PACIFIC BIOSCIENCES OF CALIFORNIA, INC.
Form 10-K
February 26, 2019
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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, 2018

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

Pacific Biosciences of California, Inc.

(Exact name of registrant as specified in its charter)

Delaware	16-1590339
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

1305 O'Brien Drive

Menlo Park, CA 94025 94025
(Address of principal executive offices) (Zip Code)
(Registrant's telephone number, including area code)

(650) 521-8000

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

Title of Each Class	Name of Each Exchange on Which Registered
Common Stock, par value $0.001 per share	The NASDAQ Stock Market LLC

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

None

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

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 No

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 No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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	Accelerated filer
Non-accelerated filer	Smaller reporting company

Emerging growth company

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.

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

Aggregate market value of registrant's common stock held by non-affiliates of the registrant on June 30, 2018, based upon the closing price of Common Stock on such date as reported by NASDAQ Global Select Market, was approximately $428,497,000. 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 issuer's common stock as of February 22, 2019: 150,959,952

DOCUMENTS INCORPORATED BY REFERENCE:

Portions of the registrant's definitive Proxy Statement relating to its 2019 Annual Meeting of Stockholders to be held on June 18, 2019 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

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

Discussions under the captions “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, our statements regarding the merger agreement and proposed merger with Illumina, Inc.(“Illumina”), the Early Access Program, the expected timing of commercial shipments of Sequel II Systems and SMRT Cell 8M products, the attributes and sequencing advantages of SMRT® technology and the Sequel® System, market opportunities, strategic and commercial plans, including strategy for our business and related financing, expectations regarding the conversion of backlog to revenue and the pricing and gross margin for products, manufacturing plans including developing and scaling of manufacturing and delivery of our products, research and development plans, product development 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, intentions regarding seeking regulatory approval for our products, competition, expectations regarding unrecognized income tax benefits, expectations regarding the impact of an increase in market rates on the value of our investment portfolio, 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. Such statements may be signified by terms such as “anticipates,” “believes,” “could,” “estimates,” “expects,” “intends,” “may,” “plans,” “potential,” “predicts,” “pro “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.

ITEM 1. BUSINESS

Merger with Illumina, Inc.

On November 1, 2018, we entered into an Agreement and Plan of Merger with Illumina, Inc. ("Illumina") and FC Ops Corp., a wholly-owned subsidiary of Illumina (the "Merger Agreement") pursuant to which Illumina will acquire us for $8.00 per share of our common stock in an all-cash transaction and FC Ops Corp. will be merged with and into us (the "Merger"), with us surviving the Merger and becoming a wholly-owned subsidiary of Illumina. Completion of the transaction is subject to terms and conditions set forth in the Merger Agreement, including expiration or termination of any waiting periods applicable to the consummation of the Merger under the United States Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, and clearance under the antitrust laws of certain non-United States jurisdictions. At a Special Meeting of Stockholders held on January 24, 2019, our stockholders, among other things, approved the adoption of the Merger Agreement. We and Illumina have each received a request for additional information and documentary material, commonly referred to as a "second request," from the United States Federal Trade Commission (the "FTC") in connection with the Merger. The FTC's "second request" has the effect of extending the waiting period applicable to the consummation of the Merger until the 30th day after substantial compliance by us and Illumina with the "second request," unless the waiting period is extended voluntarily by the parties or terminated sooner by the FTC. The parties have entered into a timing agreement with the FTC that extends the waiting period of the "second request" to mid-2019. We and Illumina continue to expect the Merger to be completed in mid-2019, at which time we will become a wholly-owned subsidiary of Illumina and will cease to be a publicly-traded company. No assurance can be given that the required regulatory approvals will be obtained or that the required conditions to closing will be satisfied, and, even if all such approvals are obtained and the conditions are satisfied, no assurance can be given as to the terms, conditions and timing of the approvals. For more information about the effects of our agreement to be acquired by Illumina please see Item 1A Risk Factors under the section "Risks Related to Our Business".

Overview

We design, develop and manufacture sequencing systems to help scientists resolve genetically complex problems. Based on our novel Single Molecule, Real-Time (SMRT®) sequencing technology, our products enable: de novo genome assembly to finish genomes in order to more fully identify, annotate and decipher genomic structures; full-length transcript analysis to improve annotations in reference genomes, characterize alternatively spliced isoforms in important gene families, and find novel genes; targeted sequencing to more comprehensively characterize genetic variations; and real-time kinetic information for epigenome characterization. Our technology provides high accuracy, ultra-long reads, uniform coverage and the ability to simultaneously detect epigenetic changes. PacBio® sequencing systems, including consumables and software, provide a simple and fast end-to-end workflow for SMRT sequencing.

Our current products include the Sequel instrument and the Sequel SMRT Cell 1M, which together are capable of sequencing up to approximately one million DNA molecules simultaneously. We are continuously developing new products including the SMRT Cell 8M, which is designed to have up to eight times as much throughput capability as the current Sequel SMRT Cell 1M. We commenced our Early Access Program for the SMRT® Cell 8M chip and platform, the Sequel® II System, in January 2019 and the five Early Access sites selected have installed and operated their Sequel II Systems. Based on the early performance of the Sequel II Systems at these sites, we expect to begin

commercial shipments of Sequel II Systems and SMRT Cell 8M products in the early part of the second quarter of 2019.

Our customers and our scientific collaborators have published numerous peer-reviewed articles in journals including Nature, Science, Cell, PNAS and The New England Journal of Medicine highlighting the power and applications of SMRT sequencing in projects such as finishing genomes, structural variation discovery, isoform transcriptome characterization, rare mutation discovery and the identification of chemical modifications of DNA related to virulence and pathogenicity. Our research and development efforts are focused on developing new products and further improving our existing products, including continuing chemistry and sample preparation improvements to increase throughput and expand our supported applications. By providing access to genetic information that was previously inaccessible, we enable scientists to confidently increase their understanding of biological systems.

Pacific Biosciences of California, Inc., formerly Nanofluidics, Inc., was incorporated in the State of Delaware in 2000. Our executive offices are located at 1305 O'Brien Drive, Menlo Park, California 94025, and our telephone number is (650) 521-8000.

The Underlying Science

Genetic inheritance in living systems 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. Inside living cells, these chains usually exist in pairs bound together in a double helix by complementary bases, with A of one strand always binding to a T of the other strand and C always binding to G.

In humans, there are approximately three billion DNA base-pairs in the molecular blueprint of life, called the genome. These three billion bases are divided into 23 chromosomes ranging in size from 50 million to 250 million bases. Normally, there are two complete copies of the genome contained in each cell, one of maternal origin and the other of paternal origin. When cells divide, the genomes are replicated by an enzyme called DNA polymerase, which visits each base in the sequence, creating a complementary copy of each chromosome using building blocks called nucleotides. Contained within these chromosomes are approximately 23,000 smaller regions,

called genes, each one containing the recipe for a protein or group of related proteins. The natural process of protein production takes place in steps. In a simplified model, the first step is transcription, a process in which an enzyme called RNA polymerase uses DNA as a template to synthesize new strands of messenger RNA, or mRNA. The mRNAs are then translated into proteins by ribosomes. The resulting proteins go on to play crucial roles in cellular structure and function and thus the operation of biological systems.

Numerous scientific approaches have evolved to adapt to the emerging awareness of the magnitude of complexity embedded in biological systems. The field of genomics developed to study the interactions among components in the genome and the massive quantities of associated data. Subsequently, proteomics, transcriptomics and a number of other related fields emerged.

Advances in biology over the next decade are expected to be shaped by a more detailed understanding of the fundamental complexity of biological systems. These systems vary among individuals in previously unrecognized ways and are influenced by factors including time, molecular interactions, and cell type.

Importantly for the future of genomics, the first few whole-genome sequencing studies of disease have shown that rare mutations play a critical role in human disease. These mutations would not have been detected in earlier studies because too few people, or perhaps only one person, carry the specific mutation. In addition, it is now understood that structural changes to the genome in which whole sections are deleted, inverted, copied or moved may be responsible for a significant fraction of variation among individuals. The scope of these structural changes challenges the very idea of a reference genome.

Recent discoveries have highlighted additional complexities in the building blocks of DNA and RNA, including the presence of modified bases. It has long been known that in humans and many other organisms, the cytosine bases can be chemically modified through the addition of a methyl group in a process called methylation, resulting in modified bases such as 5-methylcytosine (5-mC) and N4-methylcytosine (4-mC). These chemical modifications have been shown to play a role in embryonic development, have important impacts on diseases such as cancer and can even affect the characteristics of offspring for multiple generations. More recently, it has been discovered that other modified bases, such as 5-hydroxymethylcytosine, 8-oxoguanine and many others, play important physiological roles. For example, in bacteria, N6-methyladenine (6-mA) has been shown to play an important role in pathogenicity.

Another source of complexity derives from the processing of RNA molecules after being transcribed from the genome. The majority of all genes code for different forms of a protein that can be made depending on the structure of the RNA molecule, referred to as splice variants. A detailed understanding of both the expression pattern and regulation of these variants is believed to play an important role in a number of critical biological processes.

Recent advances in our understanding of biological complexity have highlighted the need for advanced tools such as the PacBio® RS II System and the Sequel® System to study DNA, RNA and proteins. In the field of nucleic acid sequencing, incremental technological advances have provided novel insights into the structure and function of the genome. Despite these advances, scientists have not been able to fully characterize the human genome and the genomes of other living organisms because of inherent limitations in these tools.

Evolution of Sequencing

In order to understand the limitations of current nucleic acid sequencing technologies, it is important to understand the sequencing process. This consists of three phases: sample preparation, physical sequencing, and analysis. The first step of sample preparation is to either break the target genome into multiple small fragments or, depending on the amount of sample DNA available, amplify the target region using a variety of molecular methods. In the physical sequencing phase, the individual bases in each fragment are identified in order, creating individual reads. The number

of individual bases identified contiguously is defined as read length. In the analysis phase, bioinformatics software is used to align overlapping reads, which allows the original genome to be assembled into contiguous sequence. The longer the read length, the easier it is to assemble the genome.

Sanger Sequencing

The first automated sequencing methodology, often referred to as “Sanger sequencing,” was developed by Frederick Sanger in 1977. With this technology, during sample preparation, scientists first make different sized fragments of DNA each starting from the same location. Each fragment ends with a particular base that is labeled with one of four fluorescent dyes corresponding to that particular base. Then all of the fragments are distributed in order of their length by driving them through a gel. Information regarding the last base is used to determine the original sequence. Under standard conditions, this method results in a read length that is approximately 700 bases on average, but may be extended to 1,000 bases. These are relatively long read lengths compared with many next-generation sequencing methods. However, Sanger sequencing is limited by the small amounts of data that can be processed per unit of time, referred to as throughput.

Short-read Sequencing

Several commercial DNA sequencing tools emerged in 2005 in response to the low throughput of Sanger sequencing. Now commonly referred to as “short-read sequencing”, these methods achieve much higher throughput by sequencing a large number of DNA molecules in parallel, but with the tradeoff of shorter read lengths.

In most short-read sequencing methodologies, tens of thousands of identical strands are anchored to a given location to be read in a process consisting of successive flushing and scanning operations. The “flush and scan” sequencing process involves sequentially flushing in reagents, such as labeled nucleotides, incorporating nucleotides into the DNA strands, stopping the incorporation reaction, washing out

the excess reagent, scanning to identify the incorporated base and finally treating that base so that the strand is ready for the next “flush and scan” cycle. This cycle is repeated until the reaction is no longer viable.

Due to the large number of flushing, scanning and washing cycles required, the time to result for short-read sequencing methods can be longer, sometimes taking days. This repetitive process also limits the average read length produced by most of these systems under standard sequencing conditions to approximately 35 to 600 bases.

The short-read sequencing technologies require a large number of DNA molecules during the sequencing process. To generate enough DNA molecules, a copying method called PCR amplification is required during sample preparation. This amplification process can introduce errors known as amplification bias. The effect of this bias is that resulting copies are not uniformly representative of the original template DNA. In cases where the original template DNA contains regions of relatively high G-C content or relatively high A-T content, the PCR amplification process tends to under-represent these regions. As a result, these regions, which may contain entire genes, can be completely missed.

In summary, while short-read sequencing methods can offer very high throughput and low cost per identified base, their disadvantages can include limited read length, variation in sequence coverage with regard to representation bias and accuracy, dependence on amplification, long time to result, and/or a need for many samples to justify machine operation.

The PacBio Solution — Single Molecule, Real-Time Technology

We have developed our SMRT technology, which enables single molecule, real-time detection of biological processes, to address many of the limitations of previous sequencing technologies. By providing long read lengths, elimination of the dependence on amplification during sample preparation (which can result in amplification bias), very high consensus accuracy, and the ability to detect DNA base modifications, the PacBio RS II System and the Sequel System can provide more comprehensive and higher quality information of DNA and RNA sequence as well as epigenetic regulation and DNA damage.

Pacific Biosciences’ SMRT Technology

SMRT technology enables the observation of DNA synthesis as it occurs in real time by harnessing the natural process of DNA replication, which in nature is a highly efficient and accurate process actuated by the DNA polymerase. The DNA polymerase attaches itself to a strand of DNA to be replicated, examines the individual base at the point it is attached, and then determines which of four building blocks, or nucleotides, is required to complement that individual base. After determining which nucleotide is required, the polymerase incorporates that nucleotide into the growing strand being produced. After incorporation, the enzyme advances to the next base to be replicated and the process is repeated.

To overcome the challenges inherent in real-time observation of the natural activity of the DNA polymerase, an enzyme measuring approximately 15 nanometers (nm) in diameter, we offer and support three key innovations:

- The SMRT Cell
- Phospholinked nucleotides
- The PacBio RS II and Sequel instruments

The SMRT Cell

One of the fundamental challenges with observing a single DNA polymerase molecule working in real time is the ability to detect the incorporation of a single nucleotide, taken from a large pool of potential nucleotides, during DNA

synthesis. To resolve this problem, we utilize our nanoscale innovation, the zero-mode waveguide, or ZMW.

The ZMWs in our SMRT Cells consist of holes in an opaque layer, measuring only tens of nanometers in diameter forming nanoscale wells. The small size of the ZMW causes the intensity of visible laser light, which has a wavelength of approximately 600nm, to decay exponentially in the ZMW. Therefore, laser light shined into the ZMW from below is blocked from reaching the sequencing solution above the ZMW, providing selective illumination of only the bottom portion of the nanoscale well. DNA polymerases are anchored to the bottom of the glass surface of the nanoscale wells using proprietary techniques. Nucleotides, each type labeled with a different colored fluorophore, are then flooded above an array of ZMWs at the required concentration. When the labeled nucleotides diffuse into the bottom portion of the nanoscale wells, which contain the anchored DNA polymerases, their fluorescence can be monitored. When the correct nucleotide is detected by the polymerase, it is incorporated into the growing DNA strand in a process that takes milliseconds in contrast to simple diffusion which takes microseconds. This difference in time results in higher signal intensity for incorporated versus unincorporated nucleotides, which creates a high signal-to-noise ratio. Thus, the ZMW provides the ability to detect a single incorporation event against the background of fluorescently labeled nucleotides at biologically relevant concentrations. Our DNA sequencing is performed on proprietary SMRT Cells, each having an array of ZMWs. The SMRT Cells for the PacBio RS II System each contain approximately 150,000 ZMWs, whereas the SMRT Cells for the Sequel System each contain approximately one million ZMWs. The SMRT Cells for the Sequel II System currently in development contain approximately eight million ZMWs. Each ZMW is capable of containing a DNA polymerase molecule bound to a single DNA template. Currently, our immobilization process randomly distributes polymerases into ZMWs across the SMRT Cell, typically resulting in approximately one-third to two-thirds of the ZMWs having a single template.

Phospholinked Nucleotides

Our proprietary phospholinked nucleotides have a fluorescent dye attached to the phosphate chain of the nucleotide rather than to the base. As a natural step in the synthesis process, the phosphate chain is cleaved when the nucleotide is incorporated into the DNA strand. Thus, upon incorporation of a phospholinked nucleotide, the DNA polymerase naturally frees the dye molecule from the nucleotide when it cleaves the phosphate chain. Upon cleaving, the label quickly diffuses away, leaving a natural piece of DNA without evidence of labeling.

The PacBio RS II and Sequel Instruments

The PacBio RS II and Sequel instruments conduct, monitor, and analyze single molecule biochemical reactions in real time. We no longer manufacture the PacBio RS II instrument; however, we continue to service and support installed PacBio RS II instruments. 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, or QVs. To generate a consensus sequence from the data, an assembly process assembles the different fragments from each ZMW based on common sequences.

SMRT Sequencing Advantages

Sequencing based on our SMRT technology offers the following key benefits:

· Longer read lengths
SMRT technology has been demonstrated to produce read lengths that are significantly longer than those of previous sequencing technologies. Long read lengths are necessary to span repetitive regions to efficiently assemble genomes. Long read lengths are an important factor in enabling a comprehensive view of the genome, as they can reveal multiple types of genetic variation such as structural variants.

· High consensus accuracy
Users of SMRT technology can achieve very high consensus accuracy due to the attributes of SMRT sequencing, including long read lengths, lack of reliance on amplification during sample preparation (which can result in amplification bias), and lower systematic bias. Users of short-read sequencing technologies often cannot achieve comparable results due to their shorter read lengths and systematic bias.

