	100%
\$390 million	150%
\$430 million or greater	200%

Provided that the Revenue achieved for Fiscal Year 2025 is greater than the Minimum Revenue Threshold, if the Revenue is achieved at an amount that is between any of the Revenue levels indicated in the left column of the table above, then the percentage of the Target Units that become the Eligible Portion will be determined by applying linear interpolation between the Revenue levels that are immediately above and below such Revenue that is achieved (with any resulting fractional Share rounded up to the nearest whole Share).

C. Certification, Vesting, and Forfeiture. The Administrator will certify achievement in writing ("Certification") of the Company's performance against the Performance Goals upon completion of Fiscal Year 2025. The Certification will be completed no later than ninety (90) days following the end of Fiscal Year 2025 (the "Deadline Date"). If any portion of this Award becomes an Eligible Portion upon the Certification, the Eligible Portion will vest on the date of the Certification, subject to Participant remaining a Service Provider through such date. If any portion of this Award does not become an Eligible Portion upon the Certification, then that portion immediately will be forfeited and Participant will have no further rights to such Restricted Stock Units or the Shares thereunder. To the extent any portion of the Award has not vested by the Deadline Date, such unvested portion of the Award will be forfeited automatically at the end of the day on the Deadline Date, unless prior to such time the Administrator determines otherwise.

D. Change in Control.

1. Change in Control Before Fiscal Year 2025. In the event of a Change in Control that occurs after the Date of Grant but prior to the end of Fiscal Year 2025, the terms of this subsection 1 will apply. The Administrator will adjust the period over which Revenue will be measured (such period, the "Adjusted Revenue Period") to be the four (4), consecutive fiscal quarters of the Company ending with the last fiscal quarter of the Company that ends no later than (a) the date that the Company enters into a definitive agreement (or similar transaction agreement) pursuant to which the completion of the transactions contemplated thereunder results in the Change in Control (a "Transaction Agreement"), or (b) if no such Transaction Agreement has been entered into, the date that the Administrator determines in its sole discretion to be ten (10) business days prior to the Change in Control (such applicable last fiscal quarter, the "Last Pre-CIC Quarter"). The Administrator will complete a Certification following the Last Pre-CIC Quarter but no later than the day immediately prior to the Change in Control (the "CIC Certification"), to determine the extent to which Revenue for the Adjusted Revenue Period is achieved against the Performance Goal (provided that the Administrator, in its sole discretion, may waive the requirement for the Revenue to be pursuant to the Company's audited financial statements, to the extent the Administrator deems appropriate or advisable in order to timely complete the CIC Certification). As of immediately prior to the completion of the Change in Control and subject to Participant remaining a Service Provider through such time, one hundred percent (100%) of the Target Units, or if greater, the number of Target Units that are determined to have satisfied the Performance Goal requirement upon the CIC Certification, will vest.

2. Change in Control After Fiscal Year 2025. In the event of a Change in Control that occurs after Fiscal Year 2025, the Administrator will complete a Certification before the date of the Change in Control, and the terms of Section C above will apply (provided that the Administrator, in its sole discretion, may waive the requirement for the Revenue to be pursuant to the Company's audited financial statements, to the extent the Administrator deems appropriate or advisable in order to timely complete the Certification).

3. Forfeiture of Unvested Restricted Stock Units. Any Restricted Stock Units that have not vested in accordance with this Section D as of immediately prior to the completion of the Change in Control will be forfeited immediately, Participant will have no further rights to such Restricted Stock Units or the Shares thereunder, and for clarity, such forfeited Restricted Stock Units will not be eligible for any vesting acceleration pursuant to Section 14(c) of the Plan.

E. Maximum Shares That May Vest. In no event will the number of Shares subject to this Award that vest exceed the Maximum Number of Restricted Stock Units (as specified in the Notice of Grant).

* * *

LIST OF SUBSIDIARIES

Subsidiary name	Jurisdiction	Type
Subsidiary name	Jurisdiction	Type
Pacific Biosciences International LLC	Delaware	Domestic
Pacific Biosciences Canada Limited	Canada (Ontario)	Foreign
Pacific Biosciences Germany GmbH	Germany (Munich)	Foreign
Pacific Biosciences Japan GK	Japan (Tokyo)	Foreign
Pacific Biosciences (Shanghai) Co., Ltd.	China (Shanghai)	Foreign
PacBio Singapore Pte. Limited	Singapore	Foreign
Pacific Biosciences UK, Ltd.	United Kingdom (London)	Foreign
Omnioeme, LLC	Delaware	Domestic
Circulomics Inc.	Maryland	Domestic
PacBio B.V.	Netherlands (Amsterdam)	Foreign
PacBio of Korea, Yuhan Hoesa	Korea	Foreign
Apton Biosystems LLC	Delaware	Domestic

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

- (1) Registration Statements (Forms S-8 Nos. 333-170211, 333-179810, 333-186065, 333-193437, 333-201678, 333-209157, 333-215746, 333-222696, 333-229368, 333-236061, 333-241687, 333-170211, 333-179810, 333-186065, 333-193437, 333-201678, 333-209157, 333-215746, 333-222696, 333-229368, 333-236061, 333-251153, 333-253669, 333-255342, 333-259671, 333-261251, 333-263101 and 333-265249) pertaining to the Pacific Biosciences of California, Inc. 2010 Equity Incentive Plan, the Pacific Biosciences of California, Inc. 2010 Employee Stock Purchase Plan, the Pacific Biosciences of California, Inc. 2010 Outside Director Equity Incentive Plan, the Pacific Biosciences of California, Inc. 2020 Equity Incentive Plan, the Pacific Biosciences of California, Inc. 2020 Inducement Equity Incentive Plan, and the Omnioeme Equity Incentive Plan of Pacific Biosciences of California, Inc., and
- (2) Registration Statements (Forms S-3 Nos. 333-239071, 333-249999, 333-255324, 333-259670 and 333-259672) and related Prospectuses of Pacific Biosciences of California, Inc.;
- (1) Registration Statements (Forms S-8 Nos. 333-170211, 333-179810, 333-186065, 333-193437, 333-201678, 333-209157, 333-215746, 333-222696, 333-229368, 333-236061, 333-241687, 333-170211, 333-179810, 333-186065, 333-193437, 333-201678, 333-209157, 333-215746, 333-222696, 333-229368, 333-236061, 333-251153, 333-253669, 333-255342, 333-259671, 333-261251, 333-263101, 333-265249 and 333-270122) pertaining to the Pacific Biosciences of California, Inc. 2010 Equity Incentive Plan, the Pacific Biosciences of California, Inc. 2010 Employee Stock Purchase Plan, the Pacific Biosciences of California, Inc. 2010 Outside Director Equity Incentive Plan, the Pacific Biosciences of California, Inc. 2020 Equity Incentive Plan, the Pacific Biosciences of California, Inc. 2020 Inducement Equity Incentive Plan, and the Omnioeme Equity Incentive Plan of Pacific Biosciences of California, Inc., and
- (2) Registration Statements (Forms S-3 Nos. 333-255324, 333-259670, 333-259672 and 333-274846) and related Prospectuses of Pacific Biosciences of California, Inc.

of our reports dated February 28, 2023 February 28, 2024, with respect to the consolidated financial statements of Pacific Biosciences of California, Inc., and the effectiveness of internal control over financial reporting of Pacific Biosciences of California, Inc. included in this Annual Report (Form 10-K) of Pacific Biosciences of California, Inc. for the year ended December 31, 2022 December 31, 2023.