· More uniformity and less systematic error
The sample preparation step for SMRT sequencing is compatible with but does not require amplification; when amplification is not used during sample preparation, the reads are not subject to amplification bias. Importantly, this allows for uniform identification of all bases present in a DNA sample and uniform sequence coverage. As a result, SMRT sequencing can detect and identify regions and entire genes that may be missed by short-read sequencing technologies. In addition, SMRT sequencing can achieve high accuracy when sequencing through complex and highly repetitive regions, whereas other sequencing methods are unable to resolve such regions, which can often result in poor accuracy.

· Ability to observe and capture kinetic information
The ability to observe the activity of a DNA polymerase in real time enables the PacBio RS II and Sequel Systems to collect, measure and assess the dynamics and timing of nucleotides being added to a growing DNA strand, referred to as kinetics. It is well established in the scientific community that chemical modification of DNA such as the addition

of a methyl group, known as methylation, can alter the biological activity of the affected nucleotide. The PacBio RS II and Sequel Systems detect changes in kinetics automatically by capturing and recording changes in the duration of, and time period between, each of the fluorescent pulses during a typical sequencing analysis. Integrated software can then translate these kinetic signatures into uniquely characterized modified bases such as 6-mA, 4-mC and 5-mC. Other sequencing systems, which rely on a sample preparation amplification step or are limited by signal resolution, are unable to directly measure this type of kinetic data.

· Flexibility

Our sequencing systems have the ability to scale the throughput and cost of sequencing across a range of small to large projects. They can be used with a variety of sample types and can output a range of DNA lengths.

Our Products

We entered the market with our first commercial product, the PacBio RS System, during the second quarter of 2011 and launched the higher performance PacBio RS II System during the second quarter of 2013. In September 2015, we announced the Sequel System, which is based on the same underlying SMRT technology as the PacBio RS II System, but can achieve up to approximately seven times the throughput with newly-designed SMRT Cells. We are planning on introducing a new system in 2019, the Sequel II System, which is designed to achieve approximately eight times the throughput of the current Sequel System, utilizing our new SMRT Cell 8M chip. Our sequencing systems provide access to a wide range of applications and are designed for expandable improvements to performance capability and new application capabilities through chemistry and software enhancements without necessitating changes to instrument hardware.

PacBio Systems

The PacBio RS II and Sequel Systems conduct, monitor, and analyze biochemical sequencing reactions. The PacBio RS II and Sequel instruments are integrated units that include high performance optics, automated liquid handling, a touchscreen control interface and computational hardware and software. Each instrument's high performance optics monitor the ZMWs in a SMRT Cell in real time. The automated liquid handling system performs reagent mixing and prepares SMRT Cells. Each instrument's touchscreen control interface is the user's primary control center to design and monitor experiments. The computational hardware and software in each instrument is responsible for processing the sequencing data produced by the SMRT Cells. Both the PacBio RS II System and the Sequel System have been designed to allow for performance improvements to be easily integrated into the systems. We no longer manufacture the PacBio RS II instrument; however, we continue to service and support installed PacBio RS II instruments.

Consumables

Customers must purchase proprietary consumable products to run either the PacBio RS II System or Sequel System. Our consumable products include our proprietary 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. For the PacBio RS II instrument, eight SMRT Cells containing approximately 150,000 ZMWs each are individually and hermetically sealed then packaged together into a streamlined 8Pac format. Sequel System customers purchase a similarly packaged, four SMRT Cell format with approximately one million ZMWs each. The Sequel II System currently in development will also use a similarly packaged, four SMRT Cell format with approximately eight million ZMWs each.

We offer several reagent kits, each designed to address a specific step in the workflow. A template 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 kits include our modified DNA polymerase, and are used to bind SMRTbell libraries to the polymerase in preparation for sequencing. Our sequencing kits contain reagents required for on-instrument, real-time sequencing, including the phospholinked nucleotides.

Product Enhancements

Since the introduction of our products in 2011, we have continued to significantly enhance the performance of PacBio sequencing systems through a combination of sample preparation protocol enhancements, software releases, and new sequencing reagent chemistries. By providing an increasing number of longer reads per instrument run, the new chemistries have enabled users to assemble more genomes to a high quality. We have continually improved our software to expand the number of supported applications such as large genome assembly, structural variant analysis, sequencing of transcript isoforms produced from genes, and phasing of haplotypes in large amplicons.

Market for Our Products

Our customers use our products for sequencing genomes and transcriptomes across a wide range of organisms. Initially, customers in research, government and commercial markets used the PacBio RS and RS II Systems to generate more complete assemblies of small and medium size genomes, such as bacteria and fungi, and for sequencing targeted regions of larger genomes such as humans and plants. As throughput and read lengths have increased, the complexity and size of genomes being resolved with SMRT sequencing have grown. Scientists now use SMRT sequencing to generate genome assemblies of humans, plants & animals, characterize transcriptomes through full-length isoform sequencing, and phase complex genomic regions like full-length human leukocyte antigen, or HLA, genes. With continued performance improvements of our products, we anticipate increasing both mindshare and market share within research and commercial markets such as human biomedical research, plant and animal

sciences, microbiology & infectious disease, and immunogenomics.

There are a number of emerging markets for sequencing-based tests, including molecular diagnostics, which represent significant potential opportunities for our products. The development of these markets is subject to variability driven by ongoing changes in the competitive landscape, evolving regulatory requirements, government funding of research and development activities, and macroeconomic conditions. Introductions of new technologies and products, while positive to the overall development of these markets, may result in greater competition for the limited financial resources available. As we continue to expand into these emerging markets, the development of our business will be impacted by the variability of the factors affecting the growth of these markets.

Pacific Biosciences' Strategy

Key elements of our strategy include:

- Offer differentiated products based on our proprietary SMRT technology

Our SMRT technology provides a window into biological processes that has not previously been available. The combination of our products' and underlying SMRT technology's ability to deliver long read lengths, high consensus accuracy, low bias, and kinetic information affords the scientific community a new tool to conduct research not possible with other sequencing technologies.

- Enhance product performance and introduce new products to increase market share.

The design of our sequencing systems allows for significant performance improvements. Our flexible platforms are designed to generate a recurring revenue stream through the sale of proprietary SMRT Cells and reagent kits. With continued performance

improvements of our products, we anticipate increasing both market recognition and market share within the markets for our products. We plan to introduce additional product enhancements over time to further reduce DNA sequencing project costs and time to result while expanding application solutions.

· Create a global community of users to enhance informatics capabilities, develop sample preparation solutions, and drive adoption of our products in new application and market areas.

We work closely with our customers and collaborators to develop new applications and demonstrate SMRT sequencing capabilities on scientifically relevant projects. We partner with members of the informatics community to develop and define standards for working with single molecule, real-time sequence data. We maintain the PacBio DevNet site, a website on which we make available various software tools and information about our SMRT sequencing technology to support academic informatics developers, scientists and independent software vendors interested in creating tools to work with SMRT sequencing data. This gives the user flexibility to perform further analysis of the sequencing data through third-party software or share data with collaborators. To help maximize the flexibility and functionality for users, our secondary analysis algorithms are made available under open source licenses. We also make available on our main corporate website various methods developed internally and externally for simplifying and enhancing sample preparation protocols.

· Leverage SMRT technology and community engagement to expand application capabilities and penetrate new markets.

We plan to leverage our customers' successes with SMRT sequencing to expand the capabilities of our products for applications our customers have identified as high-value based on the differentiating attributes of our technology. Early applications identified by our customers include: whole genome sequencing, targeted sequencing of complex regions, isoform discovery and characterization, resolution of complex populations, and epigenetic analysis. Our customers have been particularly successful sequencing plant and animal genomes with our products. We plan to develop whole product solutions around these applications, making it easier for customers who are not typically early adopters of new technology to take advantage of SMRT sequencing.

In the long term, we believe that our SMRT technology may also be adapted for RNA transcription monitoring, direct RNA sequencing, protein translation and ligand binding. We believe these applications can create substantial new markets for our technology.

Marketing, Sales, Service and Support

We market our products through a direct sales force in North America and parts of Europe and through distribution partners in Asia, certain other parts of Europe, the Middle East and Africa, and Latin America. Our sales strategy involves the use of a combination of sales personnel and field application scientists. The role of our sales personnel is to educate customers on the advantages of SMRT technology and the applications that our technology makes possible. The role of our field application scientists is to provide on-site training and scientific technical support to prospective and existing customers and to encourage customer utilization of our SMRT sequencing technology. Our field application scientists are technical experts, often with advanced degrees, and generally have extensive experience in academic research and core sequencing lab experience.

Service for our instruments is performed by field service engineers. These field service engineers are trained by experienced personnel to test, trouble-shoot, and service instruments installed at customer sites.

In addition, we maintain an applications lab team in Menlo Park, California composed of scientific experts who can transfer knowledge from the research and development team to the field application scientists. The applications lab

team also runs foundational scientific collaborations and proof of principle studies, which help demonstrate the value of our product offering to prospective customers.

Our business is subject to seasonal trends. See "Risk Factors— Seasonality may cause fluctuations in our revenue and results of operations" for additional information.

Customers

Our customers include research institutions, commercial laboratories, genome centers, clinical, government and academic institutions, genomics service providers, pharmaceutical companies and agricultural companies. In general, our customers will isolate, prepare and analyze genetic samples using PacBio sequencing systems in their own research labs, 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. Excluding contractual revenue from the Development, Commercialization and License Agreement dated September 24, 2013 (the "Roche Agreement") with F. Hoffman-La Roche Ltd ("Roche"), which has now been terminated, for the years ended December 31, 2018 and 2017, one customer, Gene Company Limited, our distributor for China and Hong Kong, accounted for approximately 26% and 31% of our total revenue, respectively. Excluding contractual revenue from the Development, Commercialization and License Agreement dated September 24, 2013 (the "Roche Agreement") with F. Hoffman-La Roche Ltd ("Roche"), which terminated in February 2017, for the year ended December 31, 2016, no customer accounted for more than 10% of our total revenue.

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.

We currently sell our products to a number of customers outside the United States, including customers in other areas of North America, Europe, Middle East, Africa, Asia Pacific and South America. Roche-related contractual revenue has been classified as revenue from the United States. Revenue from customers outside the United States totaled $44.7 million, or 57% of our total revenue during fiscal 2018, compared to $54.3 million, or 58% of our total revenue, during fiscal 2017, and compared to $41.0 million, or 45% of our total revenue, during fiscal 2016.

Backlog

As of December 31, 2018, our instrument backlog was approximately $4.6 million, compared to $4.1 million as of December 31, 2017. 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 this backlog to revenue during 2019; 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

Our principal manufacturing activities are performed at our headquarters in Menlo Park, California. We currently perform some of the manufacturing and all of the final integration of our instruments in-house, while outsourcing most sub-assemblies to third-party manufacturers. With respect to the manufacture of SMRT Cells, we subcontract wafer fabrication and processing to semiconductor processing facilities, but conduct critical surface treatment processes internally. We also subcontract the packaging of SMRT Cells, and bring them back in-house for final testing. In addition, we manufacture critical reagents in-house, including our phospholinked nucleotides and our DNA polymerase.

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 critical suppliers and have established a supplier certification program. We purchase components through purchase orders. Some of the components required in our products are currently either sole sourced or single sourced.

Research and Development

Our SMRT technology requires the blending of a number of unique disciplines, namely nanofabrication, physics, photonics, optics, molecular biology, engineering, signal processing, high performance computing, and bioinformatics. Our research and development team is a blend of these disciplines creating a single, cross-functional /operating unit. We have also established productive working relationships with technology industry leaders, as well as leading academic centers, to augment and complement our internal research and development efforts. We plan to continue our investment in research and development to enhance the performance and expand the application of our current products, and introduce additional products based on our SMRT technology. Our goals include further improvements in sequencing read length and mappable data per SMRT Cell, chemistry and software enhancements, and enhancements in sample preparation and bioinformatics tools that take advantage of the capabilities of our products. In addition, our engineering teams will continue their focus on increasing instrument component and system reliability, reducing costs, and implementing additional system flexibility and versatility through the enhancement of existing products and development of new products.

Intellectual Property

Developing and maintaining a strong intellectual property position is an important element of our business. We have sought, and will continue to seek, patent protection for our SMRT technology, for improvements to our SMRT 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 arrays, surface treatments, phospholinked nucleotides and other reagents for use in nucleic acid sequencing, optical 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. 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, 2018, we own or hold exclusive licenses to 297 issued U.S. patents, 79 pending U.S. patent applications, 193 granted foreign patents and 75 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 2019 and 2036. 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, 22 issued U.S. patents, one pending U.S. patent application, and 15 granted foreign patents are licensed to us by the Cornell Research Foundation, which manages technology transfers on behalf of Cornell University. We have also entered into a license agreement with Indiana University Research and Technology Corporation, or IURTC, for U.S. Patent No. 6,399,335, which relates to nucleoside triphosphates that include a labeling group attached through the terminal phosphate group in the triphosphate chain. We have also entered into a license agreement with GE Healthcare Bio-Sciences Corp, or GE Healthcare, for several U.S. and foreign patents and pending patent applications related to labeled nucleoside polyphosphate compounds.

We are involved in legal proceedings for patent infringement with Oxford Nanopore Technologies Ltd. ("ONT Ltd.") and Oxford Nanopore Technologies, Inc. ("ONT Inc.") in the United States. Please see Item 3 titled "Legal Proceedings" for more information.

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, Thermo Fisher Scientific Inc. ("Thermo"), ONT Ltd., Roche, and Qiagen N.V. ("Qiagen"). Many of these companies currently have greater financial, technical, research and/or other resources than we do. They also have larger and more established manufacturing capabilities and marketing, sales and support functions. 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, including ONT Ltd. and Roche. 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, including single molecule, real-time resolution, the combination of very high consensus accuracy and long read lengths with the ability to detect real-time kinetic information, fast time to result and flexibility, as well as the breadth and depth of current and future products and applications.

Employees

As of December 31, 2018, we had 401 full-time employees. Of these employees, 157 were in research and development, 101 were in operations and service, 88 were in marketing, sales and customer support, and 55 were in general and administration. With the exception of our field-based sales, marketing and service teams, substantially all of our employees are located at our headquarters in Menlo Park, 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.

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 10-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 "Investors" 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 as a channel of distribution for important company information. 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 "About Us - 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 account (@pacbio). Information on or that can be accessed through our website or our Twitter account 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.

ITEM 1A.RISK FACTORS

You should consider carefully the risks and uncertainties described below, together with all of the other information in our public filings with the Securities and Exchange Commission, 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.

Risks Related to Our Business

The announcement and pendency of our agreement to be acquired by Illumina could adversely affect our business.

On November 1, 2018, we entered into a definitive agreement to be acquired by Illumina. Uncertainty about the effect of the proposed acquisition on our customers, employees, partners and other parties may adversely affect our business. Our employees may experience uncertainty about their roles or seniority following the acquisition. There can be no assurance that our employees, including key personnel, can be retained, or that we will be able to attract and retain employees to the same extent that we have previously been able to. Any loss or distraction of such employees could adversely affect our business and operations. In addition, we have diverted, and will continue to divert, significant management resources toward the completion of the acquisition, which could adversely affect our business and operations. Parties with which we do business may experience uncertainty associated with the acquisition, including with respect to

current or future business relationships with us. Uncertainty may cause customers to refrain from doing business with us, which could adversely affect our business, results of operations and financial condition.

The parties must obtain certain regulatory approvals in order to complete the transactions contemplated by the Merger Agreement; if such approvals are not obtained or are obtained with conditions, the acquisition may be prevented or delayed or the anticipated benefits of the acquisition may be reduced.

Consummation of the acquisition by Illumina is conditioned upon, among other things, the absence of any law or order prohibiting or restraining the acquisition or any law making the consummation of the acquisition illegal and the expiration or termination of the waiting period (and any extensions thereof) applicable to the acquisition under the U.S. Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended ("HSR Act"). We and Illumina have each received a request for additional information and documentary materials (commonly referred to as a "second request") from the United State Federal Trade Commission ("FTC") in connection with the Merger. The FTC's "second request" has the effect of extending the waiting period applicable to the consummation of the Merger until the 30th day after substantial compliance by us and Illumina with the "second request," unless the waiting period is extended voluntarily by the parties or terminated sooner by the FTC. The parties have entered into a timing agreement with the FTC that extends the waiting period of the "second request" to mid-2019.

In the EU, the acquisition is not reviewable under Council Regulation (EC) No. 139/2004. The transaction is a relevant merger situation which will be notified to the UK's Competition and Markets Authority (CMA) under the Enterprise Act 2002, as amended by the Enterprise and Regulatory Reform Act 2013. At any time before or after the acquisition is consummated, any of the U.S. Department of Justice, the Federal Trade Commission, U.S. state attorneys general, or the CMA could take action under the antitrust laws in opposition to the acquisition, including seeking to enjoin completion of the acquisition, condition completion of the acquisition upon the divestiture of assets of Illumina, us or their and our respective subsidiaries, or impose restrictions on Illumina's post-acquisition operations. Any such requirements or restrictions may prevent or delay completion of the acquisition or may reduce the anticipated benefits of the acquisition. No assurance can be given that the required regulatory approvals will be obtained or that the required conditions to closing will be satisfied, and, even if all such approvals are obtained and the conditions are satisfied, no assurance can be given as to the terms, conditions and timing of the approvals. For more information about the effects of a failure to complete the acquisition, see the risk factor below entitled "The failure to complete the acquisition by Illumina could adversely affect our business."

The failure to complete the acquisition by Illumina could adversely affect our business.