/s/

/s/ Ernst & Young LLP

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER PURSUANT TO
SECURITIES EXCHANGE ACT RULES 13a-15(e) 13a-14(a)/15d-14(a), AS ADOPTED PURSUANT
TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Christian Henry, certify that:

1. I have reviewed this annual report on Form 10-K of Pacific Biosciences of California, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 28, 2023

February 28, 2024

Christina

By:

By:

/s/

Christian

Henry

Christian Henry

President and Chief Executive Officer

(Principal Executive Officer)

Exhibit 31.2

**CERTIFICATION OF CHIEF FINANCIAL OFFICER PURSUANT TO
SECURITIES EXCHANGE ACT RULES 13a-15(e) 13a-14(a)/15d-14(a), AS ADOPTED PURSUANT
TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Susan Kim, certify that:

1. I have reviewed this annual report on Form 10-K of Pacific Biosciences of California, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

d)Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

a)All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b)Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 28, 2023

February 28, 2024

By:

By: /s/

Susan

Kim

Susan Kim

Chief Financial Officer

(Principal Financial Officer)

Exhibit 32.1

Certification of CEO Furnished Pursuant to 18 U.S.C. Section 1350,

As Adopted Pursuant To

Section 906 of The Sarbanes-Oxley Act of 2002

In connection with the Annual Report of Pacific Biosciences of California, Inc. (the "Company") on Form 10-K for the period ended December 31, 2022 December 31, 2023, as filed with the Securities and Exchange Commission on the date hereof, I, Christian Henry, Chief Executive Officer of the Company, certify for the purposes of section 1350 of chapter 63 of title 18 of the United States Code, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge,

(i) the Annual Report of the Company on Form 10-K for the period ended December 31, 2022 December 31, 2023 (the "Report"), fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934, and

(ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 28, 2024

Date:

February

28, 2023 /s/ Christian Henry

Christian Henry
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 32.2

Certification of CFO Furnished Pursuant to 18 U.S.C. Section 1350,

As Adopted Pursuant To

Section 906 of The Sarbanes-Oxley Act of 2002

In connection with the Annual Report of Pacific Biosciences of California, Inc. (the "Company") on Form 10-K for the period ended December 31, 2022 December 31, 2023, as filed with the Securities and Exchange Commission on the date hereof, I, Susan Kim, Chief Financial Officer of the Company, certify for the purposes of section 1350 of chapter 63 of title 18 of the United States Code, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge,

(i) the Annual Report of the Company on Form 10-K for the period ended December 31, 2022 December 31, 2023 (the "Report"), fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934, and

(ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 28, 2024

Date:

February

28, 2023 /s/ Susan Kim

Susan Kim
Chief Financial Officer
(Principal Financial Officer)

Exhibit 97.1

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

COMPENSATION RECOVERY POLICY

As most recently amended on October 24, 2023

Pacific Biosciences of California, Inc. (the "Company") is committed to strong corporate governance. As part of this commitment, the Company's Board of Directors (the "Board") has adopted this clawback policy called the Compensation Recovery Policy (the "Policy"). The Policy is intended to further the Company's pay-for-performance philosophy and to comply with applicable laws by providing rules relating to the reasonably prompt recovery of certain compensation received by Covered Executives in the event of an Accounting Restatement. The application of the Policy to Covered Executives is not discretionary, except to the limited extent provided below, and applies without regard to whether a Covered Executive was at fault. Capitalized terms used in the Policy are defined below, and the definitions have substantive impact on its application so reviewing them carefully is important to your understanding.

The Policy is intended to comply with, and will be interpreted in a manner consistent with, Section 10D of the Securities Exchange Act of 1934 (the “Exchange Act”), with Exchange Act Rule 10D-1 and with the listing standards of the national securities exchange (the “Exchange”) on which the securities of the Company are listed.

Persons Covered by the Policy

The Policy is binding and enforceable against all “Covered Executives.” A Covered Executive is each individual who is or was ever designated as an “officer” by the Board in accordance with Exchange Act Rule 16a-1(f) (a “Section 16 Officer”). The Committee may (but is not obligated to) require a Covered Executive to sign and return to the Company an acknowledgement that such Covered Executive will be bound by the terms and comply with the Policy. The Policy is binding on each Covered Executive whether or not the Covered Executive signs and/or returns any acknowledgment.

Administration of the Policy

The Compensation Committee of the Board (the “Committee”) has full delegated authority to administer the Policy. The Committee is authorized to interpret and construe the Policy and to make all determinations necessary, appropriate, or advisable for the administration of the Policy. In addition, if determined in the discretion of the Board, the Policy may be administered by the independent members of the Board or another committee of the Board made up of independent members of the Board, in which case all references to the Committee will be deemed to refer to the independent members of the Board or the other Board committee. All determinations of the Committee will be final and binding and will be given the maximum deference permitted by law.

Accounting Restatements Requiring Application of the Policy

If the Company is required to prepare an accounting restatement due to the material noncompliance of the Company with any financial reporting requirement under the securities laws, including any required accounting restatement to correct an error in previously issued financial statements that is material to the previously issued financial statements, or that would result in a material misstatement if the error were corrected in the current period or left uncorrected in the current period (an “Accounting Restatement”), then the Committee must determine the Excess Compensation, if any, that must be recovered. The Company’s obligation to recover Excess Compensation is not dependent on if or when restated financial statements are filed.

Compensation Covered by the Policy

The Policy applies to certain **Incentive-Based Compensation** (certain terms used in this Section are defined below) that is **Received** on or after October 2, 2023 (the “Effective Date”), during the **Covered Period** while the Company has a class of securities listed on a national securities exchange. Incentive-Based Compensation is considered “**Clawback Eligible Incentive-Based Compensation**” if the Incentive-Based Compensation is Received by a person after such person became a Section 16 Officer and the person served as a Section 16 Officer at any time during the performance period for the Incentive-Based Compensation. “**Excess Compensation**” means the amount of Clawback Eligible Incentive-Based Compensation that exceeds the amount of Clawback Eligible Incentive-Based Compensation that otherwise would have been Received had such Clawback Eligible Incentive-Based Compensation been determined based on the restated amounts. Excess Compensation must be computed without regard to any taxes paid and is referred to in the listings standards as “erroneously awarded incentive-based compensation”.

To determine the amount of Excess Compensation for Incentive-Based Compensation based on stock price or total shareholder return, where it is not subject to mathematical recalculation directly from the information in an Accounting Restatement, the amount must be based on a reasonable estimate of the effect of the Accounting Restatement on the stock price or total shareholder return upon which the Incentive-Based Compensation was Received and the Company must maintain documentation of the determination of that reasonable estimate and provide that documentation to the Exchange.

“**Incentive-Based Compensation**” means any compensation that is granted, earned, or vested based wholly or in part upon the attainment of a Financial Reporting Measure. For the avoidance of doubt, no compensation that is potentially subject to recovery under the Policy will be earned until the Company’s right to recover under the Policy has lapsed. The following items of compensation are not Incentive-Based Compensation under the Policy: salaries, bonuses paid solely at the discretion of the Committee or Board that are not paid from a bonus pool that is determined by satisfying a Financial Reporting Measure, bonuses paid solely upon satisfying one or more subjective standards and/or completion of a specified employment period, non-equity incentive plan awards earned solely upon satisfying one or more strategic measures or operational measures, and equity awards for which the grant is not contingent upon achieving any Financial Reporting Measure performance goal and vesting is contingent solely upon completion of a specified employment period (e.g., time-based vesting equity awards) and/or attaining one or more non-Financial Reporting Measures.

“**Financial Reporting Measures**” are measures that are determined and presented in accordance with the accounting principles used in preparing the Company’s financial statements, and any measures that are derived wholly or in part from such measures. Stock price and total shareholder return are also Financial Reporting Measures. A Financial Reporting Measure need not be presented within the financial statements or included in a filing with the Securities and Exchange Commission.