Consummation of our acquisition by Illumina is subject to several conditions beyond our control that may prevent, delay, or otherwise adversely affect its completion. If any of these conditions are not satisfied or waived, it is possible that the acquisition will not be consummated in the expected time frame (or at all) or that the definitive agreement may be terminated. If the proposed acquisition is not completed, the share price of our common stock may decrease to the extent that the current market price of our common stock reflects an assumption that a transaction will be

completed. In addition, under circumstances specified in the definitive agreement, we may be required to pay a termination fee of $43 million to Illumina. Further, a failed transaction may result in negative publicity and a negative impression of us in the investment community. Any disruption to our business resulting from the announcement and pendency of the transaction and from intensifying competition from our competitors, including any adverse changes in our relationships with our customers, employees, partners and other parties, could continue or accelerate in the event of a failed transaction. There can be no assurance that our business, relationships with other parties, liquidity or financial condition will not be adversely affected, as compared to the condition prior to the announcement of the acquisition, if the acquisition is not consummated.

While the acquisition by Illumina is pending, we are subject to business uncertainties and contractual restrictions that could harm our operations and the future of our business or result in a loss of employees.

Pursuant to the terms of the Merger Agreement, we are subject to certain restrictions on the conduct of our business. These restrictions generally require us to conduct our businesses in the ordinary course, consistent with past practice, and subject us to a variety of specified limitations, including the ability in certain cases to enter into material contracts, acquire or dispose of assets, incur indebtedness or incur capital expenditures, until the proposed merger becomes effective or the Merger Agreement terminates. These restrictions, which are standard for a transaction of this type, may inhibit our ability to take actions outside of the ordinary course of our business that are inconsistent with our past practice but which we may consider advantageous and limit our ability to respond to future business opportunities and industry developments that may arise during such period. The pendency of the acquisition may also divert management’s attention and our resources from ongoing business and operations. Our customers, employees, partners and other parties may have uncertainties about the effects of the acquisition. In connection with the acquisition, it is possible that some customers and other persons with whom we have a business relationship may delay or defer certain business decisions or might decide to seek to terminate, change or renegotiate their relationship with us as a result of the acquisition. If any of these effects were to occur, it could materially and adversely impact our revenue, earnings, cash flows and other business results and our financial condition, as well as the market price of our common stock and our perceived acquisition value, regardless of whether the acquisition is completed. In addition, whether or not the

acquisition is completed, while it is pending we will continue to incur costs, fees, expenses and charges related to the acquisition, which may materially and adversely affect our financial condition.

The Merger Agreement limits our ability to pursue alternatives to the acquisition.

The Merger Agreement contains provisions that make it more difficult for us to enter into alternative transactions. The Merger Agreement contains certain provisions that restrict our ability to, among other things, solicit, initiate or knowingly encourage or knowingly facilitate the submission of inquiries, proposals or offers relating to or that would reasonably be expected to lead to any acquisition proposal from a third party. The Merger Agreement also provides that our board of directors will not change its recommendation that our stockholders adopt the Merger Agreement and will not approve any agreement with respect to an acquisition proposal, subject to limited exceptions.

In addition, upon adoption of the Merger Agreement by our stockholders, our right to terminate the Merger Agreement in response to a superior proposal was eliminated. While we believe these provisions are reasonable, customary and not preclusive of other offers, the provisions might discourage a third party that has an interest in acquiring all or a significant part of us from considering or proposing such acquisition, even if such party were prepared to pay consideration with a higher per-share value than the currently proposed merger consideration. Furthermore, the requirement to pay a termination fee under certain circumstances may result in a third party proposing to pay a lower per-share price to acquire us than it might otherwise have proposed to pay because of the added expense of the $43 million termination fee that may become payable by us in certain circumstances.

Several lawsuits were filed and additional litigation may arise in connection with the acquisition by Illumina, which could be costly, divert management’s attention and otherwise materially harm our business.

We are aware of five lawsuits that were filed in connection with the merger agreement and the merger. Three putative class action complaints, captioned Wang v. Pacific Biosciences of California, Inc., et al., No. 3:18-cv-7450 (N.D. Cal.), Morrison v. Pacific Biosciences of California, Inc., et al., No. 3:18-cv-7654 (N.D. Cal.), and Speiser v. Pacific Biosciences of California, Inc., et al., No. 3:19-cv-0072 (N.D. Cal.), were filed in the United States District Court for the Northern District of California on December 11, 2018, December 20, 2018, and January 4, 2019, respectively. A fourth putative class action complaint, captioned Rosenblatt v. Pacific Biosciences of California, Inc., et al., No. 1:18-cv-2005 (D. Del.) was filed in the United States District Court for the District of Delaware on December 18, 2018. An individual complaint, captioned Washington v. Pacific Biosciences of California, Inc., et al., No. 5:18-cv-7614 (N.D. Cal.), was filed in the United States District Court for the Northern District of California on December 19, 2018. These lawsuits asserted claims under Section 14(a) and Section 20(a) of the Exchange Act in connection with the disclosures contained in the preliminary proxy statement that we filed with the SEC on December 5, 2018, the definitive proxy statement that we filed with the SEC on December 18, 2018, or both. The lawsuits named us and our directors as defendants. The complaints sought a variety of equitable and injunctive relief including, among other things, enjoining the consummation of the merger and awarding the plaintiffs costs and attorneys’ fees. While our management believed that the claims were without merit, we agreed to make supplemental disclosures in exchange for plaintiffs’ agreement that the supplemental disclosures would moot their claims. The supplemental disclosures were filed on Schedule 14A on January 18, 2019. On January 29, 2019, each plaintiff filed a voluntary dismissal of his or

her lawsuit. Additional lawsuits may also be filed challenging the disclosures contained in the proxy statement and/or challenging other aspects of the acquisition by Illumina.

Regardless of the outcome of the current or any future litigation related to the acquisition by Illumina, such litigation may be time-consuming and expensive and may distract our management from running the day-to-day operations of our business. The litigation costs and diversion of management's attention and resources to address the claims and counterclaims in any litigation related to the acquisition by Illumina may materially adversely affect our business, financial condition and operating results. Litigation related to the acquisition may result in negative publicity or an unfavorable impression of us, which could adversely affect the price of our common stock, impair our ability to recruit or retain employees, damage our relationships with our customers and suppliers, or otherwise materially harm our operations and financial performance.

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, the overall market for nucleic acid sequencing products may be particularly vulnerable to unfavorable economic conditions. A global financial crisis or a global or regional political disruption 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 lead product candidates or any future product candidates, if approved, 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 services. 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.

We have limited experience as a commercial company and the commercialization and sales of our current or future products may be unsuccessful or less successful than anticipated.

Our first commercial product launched in 2011 and we have had limited sales to date. As such, we have limited historical financial data upon which to base our projected revenue, planned operating expenses or upon which to evaluate our company and our commercial prospects. Furthermore, in September 2015, we launched the PacBio Sequel® System, and concurrently began phasing out production of PacBio RS II instruments, and we are planning on introducing the Sequel II System in 2019. Based on our limited 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, including the SMRT Cell 8M and Sequel II System, and the rate at which sales of our new products may cannibalize sales of our older products;
- drive adoption of our current and future products, including the Sequel II System;
- 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, including the new SMRT Cell 8M and Sequel II System we are developing, 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;
- grow our market share by marketing and selling our products to new and additional market segments;
- 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 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.

The risks noted above, especially with respect to the marketing, sales, and commercialization of our products (including into the markets that Roche would have addressed), may be heightened by the termination of our development, commercialization and license agreement with Roche, which became effective as of the first quarter of 2017. 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, our losses may be greater than expected and our operating results will suffer.

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 incurred net losses since inception and we cannot be certain if or when we will produce sufficient revenue from our operations to support our costs. While we achieved profitability for the quarter ended September 30, 2015, this result was largely due to a one-time gain on lease amendments. We have incurred net losses for all other fiscal

periods, and, 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.

We are not cash flow positive and may not have sufficient cash to fund our current and 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. 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 the new SMRT Cell 8M and Sequel II System. Our existing resources may not allow us to conduct all of these activities that we believe would be beneficial for our future growth. As a result, 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. In the event that we enter into collaborations or licensing arrangements to raise capital, we may be required to accept unfavorable terms. 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, 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 cease operations. Any of these actions could impede our ability to achieve our business objectives and could materially harm our operating results.

We have continued to experience losses and, if that trend continues, we may need to seek additional sources of financing for various purposes, including:

- expanding the commercialization of our products and launching new products, including the new SMRT Cell 8M and Sequel II System we are developing;
- funding our operations; and
- furthering our research and development.

Additional funds may not be available on terms acceptable to us or at all, particularly in light of restrictions under our debt agreement. We have incurred and may further incur additional debt. Debt holders have rights senior to common stockholders to make claims on our assets and the terms of our existing debt agreement restrict certain activities, including our ability to pay dividends on our common stock. 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 raise additional funds through the sale of our common stock, continued 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 may also be sold 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 existing holders more than if the market price for our common stock was higher.

If we are unable to successfully develop and timely manufacture our current and future products, including with respect to the Sequel System, the new SMRT Cell 8M and Sequel II System that we are developing 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 System, depends on a number of factors, including performance and reliability of the system, 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 the new SMRT Cell 8M and Sequel II System we are developing, 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, including with respect to the new SMRT Cell 8M we are developing. We have designed SMRT Cells and other consumables specifically for the Sequel System, and we are developing, and may need to develop in the future, other customized SMRT Cells and consumables for our future products, including the new SMRT Cell 8M we are developing for the Sequel II System. We have transferred production of the Sequel System SMRT Cells from a prototype chip vendor to a high-volume manufacturer. Our production of the SMRT Cells for the Sequel System has been and may in the future be below desired levels, and we have experienced and may experience in the future manufacturing delays, product or quality defects, SMRT Cell variability, and other issues, including unanticipated delays and other issues in connection with our transition to the high-volume manufacturer. 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 negatively impact our ability to

sell our products or result in other material adverse effects on our business, financial condition and results of operations.

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, we may be forced to delay product shipments or the scaling of manufacturing or supply. In particular, if the continued rollout of our current and future products, including with respect to the new SMRT Cell 8M and Sequel II System we are developing, 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 new SMRT Cell 8M and Sequel II System, could materially and adversely affect our business, financial condition and results of operations.

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 System. 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 with respect to the new SMRT Cell 8M and the Sequel II System we are developing. Our research and development efforts are complex and require us to incur substantial expenses. We may not be able to develop, manufacture and commercialize new products, obtain regulatory approval if necessary, or achieve an acceptable return, if any, on our research and development efforts and expenses. Furthermore, we need to continue to expand our internal capabilities or seek new partnerships or collaborations, or both, in order to successfully market, sell and commercialize our products in the markets we seek to reach.

We must successfully manage new product introductions and transitions, including with respect to the new SMRT Cell 8M and Sequel II System we are developing, we may incur significant costs during these transitions, and they 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 the benefits we anticipate from the development and commercialization of the Sequel System or our future products, including with respect to the new SMRT Cell 8M and Sequel II System we are developing and also those future products that may be developed for clinical uses, 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 the new SMRT Cell 8M and Sequel II System we are developing, 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 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. Further, 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 the 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 new SMRT Cell 8M and Sequel II System we are developing, our business, reputation and financial condition may be materially and adversely affected.

Our success is highly dependent on our ability to further penetrate the existing market for nucleic acid sequencing as well as the growth and expansion of the market 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 the overall market for nucleic acid sequencing technology is well-established, the market for our Single Molecule, Real-Time (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 the overall market 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 the growing overall sequencing market. 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 applications, including uses by academic, government and clinical laboratories, as well as pharmaceutical, diagnostic, biotechnology and agriculture companies, among others. For example, the sale and commercialization of the new SMRT Cell 8M and Sequel II System, and related products that we are developing, may not be successful.

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 new SMRT Cell 8M and Sequel II System we are developing. Our ability to further penetrate the existing market and any expansion of the market 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 have limited experience commercializing and selling products outside of the academic and research settings, and we cannot assure you that we can successfully acquire additional customers in additional markets. Furthermore, we cannot guarantee that our products will be satisfactory to potential customers in the markets we seek to reach or that our products will perform in accordance with customer expectations.

These markets 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 they will be receptive to any of our products. 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 markets 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, including with respect to the new SMRT Cell 8M and Sequel II System we are developing. 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 markets that we seek to reach, which we may be unable to do at the scale required to support our business.

If the market 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 would be materially harmed and our business may not succeed.

We rely on other companies for the manufacture of certain components and sub-assemblies and intend to outsource additional sub-assemblies in the future. 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 precision in 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. Furthermore, we have transferred production of the SMRT Cells for our Sequel System from a prototype chip vendor to a high-volume manufacturer and we have experienced, and may in the future experience, unanticipated delays and other issues in connection with such transition. 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 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 will 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 could be disrupted by conditions unrelated to our business or operations or that are beyond our control, including but not limited to international trade restrictions. 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. Our current manufacturing process is characterized by long lead times between the placement of orders for and delivery of our products. If we have received 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, our business could be materially harmed.

We may be unable to consistently manufacture our instruments and consumable kits, including SMRT Cells, 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 involves a long and complex manufacturing process, has been and may in the future be below desired levels, and we have experienced and may experience in the future manufacturing delays, product defects, variability in the performance of SMRT 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, may have a material adverse effect on our brand, business, financial condition, and operating results, and could result is 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, or that we will be successful in forecasting customer demand or manufacturing and supply costs. Furthermore, we may not be able to increase manufacturing to meet anticipated demand or may experience downtime in our manufacturing facilities. 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, financial condition and results of operations.

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

Our industry is characterized by rapid and significant technological changes, frequent new product introductions and enhancements and evolving industry standards. 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 market

opportunities. These new market opportunities may be outside the scope of our proven expertise or in areas where the market 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 new SMRT Cell 8M and Sequel II System we are developing, could diminish future demand for our products and materially harm our future operating results.

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 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 (with whom we have entered into a definitive agreement to be acquired), Thermo, ONT Ltd., Roche, and Qiagen. 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. In light of these advantages, even if our technology is more effective than the products or service offerings of these other companies, current and potential customers might purchase their products and/or services instead of our products.

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, ONT, Inc., has filed counterclaims against us in the U.S. District Court for the District of Delaware seeking declaratory judgements 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 the 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, financial condition or results of operations.

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 on our ability to attract customers for our current and future products, 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;
- 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.

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 impact our business operations.

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 year ended December 31, 2017 and December 31, 2018, one of our customers, Gene Company Limited, accounted for approximately 31% and 26% of our total revenue, respectively. Gene Company Limited is our distributor in China. 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 estimate. 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 be in the future, 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 harm our financial condition and results of operations.

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 indebtedness could adversely affect our financial condition and prevent us from fulfilling our obligations.

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

- make it more difficult for us to satisfy our obligations, including under our existing debt agreement;
- 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;
- require us to dedicate a substantial portion of our cash flow from operations to service payments on our indebtedness;
- 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 competitive disadvantage to other companies that offer nucleic acid sequencing equipment or consumables and that have less or no indebtedness; and

- limit, along with the financial and other restrictive covenants in our indebtedness, among other things, our ability to borrow additional funds.

Our existing debt contains covenants which may adversely impact our business and our failure to comply with such covenants could cause our outstanding indebtedness to become immediately payable.

Our existing debt contains various affirmative and negative covenants, including restrictions on our and our subsidiaries' ability to incur additional indebtedness or liens on our assets. These covenants impose significant operating and financial restrictions on us, including restrictions on our ability to take certain actions that may be in our best interests.

A breach of any of the covenants contained in our debt could result in an event of default. If an event of default exists, debt holders could elect to declare all amounts outstanding under the debt to be immediately due and payable. If we are unable to repay our indebtedness when due and payable, debt holders could proceed against the collateral granted to them to secure such indebtedness. We have pledged substantially all of our property and interests in property, including our intellectual property, as collateral under our existing

debt. If the debt holders accelerate the repayment of our indebtedness, we may not have sufficient funds to make such repayment, which could have a material adverse effect on our liquidity and ability to conduct our business.

In addition, at the election of the holders representing a majority of the aggregate principal amount of the outstanding notes issued pursuant to our existing debt agreement, the holders may elect to receive 25% of the net proceeds from any financing that includes an equity component, including, without limitation, the sale or issuance of our common stock, options, warrants or other securities convertible or exchangeable for shares of our common stock, as partial payment of the notes. This right is subject to certain exceptions set forth in our existing debt agreement. To the extent we raise additional capital in the future through the sale of common stock under any future "at-the-market" offering, underwritten offering or through other financing activities, we may be obligated, at the election of the holders of the notes, to pay 25% of the net proceeds from any such financing activities as partial payment of the notes.

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 technology are highly complex and may develop or contain undetected defects or errors. Our customers have experienced and may continue to experience reliability issues with our existing and future products, including the Sequel System. Despite 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, diversion of development resources, injury to our reputation and increased warranty, service and maintenance costs. New products, including the new SMRT Cell 8M and Sequel II System we are developing, or enhancements to our existing products 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 generally ship our sequencing instruments with one year of service included in the purchase price with an option to purchase one or more additional years of service. We also provide a warranty for our consumables, which is generally limited to replacing, or at our option, giving credit for any consumable with defects in material or workmanship. 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 who 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 serious adverse effect on our business, financial condition and results of operations.

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 and other personnel, our ability to maintain and develop 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 can 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. 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. The loss of any of these individuals or any inability to attract or retain qualified personnel, including scientists, engineers 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.

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. 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 and policies regarding capital expenditures during economically uncertain periods. 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 harm our future operating results.

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 and 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. 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.

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 and acceptance 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.

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. We have expanded and are continuing to expand the international jurisdictions into which we supply products, which increase the risks surrounding governmental regulations relating to our business. The 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 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 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 regulation by the U.S. Food and Drug Administration or other domestic and international regulatory agencies, 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 not currently subject to U.S. Food and Drug Administration ("FDA") clearance or approval since they are not intended for use in the diagnosis or treatment of disease. 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. Even where a product is exempted from FDA clearance or approval, the FDA may impose restrictions as to the types of customers to which we or our partners can market and sell our products. Such regulation and restrictions may materially and adversely affect our business, financial condition and results of operations. 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.

Many countries have laws and regulations that could affect our products, such as 510(k) clearances, premarket approvals or CE Mark requirements, and failure to adhere to applicable statutory or regulatory requirements by us or our business partners would have a material adverse effect on our operations and financial condition. 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. 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.

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., especially the Asia-Pacific region. We sell directly and through distribution partners throughout Europe, the Asia-Pacific region, Mexico, 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:

- 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;
- restriction on 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, reexportation, 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 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 recently implemented tariffs and additional tariff that have been proposed by the U.S. government on various imports from China, Canada, Mexico and the EU 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 Canada, the U.K. and the EU, 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 referendum held in the United Kingdom approving the separation of the United Kingdom as a member of the European Union;
- 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;
- potential increases on tariffs or restrictions on trade generally; and
- significant taxes or other burdens of complying with a variety of foreign laws, including laws relating to privacy and data protection such as the EU General Data Protection Regulation (GDPR) which took effect in the European Union 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.

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 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.

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 U.S., especially the Asia-Pacific region. 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. The current U.S. presidential administration has called for substantial changes to U.S. foreign trade policy with respect to China and other countries, including the possibility of imposing greater restrictions on international trade and significant increases in tariffs on goods imported into the United States. In September 2018, the U.S. Trade Representative (the "USTR") enacted a tariff on the import of other Chinese products, including non-U.S. components and materials that may be used in our products, with a combined import value of approximately $200 billion. The tariff became effective on September 24, 2018, with an initial rate of 10% and is expected to increase to 25%. These tariffs may raise our cost of goods. 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. Additionally, the current U.S. presidential administration continues to signal that it may alter trade agreements and terms between China and the United States, including limiting trade with China, and may impose additional tariffs on imports from China. Therefore, it is possible further tariffs may be imposed that could cover imports of 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. Further, the continued threats of tariffs, trade restrictions and trade barriers could have a generally disruptive impact on the global 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 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.

Additionally, 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. Therefore, it is possible that our ability to export our products may be restricted in the future.

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.

Our sales cycle is 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 cycle for our sequencing instruments is 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 the periods in which our sales volume is low. Factors that may cause fluctuations in our quarterly or operating results include, without limitation, market acceptance for our products; our ability to attract new customers; publications of studies by us, 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 effects of seasonality; the regulatory environment; expenses associated with warranty costs 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. 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, and a potential customer may require an extended evaluation and testing period. 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, in the event that a sale is not completed 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. Furthermore, because of our lengthy sales cycle, the realization of revenue from our selling efforts 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.

Seasonality may cause fluctuations in our revenue and results of operations.

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 the lengthy sales cycle 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 cycles 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 forfeit, or future budgets that may be reduced, if such funds remain unspent at such fiscal year-end. Furthermore, celebrations of the Lunar New Year, which occurs during our first quarter, may last for a week or longer, during which time many of our customers’ offices in China and elsewhere in the Asia-Pacific region may be closed due to the holiday, and have in the past caused, and may in the future cause, decreased sales of our consumables during such quarter. These factors have contributed, and may contribute in the future, to substantial fluctuations in our quarterly operating results. Because of these fluctuations, 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 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 become in the future, 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.

If we fail to comply with healthcare and other governmental regulations, we could face substantial penalties and our business, results of operations and financial condition could be adversely affected.

The products that we may develop for clinical uses may be highly regulated, and there can be no assurance that the regulatory environment in which we would operate will not change significantly and adversely in the future. Any arrangements with physicians, hospitals and clinics may expose us to broadly applicable fraud and abuse and other laws and regulations that may restrict the financial arrangements and relationships through which we market, sell and distribute our products and services. Our employees, consultants, and commercial partners may engage in misconduct or other improper activities, including non-compliance with regulatory standards and requirements. Federal and state healthcare and other laws and regulations that may affect our ability to conduct business, include, without limitation:

- federal and state laws and regulations regarding billing and claims payment applicable to products that we may develop for clinical uses, and regulatory agencies enforcing those laws and regulations;
- the federal Anti-Kickback Statute, which prohibits, among other things, any person from knowingly and willfully offering, soliciting, receiving or providing remuneration, directly or indirectly, in exchange for or to induce either the referral of an individual for, or the purchase, order or recommendation of, any good or service for which payment may be made under federal healthcare programs;
- the federal False Claims Act, which prohibits, among other things, individuals or entities from knowingly presenting, or causing to be presented, false claims, or knowingly using false statements, to obtain payment from the federal government;
- federal criminal laws that prohibit executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters;
- the FCPA, the U.K. Bribery Act of 2010, and other local anti-corruption laws that apply to our international activities;
- the federal Physician Payment Sunshine Act, or Open Payments, created under the Affordable Care Act, and its implementing regulations, which requires manufacturers of drugs, medical devices, biologicals and medical supplies for which payment is available under Medicare, Medicaid, or the Children's Health Insurance Program to report annually to the U.S. Department of Health and Human Services, or HHS, information related to payments or other transfers of value made to licensed physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members;
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act, and its implementing regulations, and other laws and regulations relating to privacy and data protection including the European Union's new GDPR, which impose certain requirements relating to the privacy, security and transmission of individually identifiable health information; HIPAA also created criminal liability for knowingly and willfully falsifying or concealing a material fact or making a materially false statement in connection with the delivery of or payment for healthcare benefits, items or services;
- the federal physician self-referral prohibition, commonly known as the Stark Law; and
- state law equivalents of each of the above federal laws, such as anti-kickback and false claims laws which may apply to items or services reimbursed by any third-party payor, including commercial insurers, and state and foreign laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

The Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act, or Affordable Care Act, was enacted in 2010. The Affordable Care Act, among other things, amends the intent requirement of the federal Anti-Kickback Statute and criminal healthcare fraud statutes. A person or entity no longer needs to have actual knowledge of this statute or specific intent to violate it. In addition, the Affordable Care Act provides that the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act.

Because of the breadth of these laws and the narrowness of available statutory and regulatory exemptions, it is possible that some of our activities could be subject to challenge under one or more of such laws. Any action brought against us for violations of these laws or regulations, even successfully defended, could cause us to incur significant legal expenses and divert our management's attention from the operation of our business. We may be subject to private "qui tam" actions brought by individual whistleblowers on behalf of the federal or state governments, with potential liability under the federal False Claims Act including mandatory treble damages and significant per-claim penalties.

The growth of our business and sales organization and our expansion outside of the United States may increase the potential of violating these laws. The risk of our being found in violation of these or other laws and regulations is further increased by the fact that

many have not been fully interpreted by the regulatory authorities or the courts, and their provisions are open to a variety of interpretations. Any action brought against us for violation of these or other laws or regulations, even if we successfully defend against it, could cause us to incur significant legal expenses and divert our management's attention from the operation of our business. If our operations are found to be in violation of any of the federal, state and foreign laws described above or any other current or future fraud and abuse or other healthcare laws and regulations that apply to us, we may be subject to penalties, including significant criminal, civil, and administrative penalties, damages, fines, imprisonment, for individuals, exclusion from participation in government programs, such as Medicare and Medicaid, and we could be required to curtail or cease certain of our operations. Any of the foregoing consequences could seriously harm our business and our financial results.

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 accounting principles generally accepted in the United States, or 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.

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, 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 under Section 382. We may not be able to utilize a material portion of our NOLs even if we attain profitability. Furthermore, the changes to deductions, credits and expense recognition resulting from the Tax Cuts and Jobs Act of 2018 enacted on December 22, 2017 have materially impacted the value of our deferred tax assets and liabilities, and could adversely affect our future taxable income and effective tax rate.

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.

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 the San Francisco Bay Area 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.

Ethical, legal, privacy 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 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. Such concerns or governmental restrictions could limit the use of our products, which could have a material adverse effect on our business, financial condition and results of operations.

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 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. IT systems may be vulnerable to damage from a variety of sources, including telecommunications or network failures, power loss, natural disasters, human acts, computer viruses, computer denial-of-service attacks, unauthorized access to customer or employee data or company trade secrets, and other attempts to harm our systems. 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, we could be subject to transaction errors, processing inefficiencies, loss of customers, business disruptions or loss of or damage to intellectual property through security breach. 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.

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 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, unauthorized access attempts, and cyber- or phishing-attacks, or breached due to employee error, malfeasance, faulty password management or other disruptions. Third parties may attempt to fraudulently induce employees or other persons into disclosing user names, 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 could compromise our networks and the information stored there could be accessed, publicly disclosed, lost or stolen. Any such access, disclosure or other loss of information could result in legal claims or proceedings, liability under laws that protect the privacy of personal information, disruption of our operations and damage to our reputation, 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 protective measures to reduce the risk of potential security breaches, which could cause us to incur significant additional expenses.

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 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. Reputational harm could materially and adversely affect our business, financial condition or results of operations.

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.

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.

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 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. 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 could subject us to claims of intellectual property infringement. 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 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 assure you 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. 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 our agreement 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.

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 and 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 has requested that the U.S. Patent and Trademark Office institute inter partes reviews of certain patents that we have asserted against ONT and ONT Ltd. in litigation proceedings for patent infringement. Additionally, as a result of these challenges, our patents or pending patent applications may be determined to be unpatentable to us, invalidated or unenforceable in whole or in part. Accordingly, adverse rulings in these proceedings may negatively impact the scope of our intellectual property protection for our products and technology, and may materially and adversely affect our business.

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.

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 are involved in legal proceedings for patent infringement and related matters with ONT in the United States, and we were previously involved in other legal proceedings with ONT and Harvard University in several United States and European jurisdictions. We have received adverse rulings against us with respect to our complaint with the USITC in 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 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 that could prevent us from selling any products found to be infringing the intellectual property rights of another party.

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, ONT Ltd. and Harvard University previously filed claims against us in the High Court of England and Wales and the District Court of Mannheim, Germany for patent infringement. We are aware of other issued patents and patent applications owned by third parties that could be construed to read on our products and 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 develop further, commercialize, or sell 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, 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 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 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.

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 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; and
- general economic and market conditions.

If any of the forgoing 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 that 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.

Future sales of our common stock could cause our stock price to fall.

We maintain a shelf registration statement on Form S-3 with the SEC pursuant to which we may, from time to time, sell up to an aggregate of $150 million of our common stock, preferred stock, depositary shares, warrants, debt securities or units. We have sold, and plan in the future to sell, shares of our common stock in underwritten offerings and have established, and may in the future establish, "at-the-market" offering programs pursuant to which we may offer and sell shares of our common stock. Sales of securities have resulted and will continue to result in dilution of our existing stockholders, and such sales could cause our stock price to fall.

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. We may also issue shares of common stock or securities convertible into our common stock from time to time in connection with financings, acquisitions, investments or otherwise. Any such issuance would result in dilution to our existing stockholders and could cause our stock price to fall.

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. As a result, these stockholders 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 certificate of incorporation and bylaws, as amended and restated, 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 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;
- specify that special meetings of our stockholders can be called only by our board of directors, the Chairman of the Board, the Chief Executive Officer or the President;
- establish an advance notice procedure 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.

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 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. In addition, the terms of our existing debt agreement restrict our ability to pay dividends on our common stock. 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.

ITEM 1B.UNRESOLVED STAFF COMMENTS

None.

ITEM 2.PROPERTIES

As of December 31, 2018, we lease approximately 180,000 square feet in Menlo Park, California, where we house our headquarters, research and development, service and support functions, and our in-house manufacturing operations. We also lease a sales office facility in Singapore, and engineering support facilities in Allen, Texas.

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.

ITEM 3.LEGAL PROCEEDINGS

Legal Proceedings Regarding the Merger

In connection with the proposed acquisition of us by Illumina, five lawsuits were filed, with each lawsuit naming us and our directors as defendants. Three putative class action complaints, captioned Wang v. Pacific Biosciences of California, Inc., et al., No. 3:18-cv-7450 (N.D. Cal.), Morrison v. Pacific Biosciences of California, Inc., et al., No. 3:18-cv-7654 (N.D. Cal.), and Speiser v. Pacific Biosciences of California, Inc., et al., No. 3:19-cv-0072 (N.D. Cal.), were filed in the United States District Court for the Northern District of California on December 11, 2018, December 20, 2018, and January 4, 2019, respectively. A fourth putative class action complaint, captioned Rosenblatt v. Pacific Biosciences of California, Inc., et al., No. 1:18-cv-2005 (D. Del.), was filed in the United States District Court for the District of Delaware on December 18, 2018. An individual complaint, captioned Washington v. Pacific Biosciences of California, Inc., et al., No. 5:18-cv-7614 (N.D. Cal.), was filed in the United States District Court for the Northern District of California on December 19, 2018. Each of the lawsuits asserted claims under Section 14(a) and Section 20(a) of the Securities Exchange Act of 1934 in connection with the disclosures contained in our preliminary proxy statement on Schedule 14A, filed with the Securities Exchange Commission (the “SEC”) on December 5, 2018, our definitive proxy statement on Schedule 14A, filed with the SEC on December 18, 2018, or both. The complaints sought a variety of equitable and injunctive relief including, among other things, enjoining the consummation of the acquisition and awarding the plaintiffs costs and attorneys’ fees.

Although we believed that the claims were without merit, we agreed to make supplemental disclosures in exchange for plaintiffs’ agreement that the supplemental disclosures would moot their claims. We made these supplemental disclosures in a proxy statement amendment on Schedule 14A, filed with the SEC on January 18, 2019.

On January 29, 2019, all parties to each of the lawsuits reached an agreement pursuant to which we would pay a total of $300,000 in attorneys’ fees to the plaintiffs. On January 29, 2019, each plaintiff filed a voluntary dismissal of his or her lawsuit.

USITC Proceedings

On November 2, 2016, we filed a complaint against ONT Ltd., ONT Inc. and Metrichor, Ltd. ("Metrichor" and, together with ONT Ltd. and ONT Inc., "ONT") with the U.S. International Trade Commission ("USITC") for patent infringement. On December 5, 2016, the USITC provided notice that an investigation had been instituted based on the complaint. We sought exclusionary relief with respect to several ONT products, including ONT's MinION and PromethION devices. The complaint was based on our U.S. Patent No. 9,404,146, entitled "Compositions and methods for nucleic acid sequencing" which covers novel methods for sequencing single nucleic acid molecules using linked double-stranded nucleic acid templates, providing improved sequencing accuracy. On March 1, 2017, we filed an amended complaint to add a second patent in the same patent family, U.S. Patent No. 9,542,527, which was granted on January 10, 2017, to the investigation. We sought, among other things, an exclusion order permanently barring entry of infringing ONT products into the United States, and a cease and desist order preventing ONT from advertising and selling infringing products in the United States. On May 23, 2017, the Administrative Law Judge ("ALJ") assigned to the matter issued an order construing certain claim terms of the asserted patents. On June 8, 2017, ONT filed a summary determination motion to terminate the proceedings based on the ALJ's claim construction decision, and we did not oppose the motion. The ALJ granted the motion on July 19, 2017, and, on July 31, 2017, we filed a petition to review with the USITC to correct what we believe was an incorrect construction of the claims. On September 5, 2017, the USITC issued a notice granting our petition to review the ALJ's claim construction decision. On February 7, 2018, the USITC issued a notice indicating that it had determined to adopt the ALJ's claim construction and terminating the investigation. On February 13, 2018, we filed a petition to appeal the USITC's ruling to the U.S. Court of Appeals for the Federal Circuit ("Federal Circuit"). An oral hearing for this appeal was held on February 8, 2019. On February 12, 2019, the Federal Circuit filed a judgement affirming the USITC claim construction under Federal Circuit Rule 36 without a written opinion.

U.S. District Court Proceedings

On March 15, 2017, we filed a complaint in the U.S. District Court for the District of Delaware against ONT Inc. for patent infringement (C.A. No. 17-cv-275 ("275 Action")). The complaint is based on our U.S. Patent No. 9,546,400 (the "'400 Patent"), entitled

“Nanopore sequencing using n-mers” which covers novel methods for nanopore sequencing of nucleic acid molecules using the signals from multiple monomeric units. This patent was granted on January 17, 2017. We are seeking remedies including injunctive relief, damages and costs. On May 8, 2017, the defendants filed a motion to dismiss the complaint, alleging that the asserted patent claims recite patent ineligible subject matter. On November 9, 2017, the judge denied ONT Inc.’s motion to dismiss. On June 1, 2018, we filed a motion for leave to amend the complaint to add ONT Ltd. as a defendant. On August 20, 2018, the judge granted our motion, and on August 23, 2018, we filed an amended complaint, adding ONT Ltd. as a defendant in the 275 Action. On September 24, 2018, ONT Ltd. filed a motion to dismiss the amended complaint, alleging failure to state a claim.