Incentive-Based Compensation is **"Received"** under the Policy in the Company's fiscal period during which the Financial Reporting Measure specified in the Incentive-Based Compensation award is attained, even if the payment, vesting, settlement or grant of the Incentive-Based Compensation occurs after the end of that period. For the avoidance of doubt, the Policy does not apply to Incentive-Based Compensation for which the Financial Reporting Measure is attained prior to the Effective Date.

"Covered Period" means the three completed fiscal years immediately preceding the Accounting Restatement Determination Date. In addition, Covered Period can include certain transition periods resulting from a change in the Company's fiscal year.

"Accounting Restatement Determination Date" means the earliest to occur of: (a) the date the Board, a committee of the Board, or one or more of the officers of the Company authorized to take such action if Board action is not required, concludes, or reasonably should have concluded, that the Company is required to prepare an Accounting Restatement; and (b) the date a court, regulator, or other legally authorized body directs the Company to prepare an Accounting Restatement.

Repayment of Excess Compensation

The Company must recover Excess Compensation reasonably promptly and Covered Executives are required to repay Excess Compensation to the Company. Subject to applicable law, the Company may recover Excess Compensation by requiring the Covered Executive to repay such amount to the Company by direct payment to the Company or such other means or combination of means as the Committee determines to be appropriate (these determinations do not need to be identical as to each Covered Executive). These means include (but are not limited to):

- a. requiring reimbursement of cash Incentive-Based Compensation previously paid;
- b. seeking recovery of any gain realized on the vesting, exercise, settlement, sale, transfer, or other disposition of any equity-based awards (including, but not limited to, time-based vesting awards), without regard to whether such awards are Incentive-Based Compensation or vest based on the achievement of performance goals;
- c. offsetting the amount to be recovered from any unpaid or future compensation to be paid by the Company or any affiliate of the Company to the Covered Executive, including (but not limited to) payments of severance that might otherwise be due in connection with a Covered Executive's termination of employment and without regard to whether such amounts are Incentive-Based Compensation;
- d. cancelling outstanding vested or unvested equity awards (including, but not limited to, time-based vesting awards), without regard to whether such awards are Incentive-Based Compensation; and/or
- e. taking any other remedial and recovery action permitted by law, as determined by the Committee.

The repayment of Excess Compensation must be made by a Covered Executive notwithstanding any Covered Executive's belief (whether or not legitimate) that the Excess Compensation had been previously earned under applicable law and therefore is not subject to clawback.

In addition to its rights to recovery under the Policy, the Company or any affiliate of the Company may take any legal actions it determines appropriate to enforce a Covered Executive's obligations to the Company or to discipline a Covered Executive. Failure of a Covered Executive to comply with their obligations under the Policy may result in (without limitation) termination of that Covered Executive's employment, institution of civil proceedings, reporting of misconduct to appropriate governmental authorities, reduction of future compensation opportunities or change in role. The decision to take any actions described in the preceding sentence will not be subject to the approval of the Committee and can be made by the Board, any committee of the Board, or any duly authorized officer of the Company or of any applicable affiliate of the Company. For avoidance of doubt, any decisions of the Company or the Covered Executive's employer to discipline a Covered Executive or terminate the employment of a Covered Executive are independent of determinations under this Policy. For example, if a Covered Executive was involved in activities that led to an Accounting Restatement, the Company's decision as to whether to not terminate such Covered Executive's employment would be made under its employment arrangements with such Covered Executive and the requirement to apply this no-fault and non-discretionary clawback policy will not be determinative of whether any such termination is for cause, although failure to comply with the Policy might be something that could result in a termination for cause depending on the terms of such arrangements.

Limited Exceptions to the Policy

The Company must recover the Excess Compensation in accordance with the Policy except to the limited extent that any of the conditions set forth below is met, and the Committee determines that recovery of the Excess Compensation would be impracticable:

- a. The direct expense paid to a third party to assist in enforcing the Policy would exceed the amount to be recovered. Before reaching this conclusion, the Company must make a reasonable attempt to recover such Excess Compensation, document such reasonable attempt(s) to recover, and provide that documentation to the Exchange; or
- b. Recovery would likely cause an otherwise tax-qualified retirement plan, under which benefits are broadly available to employees of the Company, to fail to meet the legal requirements as such.

Other Important Information in the Policy

The Policy is in addition to the requirements of Section 304 of the Sarbanes-Oxley Act of 2002 that are applicable to the Company's Chief Executive Officer and Chief Financial Officer, as well as any other applicable laws, regulatory requirements, rules, or pursuant to the terms of any existing Company policy or agreement providing for the recovery of compensation. With the exception of any compensation that is Received prior to the Effective Date, which compensation will remain subject to the Company's previously adopted clawback policy providing for recovery of compensation as applicable pursuant to the terms of such policy, this Policy supersedes in full all of the clawback policies of the Company that were in effect prior to the Effective Date to the extent such policies were applicable with respect to Executive Officers and the operative portions of such policies will have no further force or effect on or after the Effective Date.

Notwithstanding the terms of any of the Company's organizational documents (including, but not limited to, the Company's bylaws), any corporate policy or any contract (including, but not limited to, any indemnification agreement), neither the Company nor any affiliate of the Company will indemnify or provide advancement for any Covered Executive against any loss of Excess Compensation. Neither the Company nor any affiliate of the Company will pay for or reimburse insurance premiums for an insurance policy that covers potential recovery obligations. In the event that the Company is required to recover Excess Compensation pursuant to the Policy from a Covered Executive who is no longer an employee pursuant to the Policy, the Company will be entitled to seek recovery in order to comply with applicable law, regardless of the terms of any release of claims or separation agreement that individual may have signed.

The Committee or Board may review and modify the Policy from time to time.

If any provision of the Policy or the application of any such provision to any Covered Executive is adjudicated to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability will not affect any other provisions of the Policy or the application of such provision to another Covered Executive, and the invalid, illegal or unenforceable provisions will be deemed amended to the minimum extent necessary to render any such provision or application enforceable.

The Policy will terminate and no longer be enforceable when the Company ceases to be listed issuer within the meaning of Section 10D of the Exchange Act.

ACKNOWLEDGEMENT

- I acknowledge that I have received and read the Compensation Recovery Policy (the "**Policy**") of Pacific Biosciences of California, Inc. (the "**Company**").
- I understand and acknowledge that the Policy applies to me, and all of my beneficiaries, heirs, executors, administrators or other legal representatives and that the Company's right to recovery in order to comply with applicable law will apply, regardless of the terms of any release of claims or separation agreement I have signed or will sign in the future.
- I agree to be bound by and to comply with the Policy and understand that determinations of the Committee (as such term is used in the Policy) will be final and binding and will be given the maximum deference permitted by law.
- I understand and agree that my current indemnification rights, whether in an individual agreement or the Company's organizational documents, exclude the right to be indemnified for amounts required to be recovered under the Policy.
- I understand that my failure to comply in all respects with the Policy is a basis for termination of my employment with the Company and any affiliate of the Company as well as any other appropriate discipline.
- I understand that neither the Policy, nor the application of the Policy to me, gives rise to a resignation for good reason (or similar concept) by me under any applicable employment agreement or arrangement.
- I acknowledge that if I have questions concerning the meaning or application of the Policy, it is my responsibility to seek guidance from the Company's General Counsel, Human Resources or my own personal advisers.
- I acknowledge that neither this Acknowledgement nor the Policy is meant to constitute an employment contract.

Please review, sign and return this form to Human Resources.

Covered Executive

(print name)

(signature)

(date)

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