On September 12, 2018, ONT Inc. filed its answer, defenses and counterclaims in the 275 Action, seeking declaratory judgements of non-infringement and invalidity of the ’400 Patent and unenforceability of the ’400 Patent based on alleged inequitable conduct before the U.S. Patent and Trademark Office (“USPTO”), as well as antitrust, false advertising, and unfair competition counterclaims. On September 25, 2018, it was stipulated that the motion to dismiss ONT Inc.’s counterclaims that we submitted in the 1353 Action would also serve as our motion to dismiss ONT Inc.’s counterclaims in the 275 Action.

Related to the 275 Action, on March 15, 2018, ONT Inc. filed a petition to institute an inter partes review with the Patent Trial and Appeal Board (“PTAB”) of the USPTO, alleging invalidity of the ’400 Patent. On July 5, 2018, we filed a preliminary response outlining for the PTAB why the petition should be denied, and no review should be instituted. On September 25, 2018, the PTAB denied ONT Inc.’s petition for institution of the inter partes review for all claims of the ’400 Patent.

On September 25, 2017, we filed a second complaint in the U.S. District Court for the District of Delaware against ONT Inc. for patent infringement (C.A. No. 17-cv-1353 (“1353 Action”)). The complaint is based on our U.S. Patent No. 9,678,056 (the “’056 Patent”) entitled “Control of Enzyme Translation in Nanopore Sequencing”, granted June 13, 2017, and U.S. Patent No. 9,738,929 (the “’929 Patent”) entitled “Nucleic Acid Sequence Analysis”, granted August 22, 2017. We are seeking remedies including injunctive relief, damages and costs. On December 14, 2017, the defendants filed a motion to dismiss the complaint, alleging that the asserted patent claims in the ’929 Patent recite patent ineligible subject matter. On March 22, 2018, the judge denied ONT Inc.’s motion to dismiss. On March 28, 2018, we added a claim for infringement of our U.S. Patent No. 9,772,323 (the “’323 Patent”), entitled “Nanopore sequencing using n-mers.” On June 1, 2018, we filed a motion for leave to amend the complaint to add ONT Ltd. as a defendant. On August 20, 2018, the judge granted our motion, and on August 23, 2018 we filed an amended complaint, adding ONT Ltd. as a defendant in the 1353 Action. On September 24, 2018, ONT filed a motion to dismiss the amended complaint, alleging failure to state a claim.

On April 25, 2018, ONT Inc. filed its answer, defenses and counterclaims in the 1353 Action, seeking declaratory judgements of non-infringement and invalidity of the ’056 and ’323 Patents and unenforceability of the ’056 and ’323 Patents based on alleged inequitable conduct before the USPTO, as well as antitrust, false advertising, and unfair competition counterclaims. On June 15, 2018, we filed a motion to dismiss ONT Inc.’s counterclaims in the 1353 Action and, on June 18, 2018, we filed a motion to bifurcate and stay discovery on ONT Inc.’s antitrust counterclaims in the 1353 Action. On February 19, 2019, the judge granted our motion to dismiss ONT’s antitrust, false advertising, and unfair competition counterclaims.

Related to the 1353 Action, on September 24, 2108, ONT Inc. filed a first petition to institute an inter partes review with the PTAB of the USPTO, alleging invalidity of the ’929 Patent. On September 25, 2018, ONT filed a second petition to institute an inter partes review of the ’929 Patent based on the same art and arguments as the first petition. ONT Inc. subsequently filed a motion to withdraw the first petition, which motion was granted. On January 11, 2019, we filed a preliminary response to the second petition outlining for the PTAB why the petition should be denied, and no review should be instituted.

Also related to the 1353 Action, on September 25, 2018, ONT Inc. filed a petition to institute an inter partes review with the PTAB of the USPTO, alleging invalidity of the ’056 Patent. On February 13, 2019, we filed a preliminary response to the second petition outlining for the PTAB why the petition should be denied and no review should be instituted.

A claim construction (or “Markman”) hearing for the U.S. District Court matters was held on December 17, 2018. A trial for the U.S. District Court matters is scheduled to occur in March 2020.

UK and German Court Proceedings

On February 2, 2017, we filed a claim in the High Court of England and Wales against ONT Ltd. and Metrichor for infringement of Patent EP(UK) 3 045 542 (the “’542 Patent”), which is in the same patent family as the patents asserted in the USITC action referred to above. We sought remedies including injunctive relief, damages, and costs. On March 27, 2017, the defendants in the case filed their defense and counterclaim, denying infringement and seeking a declaration that the asserted patent is invalid. We filed our reply and defense to counterclaim on April 12, 2017. A case management conference was held on June 13, 2017. On August 31, 2017 we added a claim for infringement of a newly granted divisional, EP(UK) 3 170 904 (the “’904 Patent”). On December 22, 2017, ONT Ltd. added to the action a request for declaration of non-infringement of its 1D2 product. On January 12, 2018 we served reply to ONT Ltd.’s request for a declaration of non-infringement, asserting infringement of both patents by ONT’s 1D2 product. A trial for these matters was scheduled to occur in May 2018.

On April 21, 2017, ONT Ltd. and Harvard University filed a claim against us in the High Court of England and Wales for infringement of Patent EP(UK) 1 192 453 (the “’453 Patent”), a patent owned by Harvard University and entitled “Molecular and atomic scale evaluation of biopolymers,” and for which ONT Ltd. alleges it holds an exclusive license. ONT Ltd. and Harvard University sought remedies including injunctive relief, damages, and costs. On April 25, 2017, ONT Ltd. announced that it also had filed a claim against us in the District Court of Mannheim, Germany, for infringement of the German version of the patent. On November 2, 2017, we filed our

statement of defense in the German infringement matter and we also filed a separate nullity action in Germany to establish that the ’453 Patent is invalid. On December 6, 2017, we filed a cross-complaint in the German infringement matter alleging ONT Ltd.’s infringement in Germany of our ’542 Patent. The trial date for the German infringement matter and cross-complaint was set for July 27, 2018. A trial for the UK matter was scheduled to occur in March 2019.

On May 8, 2018, the parties entered a settlement of all UK and German court proceedings pending as of such date. Under the terms of the settlement, ONT agreed not to make, dispose of, use or import any “2D” nanopore sequencing products, or to induce or assist others to carry out a “2D” sequencing process, in the UK or Germany, through the end of 2023. During this time, we agreed not to assert the ’542 Patent and ’904 Patent against either ONT or its customers in the UK or Germany. Accordingly, the High Court of England and Wales entered an order staying our UK action against ONT through the end of 2023. As part of the settlement, ONT and Harvard University dismissed their UK and German actions under the ’453 Patent and agreed not to assert the ’453 Patent against us or our customers through the end of 2023. We correspondingly agreed to dismiss our separate German nullity action seeking to invalidate the ’453 Patent, which expires on June 22, 2020.

Related to these proceedings, on August 15, 2017, ONT Ltd. filed a notice of opposition to our ’542 Patent with the European Patent Office, and on August 16, 2017, an anonymous party filed a second notice of opposition to the same patent, each alleging invalidity of the patent. On April 5, 2018, we filed our response to the combined opposition. On January 22, 2019, an oral hearing in the matter occurred and the European Patent Office rendered a decision in favor of the opponents. We believe the European Patent Office erred in its decision, which we intend to appeal. The ’542 Patent will remain in effect while the appeal is pending. Furthermore, our settlement agreement with ONT Ltd. and Harvard University remains in effect.

Also related to these proceedings, on May 16, 2018, ONT Ltd. filed a notice of opposition to our ’904 Patent with the European Patent Office alleging invalidity of the ’904 Patent. On October 11, 2018, we filed our response to the opposition. An oral hearing in the matter is scheduled for July 16, 2019.

Litigation is inherently unpredictable, and it is too early in the proceedings to predict the outcome of these lawsuits or any impact they may have on us. As such, the estimated financial effect associated with these complaints cannot be made as of the date of filing of this Annual Report on Form 10-K. Litigation is a significant ongoing expense with an uncertain outcome, and has been in the past and may in the future be a material expense for us. Management believes this investment is important to protect our intellectual property position, even recognizing the uncertainty of the outcome.

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." The following table sets forth the high and low sales prices per share for our common stock for the indicated fiscal periods:

	2018		2017	
	High	Low	High	Low
4th Quarter	$ 7.84	$ 3.90	$ 5.58	$ 2.51
3rd Quarter	5.82	3.33	5.70	3.08
2nd Quarter	4.09	2.02	5.43	3.11
1st Quarter	3.43	2.03	5.74	3.78

Holders of Record

As of January 31, 2019, there were approximately 39 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. In addition, our ability to pay dividends is limited pursuant to covenants in our debt agreements.

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, 2013 through December 31, 2018 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.

	12/2013	12/2014	12/2015	12/2016	12/2017	12/2018
Pacific Biosciences of California, Inc.	$ 100.00	$ 149.90	$ 251.05	$ 72.66	$ 50.48	$ 141.49
NASDAQ Composite Index	100.00	114.62	122.81	133.19	172.11	165.84
NASDAQ Biotechnology Index	100.00	131.71	140.56	112.25	133.67	121.24

Recent Sales of Unregistered Securities

None.

Use of Proceeds

“At-the-Market” Offering

On February 2, 2017, we filed a prospectus supplement pursuant to which we could offer and sell, from time to time, additional shares of our common stock having an aggregate offering price of up to $60.0 million under the sales agreement for our “at-the-market” offering.

During the six-month period ended June 30, 2017 we issued 3.2 million shares of our common stock at an average price of $3.86 per share through our “at-the-market” offering, resulting in net proceeds of $11.9 million. We terminated our “at-the-market” offering program in June 2017. We paid a commission equal to 3% of the gross proceeds from the sale of shares of our common stock through the “at-the-market” offering program under the sales agreement.

Underwritten Public Equity Offerings

In August 2017, we filed a shelf registration statement on Form S-3 with the SEC pursuant to which we may, from time to time, sell up to an aggregate of $150.0 million of our common stock, preferred stock, depository shares, warrants, units or debt securities. On August 18, 2017, the registration statement was declared effective by the SEC, which allows us to access the capital markets for the three-year period following this effective date.

For the year ended December 31, 2017, we issued and sold a total of 17.7 million shares of our common stock at a price to the public of $3.10 per share in an underwritten public offering. The total net proceeds to us from the offering, after deducting the underwriting commission and offering expenses, were approximately $52.5 million.

For the year ended December 31, 2018, we issued 30.6 million shares of our common stock through our two underwritten public offerings with a weighted average offering price of $3.38. The total net proceeds to us from the two offerings, after deducting the underwriting commission and offering expenses, were approximately $97.5 million.

ITEM 6. SELECTED FINANCIAL DATA

Our historical results are not necessarily indicative of the results to be expected for any future period. The following selected financial data should be read in conjunction with “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and our consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K.

	Year Ended December 31,				
	2018	2017	2016	2015	2014
	(in thousands except per share amounts)				
Total revenue (1)	$ 78,626	$ 93,468	$ 90,714	$ 92,782	$ 60,594
Total cost of revenue	53,530	58,809	46,554	39,332	37,192
Gross profit	25,096	34,659	44,160	53,450	23,402
Gain on lease amendments (2)	—	—	—	(23,043)	—
Total operating expense	126,083	124,443	115,404	82,584	86,256
Operating loss	(100,987)	(89,784)	(71,244)	(29,134)	(62,854)
Net loss	$ (102,562)	$ (92,189)	$ (74,375)	$ (31,696)	$ (66,160)
Net loss per share:					
Basic and diluted net loss per share	$ (0.76)	$ (0.87)	$ (0.83)	$ (0.42)	$ (0.94)
Shares used in computing basic and diluted net loss per share (3)	135,094	105,682	89,148	75,614	70,475

	As of December 31,				
	2018	2017	2016	2015	2014
	(in thousands)				
Cash, cash equivalents and investments	$ 102,354	$ 62,872	$ 71,978	$ 82,270	$ 101,348
Working capital	104,775	72,984	75,237	72,363	86,271
Total assets	170,275	144,084	137,884	131,107	124,390
Total liabilities	56,214	57,981	53,216	57,567	69,441
Total stockholders' equity	$ 114,061	$ 86,103	$ 84,668	$ 73,540	$ 54,949

(1)

During 2013, we entered into the Roche Agreement and received a non-refundable up-front payment of $35.0 million. Revenue for the year ended December 31, 2014 consists of four quarterly periods of recognition of $1.7 million from the non-refundable up-front payment of $35.0 million. Revenue for the year ended December 31, 2015 consists of four quarterly periods of amortization of $3.6 million, reflecting the increased certainty of the development time period. Revenue for the year ended December 31, 2016 included amortization of $3.6 million of the upfront Roche payment for each of the first three quarters of 2016, plus amortization of $1.3 million for the fourth quarter of 2016 upon our receipt of notice on December 2016 that Roche had elected to terminate the Roche Agreement, which became effective on February 10, 2017. In addition, we achieved the first development milestone under the Roche Agreement and recorded the related $10.0 million as contractual revenue during the year ended December 31, 2014. We achieved the second and third (final) development milestones under the Roche Agreement and recognized the related $10.0 million and $20.0 million, respectively, as contractual revenue during the year ended December 31, 2015. Please see “Note 3. Contractual Revenue” in Part II, Item 8 of this Annual Report on Form 10-K for additional information.

(2) Comprised of one-time gain of $23.0 million associated with the lease amendment agreements with our prior landlord, which amended the terms and conditions of certain of our existing Menlo Park facility real property leases. Please see “Note 7. Commitments and Contingencies” in Part II, Item 8 of this Annual Report on Form 10-K for additional information.

(3) From 2012 to 2017, we established various "at-the-market" offerings pursuant to which we could offer and sell shares of our common stock. Our first sales through our "at-the-market" offering occurred in 2013 and as of December 31, 2017, we have sold a total of 27.8 million shares of our common stock at an average price of $5.83, for total net proceeds of $157.1 million. We terminated "at-the-market" offering in June 2017. Subsequently, in June 2017, we issued and sold a total of 17.7 million shares of our common stock at a price to the public of $3.10 per share in an underwritten public offering. We paid a commission equal to 4% of the gross proceeds from the sale of shares of our common stock under the underwriting agreement. The total net proceeds to us from the offering, after deducting the underwriting commission and offering expenses, were approximately $52.5 million. Additionally, for the year ended December 31, 2018, we issued 30.6 million shares of our common stock through our two underwritten public offerings with a weighted average offering price of $3.38 per share. The total net proceeds to us from the two offerings, after deducting the underwriting commission and offering expenses, were approximately $97.5 million. Please see "Note 9. Stockholders' Equity" in Part II, Item 8 of this Annual Report on Form 10-K for additional information.

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.

Merger with Illumina, Inc.

On November 1, 2018, we entered into an Agreement and Plan of Merger with Illumina, Inc. ("Illumina") and FC Ops Corp., a wholly-owned subsidiary of Illumina (the "Merger Agreement") pursuant to which Illumina will acquire us for $8.00 per share of our common stock in an all-cash transaction and FC Ops Corp. will be merged with and into us (the "Merger"), with us surviving the Merger and becoming a wholly-owned subsidiary of Illumina. Completion of the transaction is subject to terms and conditions set forth in the Merger Agreement, including expiration or termination of any waiting periods applicable to the consummation of the Merger under the United States Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, and clearance under the antitrust laws of certain non-United States jurisdictions. At a Special Meeting of Stockholders held on January 24, 2019, our stockholders, among other things, approved the adoption of the Merger Agreement. We and Illumina have each received a request for additional information and documentary material, commonly referred to as a "second request," from the United States Federal Trade Commission (the "FTC") in connection with the Merger. The FTC's "second request" has the effect of extending the waiting period applicable to the consummation of the Merger until the 30th day after substantial compliance by us and Illumina with the "second request," unless the waiting period is extended voluntarily by the parties or terminated sooner by the FTC. The parties have entered into a timing agreement with the FTC that extends the waiting period of the "second request" to mid-2019. We and Illumina continue to expect the Merger to be completed in mid-2019, at which time we will become a wholly-owned subsidiary of Illumina and will cease to be a publicly-traded company. No assurance can be given that the required regulatory approvals will be obtained or that the required conditions to closing will be satisfied, and, even if all such approvals are obtained and the conditions are satisfied, no assurance can be given as to the terms, conditions and timing of the approvals. For more information about the effects of our agreement to be acquired by Illumina please see Item 1A Risk Factors under the section "Risks Related to Our Business".

Overview

We design, develop and manufacture sequencing systems to help scientists resolve genetically complex problems. Based on our novel Single Molecule, Real-Time (SMRT®) sequencing technology, our products enable: de novo genome assembly to finish genomes in order to more fully identify, annotate and decipher genomic structures; full-length transcript analysis to improve annotations in reference genomes, characterize alternatively spliced isoforms in important gene families, and find novel genes; targeted sequencing to more comprehensively characterize genetic variations; and real-time kinetic information for epigenome characterization. Our technology provides high accuracy, ultra-long reads, uniform coverage and the ability to simultaneously detect epigenetic changes. PacBio® sequencing systems, including consumables and software, provide a simple and fast end-to-end workflow for SMRT sequencing.

Our current products include the Sequel instrument and the Sequel SMRT Cell 1M, which together are capable of sequencing up to approximately one million DNA molecules simultaneously. We are continuously developing new

products including the SMRT Cell 8M, which is designed to have up to eight times as much throughput capability as the current Sequel SMRT Cell 1M. We commenced our Early Access Program for the SMRT® Cell 8M chip and platform, the Sequel® II System, in January 2019 and the five Early Access sites selected have installed and operated their Sequel II Systems. Based on the early performance of the Sequel II Systems at these sites, we expect to begin commercial shipments of Sequel II Systems and SMRT Cell 8M products in the early part of the second quarter of 2019.

Product Developments.

In September 2015, we launched a new DNA sequencing platform, the PacBio Sequel® System (the “Sequel System”), which provides higher throughput, more scalability, a reduced footprint and lower sequencing project costs compared to the PacBio® RS II System, while maintaining the existing benefits of our SMRT Sequencing Technology. We concurrently began phasing out production of PacBio RS II instruments.

Cash Position

Cash, cash equivalents and investments, excluding restricted cash, at December 31, 2018 totaled $102.4 million, compared to $62.9 million at December 31, 2017.

For the year ended December 31, 2018, we issued 30.6 million shares of our common stock through our two underwritten public offerings with an average offering price of $3.38 per share. The total net proceeds to us from the two offerings, after deducting the underwriting commission and offering expenses, were approximately $97.5 million.

We may raise additional capital in the future. To the extent we raise additional funds through the sale of equity or convertible debt, the issuance of such securities will result in dilution to our stockholders. There can be no assurance that such funds will be available on favorable terms, or at all, particularly in light of restrictions under our debt agreement. If adequate funds are not available, we may be required to obtain funds by entering into collaboration, licensing or debt agreements on unfavorable terms. 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, 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 cease operations. If our cash, cash equivalents and investments are insufficient to fund our projected operating requirements, and we are unable to raise capital, it would have a material adverse effect on our business, financial condition and results of operations.

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. generally accepted accounting principles ("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 with some additional revenue from instrument lease agreements and grant revenue.

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. Taxes we collect concurrent with revenue-producing activities are excluded from revenue.

Our instrument sales are generally sold in a bundled arrangement and commonly include the instrument, instrument accessories, installation, training, and consumables. Additionally, our instrument sale arrangements generally include a one-year period of service. For such bundled arrangements, we account for individual products and services separately if they are distinct, that is, if a product or service is separately identifiable from other items in the bundled package and if a customer can benefit from it on its own or with other resources that are readily available to the customer. Our customers cannot benefit from our instrument systems without installation, and installation can only be performed by us or qualified distributors. As a result, the system and installation are considered to be a single performance obligation recognized after installation is completed except for sales to qualified distributors, in which case the system is distinct and recognized when control has transferred to the distributor which typically occurs upon shipment.

The consideration for bundled arrangements is allocated between separate performance obligations based on their individual standalone selling price (“SSP”). The SSP is determined based on observable prices at which we separately sell the products and services. If an SSP is not directly observable, then we will estimate the SSP 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.

Contract liabilities and contract assets - Contract liabilities primarily consist of deferred revenue. We record deferred service revenues when cash payments are received or due in advance of our performance for product maintenance agreements. Deferred service revenue is recognized over the related performance period, generally one to three years, on a straight-line basis as we are standing ready to provide services and a time-based measure of progress best reflects the satisfaction of the performance obligation. As of December 31, 2018, we had a total of $7.4 million of deferred service revenue from our service contracts, $6.5 million of which was recorded as “deferred service revenue, current” to be recognized over the next year and the remaining $0.9 million was recorded as “deferred service revenue, non-current” to be recognized in the next 2 to 5 years. Revenue recognized during the year ended December 31,

2018 includes $6.3 million of previously deferred revenue that was included in “deferred service revenue, current” as of December 31, 2017. Contract assets as of December 31, 2017 and December 31, 2018 were not material.

Instrument lease agreements - Instrument leases are generally classified as operating-type leases and revenue from these leases is recognized on a straight-line basis over the respective lease term, once the lessee takes (or has the right to take) control/possession of the property under the lease. Effectively, this occurs once the installation is complete and control of the instrument is transferred to our customers.

Other practical expedients and exemptions - Customers generally are invoiced upon acceptance of the system, which is also the start of the one-year service period. As such, there is typically not more than a one-year difference between the receipt of cash and the provision of services. Therefore, we apply the practical expedient and do not account for any potential significant financing benefit. However, it is noted that some customers will pre-order extended service periods at the time of the initial system sale. These customers may choose to make quarterly or annual payments or prepay multiple years of service upfront but there is no pricing difference between these different payment options. As such, no significant financing component is believed to exist with any of our existing arrangements.

Inventories

Inventories are stated at the lower of average 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 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 enter into inventory purchases and commitments so that we can 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, in order 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.

Operating Leases

We lease administrative, manufacturing and laboratory facilities under operating leases. Lease agreements may include rent holidays, rent escalation clauses and tenant improvement allowances. We recognize scheduled rent increases on a straight-line basis over the lease term beginning with the date we take possession of the leased space. Leasehold improvements are capitalized at cost and depreciated over the shorter of their expected useful life or the life of the lease. We record tenant improvement allowances as deferred rent liabilities and amortize the deferred rent over the term of the lease to rent expense on the statements of operations and comprehensive loss.

Recent Accounting Pronouncements

Please see “Note 2. Summary of 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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Results of Operations

Comparison of the Years Ended December 31, 2018 and 2017

	Year Ended December 31,			
	2018	2017	$ Change	% Change
Revenue:	(in thousands, except percentages)			
Product revenue	$ 66,355	$ 80,030	$ (13,675)	(17%)
Service and other revenue	12,271	13,438	(1,167)	(9%)
Total revenue	78,626	93,468	(14,842)	(16%)
Cost of Revenue:				
Cost of product revenue	42,053	42,900	(847)	(2%)
Cost of service and other revenue	11,477	15,909	(4,432)	(28%)
Total cost of revenue	53,530	58,809	(5,279)	(9%)
Gross profit	25,096	34,659	(9,563)	(28%)
Operating Expense:				
Research and development	62,594	65,324	(2,730)	(4%)
Sales, general and administrative	63,489	59,119	4,370	7%
Total operating expense	126,083	124,443	1,640	1%
Operating loss	(100,987)	(89,784)	(11,203)	(12%)
Interest expense	(2,423)	(2,921)	498	17%
Other income (expense), net	848	516	332	64%
Net loss	$ (102,562)	$ (92,189)	$ (10,373)	(11%)

Revenue

Total revenue for the year ended December 31, 2018 was $78.6 million compared to $93.5 million for 2017.

Product revenue for the year ended December 31, 2018 was $66.4 million, compared to $80.0 million for the year ended December 31, 2017. The decrease in product revenue from 2017 to 2018 was primarily a result of lower instrument installations in 2018, as some customers postponed purchases in anticipation of the Sequel® II system and SMRT® Cell 8M product launches in 2019. In addition, consumables revenue decreased in 2018 as an increase in Sequel consumables was more than offset by a significant decrease in RS II consumables.

Service and other revenue was $12.3 million and $13.4 million for the years ended December 31, 2018 and 2017, respectively, and was primarily derived from product maintenance agreements sold for our installed instrument base. Lower year-over-year service revenue was due to a decrease of higher priced RS II service contract renewals, which is a result of the ongoing transition of our customer base from RS II to Sequel systems.

Gross Profit

Gross profit for the year ended December 31, 2018 was $25.1 million, resulting in a gross margin of 32% while gross profit for the year ended December 31, 2017 was $34.7 million, resulting in a gross margin of 37%. Gross profit decreased in 2018 as a result of lower product revenue, increased inventory reserves primarily driven by product transitions, and higher period costs recognized as a result of lower production volume.

Cost of product revenue was $42.1 million for the year ended December 31, 2018, compared to $42.9 million for 2017. Despite lower product revenue in 2018 compared with 2017, cost of product revenue was relatively flat due to higher product transition costs, including an inventory reserve of $3.1 million taken on older consumables as new products were introduced in 2018 and higher period costs recognized in 2018.

Cost of service and other revenue for the year ended December 31, 2018 decreased to $11.5 million compared to $15.9 million for the year ended December 31, 2017. During the year ended December 31, 2017, we recorded charges to cost of revenue totaling $1.6 million relating to leased RS II instruments primarily due to a change in the estimated useful life of these instruments. In addition, for the year ended December 31, 2018 we have continued to improve Sequel instrument reliability which has led to reduced cost of service during the period.

Research and Development Expense

Research and development expense for the year ended December 31, 2018 decreased by $2.7 million to $62.6 million compared to $65.3 million for the year ended December 31, 2017. The decrease in research and development expenses for the year ended December 31, 2018 can be primarily attributed to lower chip development expenses in 2018 as compared to 2017. This was partially offset by an increase

of $1.2 million in stock-based compensation expense in the fourth quarter of 2018 related to the cancellation of the future offering periods of the employee stock purchase plan in connection with the Merger Agreement which we entered into with Illumina. Research and development expenses included stock-based compensation expenses of $10.1 million and $8.5 million for the years ended December 31, 2018 and December 31, 2017, respectively.

We expect our research and development expenses to remain flat in 2019.

Sales, General and Administrative Expense

Sales, general and administrative expense for the year ended December 31, 2018 increased by $4.4 million to $63.5 million compared to $59.1 million for the year ended December 31, 2017. The increase in sales, general and administrative expenses for the year ended December 31, 2018 over 2017 can be primarily attributed to $4.7 million of additional legal and professional fees incurred in connection with the Merger Agreement, $1.6 million of executive bonus costs and the increase in stock-based compensation expense related to the Merger Agreement, partially offset by a decrease in patent litigation expenses. Sales, general and administrative expenses included stock-based compensation expenses of $10.0 million and $9.5 million for the years ended December 31, 2018 and December 31, 2017, respectively.

We expect our sales, general and administrative expenses in 2019 to continue to fluctuate due to expenses related to the Merger Agreement.

Interest Expense

Interest expense for the year ended December 31, 2018 decreased by $0.5 million compared to the year ended December 31, 2017. Interest expense related primarily to the debt facility entered into in February 2013. In June 2017, we repaid $4.5 million out of the original $20.5 million debt facility. As of December 31, 2018, a balance of $16.0 million aggregate principal amount of debt remained outstanding under this facility.

Comparison of the Years Ended December 31, 2017 and 2016

	Year Ended December 31,			
	2017	2016	$ Change	% Change
Revenue:	(in thousands, except percentages)			
Product revenue	$ 80,030	$ 64,609	$ 15,421	24%
Service and other revenue	13,438	13,971	(533)	(4%)
Contractual revenue	—	12,134	(12,134)	(100%)
Total revenue	93,468	90,714	2,754	3%
Cost of Revenue:				
Cost of product revenue	42,900	34,512	8,388	24%

Cost of service and other revenue	15,909	12,042	3,867	32%
Total cost of revenue	58,809	46,554	12,255	26%
Gross profit	34,659	44,160	(9,501)	(22%)
Operating Expense:				
Research and development	65,324	67,617	(2,293)	(3%)
Sales, general and administrative	59,119	47,787	11,332	24%
Total operating expense	124,443	115,404	9,039	8%
Operating loss	(89,784)	(71,244)	(18,540)	(26%)
Interest expense	(2,921)	(3,234)	313	10%
Other income (expense), net	516	103	413	401%
Net loss	$ (92,189)	$ (74,375)	$ (17,814)	(24%)

Revenue

Total revenue for the year ended December 31, 2017 was $93.5 million compared to $90.7 million for 2016.

Product revenue for the year ended December 31, 2017 consisted of $38.6 million from sales of instruments and $41.4 million from sales of consumables, for total product revenues of $80.0 million, compared to $41.0 million from sales of instruments and $23.7 million from sales of consumables, for total product revenue of $64.6 million for the year ended December 31, 2016. The increase in consumable sales from 2016 to 2017 was primarily attributable to higher system utilization and a larger installed instrument base.

Service and other revenue was $13.4 million and $14.0 million for the year ended December 31, 2017 and 2016, respectively, and was primarily derived from product maintenance agreements sold on our installed instruments.

There was no contractual revenue for the year ended December 31, 2017, compared to $12.1 million in contract revenue for the same period in 2016. Contractual revenue for 2016 included amortization of $3.6 million of the upfront payment from F. Hoffman-La Roche Ltd ("Roche") for each of the first three quarters of 2016, plus amortization of $1.3 million for the fourth quarter of 2016, from the non-refundable upfront payment of $35.0 million we received during September 2013 pursuant to our agreement with Roche. In December 2016, we received notice from Roche that Roche had elected to terminate our agreement for convenience and the termination became effective February 10, 2017.

Gross Profit

Gross profit for the year ended December 31, 2017 was $34.7 million, resulting in a gross margin of 37.1%. During the year ended December 31, 2017 we recorded a total charge of $1.6 million to cost of revenue relating to leased RS II instruments primarily due to a change in the estimated useful life of these instruments. Gross profit for the year ended December 31, 2016 was $44.2 million, resulting in a gross margin of 48.7%, which included $12.1 million of contractual revenue at 100% gross margin. Excluding this contractual revenue, adjusted gross margin for the year ended December 31, 2016 would have been 40.8%, and adjusted for the contractual revenue, this change in gross margin year over year can be primarily attributed to an increase in costs described below. Adjusted gross margin is not meant to be considered in isolation or as a substitute for gross margin. Adjusted gross margin is subject to limitations and should be read only in conjunction with our consolidated financial statements.

Cost of product revenue was $42.9 million for the year ended December 31, 2017, compared to cost of product revenue of $34.5 million for the same period during 2016. Cost of service and other revenue for the year ended December 31, 2017 was $15.9 million, compared to $12.0 million for the same period during 2016. The increase in cost of product revenue of $8.4 million was primarily driven by the increased instrument installs and consumable sales year over year. In addition, product transition costs and warranty costs related to consumables were higher for the year ended December 31, 2017 compared to the same period during 2016. The increase in cost of service and other revenue of $3.9 million was primarily due to the higher labor and material costs required to service a larger installed base of Sequel instruments and the charge associated with the leased RS II instruments described above.

Research and Development Expense

For the year ended December 31, 2017, research and development expense decreased by $2.3 million compared to 2016. The decrease in research and development expense was primarily attributable to a decrease of $6.7 million in chip development costs, a decrease of $0.8 million in outside consulting fees mainly due to replacement of contractors in the software group, partially offset by an increase of $4.9 million in facility allocation incurred in the new O'Brien building and an increase of $0.3 million in compensation expenses as a result of increased headcount. Research and development expense included stock-based compensation expense of $8.5 million and $8.3 million during the year ended December 31, 2017 and 2016, respectively.

Sales, General and Administrative Expense

For the year ended December 31, 2017, sales, general and administrative expense increased by $11.3 million compared to 2016. The increase in sales, general and administrative expense was primarily attributable to an increase of $5.7 million in consulting and professional fees, including legal fees incurred in connection with the patent infringement litigation described under "Legal Proceedings", an increase of $2.6 million in facilities and depreciation expense allocated to sales, general and administration expenses mainly due to the addition of rent expense, tenant improvement and other fixed assets related to the O'Brien move and an increase of $2.7 million in compensation expenses as a result of increased headcount. Sales, general and administrative expense included stock-based compensation expense of $9.5 million and $9.2 million during the year ended December 31, 2017 and 2016,

respectively.

Interest Expense

For the year ended December 31, 2017, interest expense decreased $0.3 million compared to 2016. Interest expense related primarily to the debt facility entered into in February 2013. In June 2017, we repaid $4.5 million out of the original $20.5 million debt facility. As of December 31, 2017, we had an outstanding principal amount $16.0 million remaining in the Notes, net of $2.4 million debt discount, resulting in a net $13.6 million recorded as “Notes payable, non-current” on the consolidated balance sheets with the principal payment due in 2020.

Liquidity and Capital Resources

Liquidity

Cash, cash equivalents and investments at December 31, 2018 totaled $102.4 million, compared to $62.9 million at December 31, 2017. We believe that our existing cash, cash equivalents and investments will be sufficient to fund our projected operating requirements for at least the next 12 months from the filing date of the Annual Report on Form 10-K for the year ended December 31, 2018; however, we may raise additional capital in the future. Our view regarding sufficiency of cash and liquidity is primarily based on our financial forecast for 2018, which includes various assumptions regarding demand for our products. Generally, we expect demand for our products to increase.

Factors that may affect our capital needs include, but are not limited to, slower than expected adoption of our products resulting in lower sales of our products and services; our ability to obtain new collaboration and customer arrangements; the progress of our research and development programs; initiation or expansion of research programs and collaborations; the purchase of patent licenses; future acquisitions; manufacturing costs, service costs, the impact of product quality, litigation costs, including the costs involved in preparing, filing, prosecuting, defending and enforcing intellectual property rights; costs of developing new and enhanced products; and other factors.

To the extent we raise additional funds through the sale of equity or convertible debt, the issuance of such securities will result in dilution to our stockholders. There can be no assurance that such funds will be available on favorable terms, or at all, particularly in light of restrictions under our debt agreement. If adequate funds are not available, we may be required to obtain funds by entering into collaboration, licensing or debt agreements on unfavorable terms. 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, 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 cease operations. If our cash, cash equivalents and investments are insufficient to fund our projected operating requirements, and we are unable to raise capital, it would have a material adverse effect on our business, financial condition and results of operations.

Operating Activities

Our primary uses of cash in operating activities are for the development of ongoing product enhancements and future products, manufacturing, and support functions related to our sales, general and administrative activities. The net cash used for the years ended December 31, 2018, 2017 and 2016 primarily reflected the net loss for those periods, partially offset by non-cash operating expenses including depreciation and stock-based compensation, as well as changes in working capital.

Cash used in operating activities was $66.4 million, reflected a net loss of $102.6 million, adjusted for non-cash items such as stock-based compensation of $23.2 million and depreciation of $7.2 million. The change in net operating assets and liabilities was primarily attributed to a decrease of $4.8 million in accounts receivable, a decrease of $3.6 million in inventory, partially offset by a decrease of $2.2 million in accounts payable.

Cash used in operating activities was $67.5 million in 2017, reflected a net loss of $92.2 million, adjusted for non-cash items such as stock-based compensation of $20.4 million and depreciation of $8.4 million. The change in net operating assets and liabilities was primarily attributed to an increase of $8.4 million in inventory and a decrease of $4.0 million in accrued expenses, partially offset by a decrease in prepaid expenses and other assets of $7.8 million, of which $5.0 million related to the payments we received from our prior landlord as a result of exiting a portion of our prior facilities.

Cash used in operating activities was $67.9 million in 2016, reflected a net loss of $74.4 million, adjusted for non-cash items such as stock-based compensation of $19.6 million, depreciation and amortization of $3.9 million and amortization of debt discount and financing costs of $1.2 million. Additionally, the change in net operating assets and liabilities was attributed to a reduction in deferred contractual revenue of $12.1 million, an increase in inventory of $6.2 million and an increase in accounts receivable of $6.2 million, partially offset by an increase of $4.5 million in accounts payable and accrued expenses due primarily to the timing of payments. The change in inventory also reflects a transfer of $1.3 million from inventory to fixed assets relating to our instruments.

Investing Activities

Our investing activities consist primarily of capital expenditures and investment purchases, sales and maturities.

In 2018, net cash used in investing activities was $38.4 million, comprised of net purchase of investments of $36.6 million and purchase of property and equipment of $1.9 million.

In 2017, net cash used in investing activities was $1.5 million, comprised of net sales and maturities of investments of $8.8 million and net purchase of property and equipment of $10.4 million.

In 2016, net cash used in investing activities was $14.9 million, comprised of net purchase of investments of $6.7 million and net purchase of property and equipment of $8.2 million.

Financing Activities

In 2018, cash provided by financing activities was $107.2 million, comprised of net proceeds of $97.5 million from our underwritten public equity offerings, after deducting underwriter commissions and offering expenses and $9.7 million from the issuance of common stock through our equity compensation plans.

In 2017, cash provided by financing activities was $68.8 million, comprised of net proceeds of $52.5 million from our underwritten public equity offering, after deducting underwriter commissions and offering expenses, net proceeds of $11.9 million from our common stock “at-the-market” offering program and $8.9 million from the issuance of common stock through our equity compensation plans, partially offset by our payment of $4.5 million in outstanding principal under our debt facility in the second quarter of 2017.

In 2016, cash provided by financing activities was $65.9 million, comprised of net proceeds of $58.2 million from our common stock “at-the-market” offering program and $7.7 million from the issuance of common stock through our equity compensation plans.

Capital Resources

In August 2017, we filed a shelf registration statement on Form S-3 with the SEC pursuant to which we may, from time to time, sell

up to an aggregate of $150.0 million of our common stock, preferred stock, depository shares, warrants, units or debt securities. On August 18, 2017, the registration statement was declared effective by the SEC, which allows us to access the capital markets for the three-year period following this effective date.

"At-the-Market" Equity Offering

In February 2017, we filed a prospectus supplement pursuant to which we could offer and sell, from time to time, additional shares of our common stock having an aggregate offering price of up to $60.0 million.

During the six-month period ended June 30, 2017 we issued 3.2 million shares of our common stock at an average price of $3.86 per share through our "at-the-market" offering, resulting in net proceeds of $11.9 million. We terminated our current "at-the-market" offering program in June 2017. We paid a commission equal to 3% of the gross proceeds from the sale of shares of our common stock through the "at-the-market' offering program under the sales agreement.

Underwritten Public Equity Offering

In June 2017, we issued and sold a total of 17,732,257 shares of our common stock at a price of $3.10 per share in an underwritten public offering. We paid a commission equal to 4% of the gross proceeds from the sale of shares of our common stock under the underwriting agreement. The total net proceeds to us from the offering, after deducting the underwriting commission and offering expenses, were approximately $52.5 million.

For the year ended December 31, 2018, we issued 30.6 million shares of our common stock through our two underwritten public offerings with an average offering price of $3.38. The total net proceeds to us from the two offerings, after deducting the underwriting commission and offering expenses, were approximately $97.5 million.

Debt Facility Agreement

Under the terms of our February 2013 debt agreement with Deerfield (the "Facility Agreement"), we received $20.5 million and issued promissory notes in the aggregate principal amount of $20.5 million (the "Notes"). The Notes bear simple interest at a rate of 8.75% per annum, payable quarterly in arrears commencing on April 1, 2013 and on the first business day of each January, April, July and October thereafter. The Facility Agreement has a maximum term of seven years. We received net proceeds of $20.0 million, representing $20.5 million of gross proceeds, less a $500,000 facility fee, before deducting other expenses of the transaction. On June 23, 2017, pursuant to a partial exercise by the Notes holders of their right to elect to receive up to 25% of the net proceeds from any financing that includes an equity component, we paid $4.5 million of outstanding principal, together with accrued and unpaid interest, to one of the Notes holders with proceeds from our underwritten public equity offering. As of December 31, 2018, we had an outstanding principal amount of $16.0 million remaining on the Notes. The principal is due to the repaid in February 2020.

The Facility Agreement also contains various representations and warranties, and affirmative and negative covenants, customary for financings of this type, including restrictions on our ability to incur additional indebtedness or liens on our assets, except as permitted under the Facility Agreement. In addition, the Facility Agreement requires us to maintain consolidated cash and cash equivalents on the last day of each calendar quarter of not less than $2.0 million. As security for our repayment of our obligations under the Facility Agreement, we granted the lenders a security interest in substantially all of our property and interests in property.

Subject to certain exceptions set forth in our Facility Agreement, holders of our Notes may elect to receive up to 25% of the net proceeds from financing activities that include an equity component as prepayment of the Notes to be applied first, to accrued and unpaid interest and second, to principal. However, in both February 2018 and September 2018, holders representing a majority of the aggregate principal amount of the outstanding Notes waived such right in connection with the issuance and sale of shares of common stock in our public offering. In June 2017, pursuant to a partial exercise by the Notes holders of this right, we repaid $4.5 million of outstanding principal, together with accrued and unpaid interest, to one of the Notes holders with proceeds from our underwritten public equity offering.

Contractual Obligations, Commitments and Contingencies

Lease

On July 22, 2015, we entered into a lease agreement (the “O’Brien Lease”) with respect to our facility located at 1305 O’Brien Drive, Menlo Park, California (the “O’Brien Premises”). The term of the O’Brien Lease is one hundred thirty-two (132) months. In December 2016, we entered into an amendment to the O’Brien Lease which defined the commencement date of the lease to be October 25, 2016, notwithstanding that such substantial completion did not occur until the first quarter of 2017. Base monthly rent was abated for the first six (6) months of the lease term and thereafter was $540,000 per month during the first year of the lease term, with specified annual increases thereafter until reaching $711,000 per month during the last twelve (12) months of the lease term. We were required to establish a letter of credit for the benefits of the landlord and to submit $4.5 million as a deposit for the letter of credit in October 2015; and, as such, $4.5 million was recorded at such time and continued to be recorded in “Long-term restricted cash” in the consolidated balance sheet as of both December 31, 2018 and December 31, 2017.

The landlord was obligated to construct certain warm shell improvements at the landlord’s cost and expense and provide us with a tenant improvement allowance in the amount of $12.6 million. Construction was completed in phases and we began moving into the

O'Brien Premises during January 2017. By the end of the first quarter of 2017, improvements associated with the entire O'Brien Premises were substantially completed. As a result, during the first quarter of 2017 we capitalized $28.8 million of tenant improvements, of which $12.6 million was paid by the landlord as a tenant improvement allowance. As the $12.6 million tenant improvement allowance is accounted for as a lease incentive, we recorded the $12.6 million to "Deferred rent, non-current", which will be amortized over the lease term of approximately 11 years. In addition, as the premises were completed in phases in 2017, tenant improvements were placed into service in phases once construction was substantially complete and the related asset was ready for its intended use.

The following table provides summary information concerning our future contractual obligations as of December 31, 2018.

	Payments due by period (in thousands)						
	Total	2019	2020	2021	2022	2023	After
Operating lease obligations (1)	$ 67,968	$ 6,930	$ 7,056	$ 7,272	$ 7,488	$ 7,704	$ 31,518
Debt (2)	17,891	1,400	16,491	—	—	—	—
Total contractual obligations	$ 85,859	$ 8,330	$ 23,547	$ 7,272	$ 7,488	$ 7,704	$ 31,518

(1) Maintenance, insurance, taxes and contingent rent obligations are excluded.
(2) Amounts in the table above include interest and principal repayments on the debt.

Other Purchase Commitments

In addition, we had other purchase commitments of an estimated amount of approximately $13.1 million as of December 31, 2018, consisting 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, and acquisition and licensing of intellectual property. 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.

License Agreements

Payments related to licensing and other arrangements not included in the contractual obligations table include amounts related to cancelable 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.

The table above reflects only payment obligations that are fixed and determinable. Future royalties under our license agreements are not included in the table above because we cannot, at this time, determine when or if the events triggering any such payment obligations will occur or the amounts that will become potentially payable.

Legal Proceedings

Please see Item 3 titled “Legal Proceedings” of this Annual Report on Form 10-K for more information.

Off-Balance Sheet Arrangements

As of December 31, 2018, 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 negligent 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 such third parties and us in connection with such fundraising efforts. To the extent that such indemnification obligations apply to the lawsuits described in “Note 7. Commitments and Contingencies” in Part II, Item 8 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 at December 31, 2018.

ITEM 7A. Quantitative and Qualitative Disclosures About Market Risk

Interest Rate and Market Risk

Our exposure to market risk is confined to our cash, cash equivalents and our investments. 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. We currently do not hedge interest rate exposure. Because of the short-term maturities of our investments, we do not believe that an increase in market rates would have any material negative impact on the value of our investment portfolio.

Foreign Exchange Risk

The majority of our revenue, expense, and capital purchasing activities are transacted in U.S. dollars. However, a portion of our operations consists of development and sales activities outside of the United States therefore we have foreign exchange exposures relating to non-U.S. dollar revenue, operating expense, accounts receivable, accounts payable and currency balances. Our primary exposure is with 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, 2018 would have resulted in a $0.2 million decrease in the carrying amounts of those net assets. Actual gains and losses in the future may differ materially from the hypothetical gains and losses discussed above 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.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTAL DATA

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Index to Consolidated Financial Statements

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING 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, 2018 and 2017, the related consolidated statements of operations and comprehensive loss, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2018, 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 as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with US 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, 2018, 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 26, 2019 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 US 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.

/s/ Ernst & Young LLP

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

Redwood City, California

February 26, 2019

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Consolidated Balance Sheets

(in thousands, except par value)	December 31, 2018	2017
Assets		
Current assets		
Cash and cash equivalents	$ 18,844	$ 16,507
Investments	83,510	46,365
Accounts receivable	8,595	13,433
Inventory	17,878	23,065
Prepaid expenses and other current assets	2,832	2,249
Total current assets	131,659	101,619
Property and equipment, net	34,073	37,920
Long-term restricted cash	4,500	4,500
Other long-term assets	43	45
Total assets	$ 170,275	$ 144,084
Liabilities and Stockholders' Equity		
Current liabilities		
Accounts payable	$ 6,736	$ 9,093
Accrued expenses	12,823	12,618
Deferred service revenue, current	6,537	6,319
Other liabilities, current	788	605
Total current liabilities	26,884	28,635
Deferred service revenue, non-current	890	1,075
Deferred rent, non-current	13,765	14,453
Notes payable	14,659	13,635
Financing derivative	16	183
Total liabilities	56,214	57,981
Commitments and contingencies		
Stockholders' equity		
Preferred Stock, $0.001 par value:		
Authorized 50,000 shares; No shares issued or outstanding	—	—
Common Stock, $0.001 par value:		
Authorized 1,000,000 shares; Issued and outstanding 150,244 and 116,277 shares at December 31, 2018 and 2017, respectively	150	116
Additional paid-in-capital	1,096,053	965,752
Accumulated other comprehensive loss	(36)	(32)
Accumulated deficit	(982,106)	(879,733)
Total stockholders' equity	114,061	86,103

Total liabilities and stockholders' equity	$ 170,275	$ 144,084

See accompanying notes to the consolidated financial statements.

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Consolidated Statements of Operations and Comprehensive Loss

	Years ended December 31,		
(in thousands, except per share amounts)	2018	2017	2016
Revenue:			
Product revenue	$ 66,355	$ 80,030	$ 64,609
Service and other revenue	12,271	13,438	13,971
Contractual revenue	—	—	12,134
Total revenue	78,626	93,468	90,714
Cost of Revenue:			
Cost of product revenue	42,053	42,900	34,512
Cost of service and other revenue	11,477	15,909	12,042
Total cost of revenue	53,530	58,809	46,554
Gross profit	25,096	34,659	44,160
Operating Expense:			
Research and development	62,594	65,324	67,617
Sales, general and administrative	63,489	59,119	47,787
Total operating expense	126,083	124,443	115,404
Operating loss	(100,987)	(89,784)	(71,244)
Interest expense	(2,423)	(2,921)	(3,234)
Other income, net	848	516	103
Net loss	(102,562)	(92,189)	(74,375)
Other comprehensive loss:			
Unrealized gain (loss) on investments	(4)	(37)	12
Comprehensive loss	$ (102,566)	$ (92,226)	$ (74,363)
Net loss per share:			
Basic and diluted net loss per share	$ (0.76)	$ (0.87)	$ (0.83)
Shares used in computing basic and diluted net loss per share	135,094	105,682	89,148

See accompanying notes to the consolidated financial statements.

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Consolidated Statements of Stockholders' Equity

(in thousands)	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total Stockholders' Equity
Balance at December 31, 2015	79,983	$ 80	$ 786,636	$ (7)	$ (713,169)	$ 73,540
Net loss	—	—	—	—	(74,375)	(74,375)
Other comprehensive loss	—	—	—	12	—	12
Issuance of common stock in conjunction with equity plans	2,004	2	7,727	—	—	7,729
Issuance of common stock in conjunction with "at-the-market" offering, net of issuance costs	6,526	7	58,193	—	—	58,200
Issuance of common stock from exercise of warrant	4,164	4	(4)	—	—	—
Stock-based compensation expense	—	—	19,562	—	—	19,562
Balance at December 31, 2016	92,677	93	872,114	5	(787,544)	84,668
Net loss	—	—	—	—	(92,189)	(92,189)
Other comprehensive loss	—	—	—	(37)	—	(37)
Issuance of common stock in conjunction with equity plans	2,697	2	8,912	—	—	8,914
Issuance of common stock in conjunction with "at-the-market" offering, net of issuance costs	3,171	3	11,862	—	—	11,865
Issuance of common stock from Underwritten Public Equity Offering, net of issuance costs	17,732	18	52,512	—	—	52,530
Stock-based compensation expense	—	—	20,352	—	—	20,352
Balance at December 31, 2017	116,277	116	965,752	(32)	(879,733)	86,103
Net loss	—	—	—	—	(102,562)	(102,562)
Other comprehensive loss	—	—	—	(4)	—	(4)
ASC606 adoption effect					189	189

Issuance of common stock in conjunction with equity plans	3,357	4	9,648	—	—	9,652
Issuance of common stock from Underwritten Public Equity Offerings, net of issuance costs	30,610	30	97,500	—	—	97,530
Stock-based compensation expense	—	—	23,153	—	—	23,153
Balance at December 31, 2018	150,244	$ 150	$ 1,096,053	$ (36)	$ (982,106)	$ 114,061

See accompanying notes to the consolidated financial statements.

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Consolidated Statements of Cash Flows

	Years Ended December 31,		
(in thousands)	2018	2017	2016
Cash flows from operating activities			
Net loss	$ (102,562)	$ (92,189)	$ (74,375)
Adjustments to reconcile net loss to net cash used in operating activities			
Depreciation and amortization	7,215	8,442	3,875
Amortization of debt discount and financing costs	1,024	1,203	1,158
Stock-based compensation	23,153	20,352	19,562
Non-cash portion of gain on lease amendments	—	—	—
(Gain) loss from derivative	(167)	653	(244)
Amortization and accretion for investment premium (discount)	(758)	47	97
Changes in assets and liabilities			
Accounts receivable	4,838	(2,012)	(6,176)
Inventory	3,623	(8,442)	(6,151)
Prepaid expenses and other assets	(290)	7,803	(202)
Accounts payable	(2,239)	764	3,402
Accrued expenses	205	(3,986)	1,053
Deferred service revenue	33	(1,033)	469
Deferred contractual revenue	—	—	(12,134)
Other liabilities	(505)	880	1,737
Net cash used in operating activities	(66,430)	(67,518)	(67,929)
Cash flows from investing activities			
Purchase of property and equipment	(1,854)	(10,433)	(8,207)
Proceeds from disposal of property and equipment	—	41	10
Purchase of investments	(122,183)	(86,339)	(95,848)
Sales of investments	2,442	7,111	23,285
Maturities of investments	83,180	88,071	65,896
Net cash used in investing activities	(38,415)	(1,549)	(14,864)
Cash flows from financing activities			
Proceeds from issuance of common stock from equity plans	9,652	8,914	7,729
Notes payable principal payoff	—	(4,500)	—
Proceeds from issuance of common stock from "at-the-market" offerings, net of issuance costs	—	11,865	58,200
Proceeds from issuance of common stock from underwritten public equity offerings, net of issuance costs	97,530	52,530	—
Net cash provided by financing activities	107,182	68,809	65,929
Net decrease in cash and cash equivalents and restricted cash	2,337	(258)	(16,864)
Cash and cash equivalents and restricted cash at beginning of period	21,007	21,265	38,129
Cash and cash equivalents and restricted cash at end of period	$ 23,344	$ 21,007	$ 21,265

Cash and cash equivalents at end of period	18,844	16,507	16,765
Restricted cash at end of period	4,500	4,500	4,500
Cash and cash equivalents and restricted cash at end of period	$ 23,344	$ 21,007	$ 21,265
Supplemental disclosure of cash flow information			
Interest paid	$ 1,400	$ 1,687	$ 1,799
Supplemental disclosure of non-cash investing and financing activities			
Inventory transferred to property and equipment	1,871	1,267	1,282
Property and equipment paid by landlord	—	12,600	-
Changes in deposits for property and equipment paid in prior period	—	9,694	-
Property and equipment returned to landlord	—	1,854	-

See accompanying notes to the consolidated financial statements.

PACIFIC BIOSCIENCES OF CALIFORNIA, INC.

Notes to Consolidated Financial Statements

NOTE 1. OVERVIEW

We design, develop and manufacture sequencing systems to help scientists resolve genetically complex problems. Based on our novel Single Molecule, Real-Time (SMRT®) sequencing technology, our products enable: de novo genome assembly to finish genomes in order to more fully identify, annotate and decipher genomic structures; full-length transcript analysis to improve annotations in reference genomes, characterize alternatively spliced isoforms in important gene families, and find novel genes; targeted sequencing to more comprehensively characterize genetic variations; and real-time kinetic information for epigenome characterization. Our technology provides high accuracy, ultra-long reads, uniform coverage and the ability to simultaneously detect epigenetic changes. PacBio® sequencing systems, including consumables and software, provide a simple and fast end-to-end workflow for SMRT sequencing.

Our current products include the Sequel instrument and the Sequel SMRT Cell 1M, which together are capable of sequencing up to approximately one million DNA molecules simultaneously. We are continuously developing new products including the SMRT Cell 8M, which is designed to have up to eight times as much throughput capability as the current Sequel SMRT Cell 1M. We commenced our Early Access Program for the SMRT® Cell 8M chip and platform, the Sequel® II System, in January 2019 and the five Early Access sites selected have installed and operated their Sequel II Systems. Based on the early performance of the Sequel II Systems at these sites, we expect to begin commercial shipments of Sequel II Systems and SMRT Cell 8M products in the early part of the second quarter of 2019.

On November 1, 2018, we entered into an Agreement and Plan of Merger with Illumina, Inc. (“Illumina”) and FC Ops Corp., a wholly-owned subsidiary of Illumina (the “Merger Agreement”) pursuant to which Illumina will acquire us for $8.00 per share of our common stock in an all-cash transaction and FC Ops Corp. will be merged with and into us (the “Merger”), with us surviving the Merger and becoming a wholly-owned subsidiary of Illumina. Completion of the transaction is subject to terms and conditions set forth in the Merger Agreement, including expiration or termination of any waiting periods applicable to the consummation of the Merger under the United States Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, and clearance under the antitrust laws of certain non-United States jurisdictions. At a Special Meeting of Stockholders held on January 24, 2019, our stockholders, among other things, approved the adoption of the Merger Agreement. We and Illumina have each received a request for additional information and documentary material, commonly referred to as a “second request,” from the United States Federal Trade Commission (the “FTC”) in connection with the Merger. The FTC’s “second request” has the effect of extending the waiting period applicable to the consummation of the Merger until the 30th day after substantial compliance by us and Illumina with the “second request,” unless the waiting period is extended voluntarily by the parties or terminated sooner by the FTC. The parties have entered into a timing agreement with the FTC that extends the waiting period of the “second request” to mid-2019. We and Illumina continue to expect the Merger to be completed in mid-2019, at which time we will become a wholly-owned subsidiary of Illumina and will cease to be a publicly-traded company. No assurance can be given that the required regulatory approvals will be obtained or that the required conditions to closing will be satisfied, and, even if all such approvals are obtained and the conditions are satisfied, no assurance can be given as to the terms, conditions and timing of the approvals. For more information about the effects of our agreement to be acquired by Illumina please see Item 1A Risk Factors under the section “Risks Related to Our Business”.

The names “Pacific Biosciences,” “PacBio,” “SMRT,” “SMRTbell,” “Sequel” and our logo are our trademarks.

NOTE 2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

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. Translation adjustments resulting from translating foreign subsidiaries’ results of operations and assets and liabilities into U.S. dollars are immaterial for all periods presented.

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP requires us to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes to the financial statements. Our estimates include, but are not limited to, the valuation of inventory, revenue recognition, the valuation of a financing derivative and long-term notes, the valuation and recognition of share-based compensation, the useful lives assigned to long-lived assets, and the computation provisions for income taxes. Actual results could differ materially from these estimates.

During 2017, we recorded a charge to cost of service and other revenue of $1.6 million relating to leased RS II instruments primarily due to a change in the estimated useful life of these instruments. The charge of $1.6 million increased loss per share by $0.01 for the year ended December 31, 2017.

Fair Value of Financial Instruments

The carrying amount of our accounts receivable, prepaid expenses, other current assets, accounts payable, accrued expenses and other liabilities, current, approximate fair value due to their short maturities. The carrying value of our other liabilities, non-current, approximates fair value due to the time to maturity and prevailing market rates.

The fair value hierarchy established under U.S. GAAP requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. A financial instrument's categorization within the fair value hierarchy is based upon the lowest level of input that is significant to the fair value measurement. 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.

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.

Assets and Liabilities Measured at Fair Value on a Recurring Basis

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, 2018 and December 31, 2017 respectively (in thousands):

	December 31, 2018				December 31, 2017			
(in thousands)	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total

Assets								
Cash and cash equivalents:								
Cash and money market funds	$ 18,844	$ —	$ —	$ 18,844	$ 14,858	$ —	$ —	$ 14,858
Commercial paper	—	—	—	—	—	1,649	—	1,649
Total cash and cash equivalents	18,844	—	—	18,844	14,858	1,649	—	16,507
Investments:								
Commercial paper	—	53,469	—	53,469	—	20,394	—	20,394
Corporate debt securities	—	10,214	—	10,214	—	9,034	—	9,034
US government & agency securities	—	19,827	—	19,827	—	16,937	—	16,937
Total investments	—	83,510	—	83,510	—	46,365	—	46,365
Long-term restricted cash:								
Cash	4,500	—	—	4,500	4,500	—	—	4,500
Total assets measured at fair value	$ 23,344	$ 83,510	$ —	$ 106,854	$ 19,358	$ 48,014	$ —	$ 67,372
Liabilities								
Financing derivative	$ —	$ —	$ 16	$ 16	$ —	$ —	$ 183	$ 183
Total liabilities measured at fair value	$ —	$ —	$ 16	$ 16	$ —	$ —	$ 183	$ 183

The estimated fair value of the Financing Derivative liability (as defined in “Note 6. Notes Payable’) was determined using Level 3 inputs, or significant unobservable inputs. Refer to “Note 6. Notes Payable” for a detailed description and valuation approach. Changes to the estimated fair value of the Financing Derivative are recorded in “Other income (expense), net” in the consolidated statements of operations and comprehensive loss.

The following table provides the changes in the fair value of the Financing Derivative for the years ended December 31, 2018 and 2017 (in thousands), respectively:

Financing Derivative	Amount
Balance as of December 31, 2016	$ 356
Loss on change in fair value of Financing Derivative	653
Change in fair value due to partial exercise of derivative associated with $4.5 million principal payoff	(826)
Balance as of December 31, 2017	183
Gain on change in fair value of Financing Derivative	(167)
Balance as of December 31, 2018	$ 16

For the year ended December 31, 2018, there were no transfers between Level 1, Level 2, or Level 3 assets or liabilities reported at fair value on a recurring basis and our valuation techniques did not change compared to the prior year.

Financial Assets and Liabilities Not Measured at Fair Value on a Recurring Basis

We determined the fair value of the Notes (as defined in “Note 6. Notes Payable”) from the debt facility we entered into during the first quarter of 2013 using Level 3 inputs, or significant unobservable inputs. The value of the Notes was determined by comparing the difference between the fair value of the Notes with and without the Financing Derivative by calculating the respective present values from future cash flows using a 9.6% and 10.3% weighted average market yield at December 31, 2018 and December 31, 2017, respectively. Refer to “Note 6. Notes Payable” for additional details regarding the Notes. The estimated fair value and carrying value of the Notes are as follows (in thousands):

	December 31, 2018		December 31, 2017	
	Fair Value	Carrying Value	Fair Value	Carrying Value
Long-term notes payable	$ 15,915	$ 14,659	$ 15,664	$ 13,635

Cash and Cash Equivalents

We consider all highly liquid investments purchased with an original maturity of three months or less to be cash equivalents.

Investments

We have designated all investments as available-for-sale and therefore, such investments are reported at fair value, with unrealized gains and losses recognized in accumulated other comprehensive income (loss) ("OCI") in stockholders' equity. The cost of marketable securities is adjusted for the amortization of premiums and discounts to expected maturity. Premium and discount amortization is included in other income, net. Realized gains and losses, as well as interest income, on available-for-sale securities are also included in other income, net. The cost of securities sold is based on the specific identification method. We include all of our available-for-sale securities in current assets.

All of our investments are subject to a periodic impairment review. We recognize an impairment charge when a decline in the fair value of our investments below the cost basis is judged to be other-than-temporary. Factors considered in determining whether a loss is temporary include the length of time and extent to which an investment's fair value has been less than its cost basis, the financial condition and near-term prospects of the investee, extent of the loss related to credit of the issuer, the expected cash flows from the security, our intent to sell the security and whether or not we will be required to sell the security before the recovery of its amortized cost. During the years ended December 31, 2018, 2017 and 2016, we did not recognize any impairment charges on our investments as it is more likely than not that we will recover their amortized cost basis upon sale or maturity.

Concentration and Other Risks

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. Our accounts receivable are derived from net 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. We regularly review our accounts receivable including consideration of factors such as historical experience, credit quality, the age of the accounts receivable balances and current economic conditions that may affect a customer's ability to pay. We have not experienced any significant credit losses to date.

Excluding contractual revenue from the Roche agreement, which has now been terminated, for the year ended December 31, 2018 and 2017, one customer, Gene Company Limited, accounted for approximately 26% and 31% of our total revenue, respectively. For the years ended December 31, 2016, no customer accounted for more than 10% of our total revenue.

As of December 31, 2018 and 2017, 50% and 84% of our accounts receivable were from domestic customers, respectively. As of December 31, 2018 and 2017, one customer, Gene Company Limited, represented approximately 14% and 20% of our net accounts

receivable, respectively. 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. However, 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

Inventories are stated at the lower of average 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.

Property and Equipment, Net

Property and equipment are stated at cost, net of accumulated depreciation and any impairment charges. Depreciation is computed using the straight-line method over the estimated useful life of the asset, generally two to three years for computer equipment, three to five years for software, three to seven years for furniture and fixtures and three to five years for lab equipment. 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.

Long-term Restricted Cash

As required under the lease agreement for our corporate offices (the "O'Brien lease"), we were required to establish a letter of credit for the benefits of the landlord and to submit $4.5 million as a deposit for the letter of credit in October 2015; and, as such, $4.5 million was recorded in "Long-term restricted cash" in the consolidated balance sheet as of such year and continued to be so recorded as of both December 31, 2018 and December 31, 2017.

Impairment of Long-Lived Assets

We periodically review property and equipment for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset is impaired or the estimated useful lives are no longer appropriate. Fair value is estimated based on discounted future cash flows. If indicators of impairment exist and the undiscounted projected cash flows associated with such assets are less than the carrying amount of the asset, an impairment loss is recorded to write the asset down to its estimated fair value. To date, we have not recorded any impairment charges.

Going concern

We may raise additional capital in the future. To the extent we raise additional funds through the sale of equity or convertible debt, the issuance of such securities will result in dilution to our stockholders. There can be no assurance that such funds will be available on favorable terms, or at all, particularly in light of restrictions under our debt agreement and the Merger Agreement. If adequate funds are not available, we may be required to obtain funds by entering into collaboration, licensing or debt agreements on unfavorable terms. 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, 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 cease operations. If our cash, cash equivalents and investments are insufficient to fund our projected operating requirements, and we are unable to raise capital, it would

have a material adverse effect on our business, financial condition and results of operations.

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 with some additional revenue from instrument lease agreements and grant revenue.

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. Taxes we collect concurrent with revenue-producing activities are excluded from revenue.

Our instrument sales are generally sold in a bundled arrangement and commonly include the instrument, instrument accessories, installation, training, and consumables. Additionally, our instrument sale arrangements generally include a one-year period of service. For such bundled arrangements, we account for individual products and services separately if they are distinct, that is, if a product or service is separately identifiable from other items in the bundled package and if a customer can benefit from it on its own or with other resources that are readily available to the customer. Our customers cannot benefit from our instrument systems without installation, and installation can only be performed by us or qualified distributors. As a result, the system and installation are considered to be a single performance

obligation recognized after installation is completed except for sales to qualified distributors, in which case the system is distinct and recognized when control has transferred to the distributor which typically occurs upon shipment.

The consideration for bundled arrangements is allocated between separate performance obligations based on their individual standalone selling price ("SSP"). The SSP is determined based on observable prices at which we separately sell the products and services. If an SSP is not directly observable, then we will estimate the SSP 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.

Contract liabilities and contract assets - Contract liabilities primarily consist of deferred revenue. We record deferred service revenues when cash payments are received or due in advance of our performance for product maintenance agreements. Deferred service revenue is recognized over the related performance period, generally one to three years, on a straight-line basis as we are standing ready to provide services and a time-based measure of progress best reflects the satisfaction of the performance obligation. As of December 31, 2018, we had a total of $7.4 million of deferred service revenue from our service contracts, $6.5 million of which was recorded as "deferred service revenue, current" to be recognized over the next year and the remaining $0.9 million was recorded as "deferred service revenue, non-current" to be recognized in the next 2 to 5 years. Revenue recognized during the year ended December 31, 2018 includes $6.3 million of previously deferred revenue that was included in "deferred service revenue, current" as of December 31, 2017. Contract assets as of December 31, 2017 and December 31, 2018 were not material.

Instrument lease agreements - Instrument leases are generally classified as operating-type leases and revenue from these leases is recognized on a straight-line basis over the respective lease term, once the lessee takes (or has the right to take) control/possession of the property under the lease. Effectively, this occurs once the installation is complete and control of the instrument is transferred to our customers.

Other practical expedients and exemptions - Customers generally are invoiced upon acceptance of the system, which is also the start of the one-year service period. As such, there is typically not more than a one-year difference between the receipt of cash and the provision of services. Therefore, we apply the practical expedient and do not account for any potential significant financing benefit. However, it is noted that some customers will pre-order extended service periods at the time of the initial system sale. These customers may choose to make quarterly or annual payments or prepay multiple years of service upfront but there is no pricing difference between these different payment options. As such, no significant financing component is believed to exist with any of our existing arrangements.

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. There are no incremental costs associated with our contractual revenue; all product development costs are reflected in research and development expense.

Manufacturing overhead is predominantly comprised of labor and facility costs. We determine and 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.

Research and Development

Research and development expense consists primarily of expenses for personnel engaged in the development of our SMRT Sequencing technology, the design and development of our future products and current product enhancements. These expenses also include prototype-related expenditures, development equipment and supplies, facilities costs and other related overhead. We expense research and development costs during the period in which the costs are incurred. However, 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.

Operating Leases

We lease administrative, manufacturing and laboratory facilities under operating leases. Lease agreements may include rent holidays, rent escalation clauses and tenant improvement allowances. We recognize scheduled rent increases on a straight-line basis over the lease term beginning with the date we take possession of the leased space. Leasehold improvements are capitalized at cost and depreciated over the shorter of their expected useful life or the life of the lease. We record tenant improvement allowances as deferred rent liabilities and amortize the deferred rent over the term of the lease to rent expense on the statements of operations and comprehensive loss.

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. 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 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 would accrue the estimated amount of tax related to such uncertain positions.

Stock-based Compensation

Stock-based compensation expense for all stock-based compensation awards, including stock options and also including shares issued under 2010 Employee Stock Purchase Plan ("ESPP"), is based on the grant date fair value estimated using the Black-Scholes option pricing model.

Expected Term. Starting January 1, 2018, we determined the expected term using historical option experience. We determined expected term based on historical exercise patterns and an expectation of the time it will take for employees to exercise options still outstanding. Prior to 2018, we did not believe that we were able to rely on our historical employee exercise behavior to provide accurate data for estimating our expected term for use in determining the fair value of these options due to limited trading history. Therefore, for the period prior to 2018, the period the expected term of options is estimated based on the simplified method.

Expected Volatility. Starting January 1, 2018, we estimate the volatility of our common stock at the date of grant based on the historical volatility of our common stock. Prior to 2018, we did not have sufficient trading history to solely rely on the volatility of our own common stock for establishing expected volatility. Therefore, we based our expected volatility on the historical stock volatilities of our common stock as well as several comparable publicly listed companies over a period equal to the expected term of the options.

Risk-Free Rate. The risk-free interest rate is based on the U.S. Treasury yield curve in effect at the time of grant for the expected term of the stock option.

Dividends. We have never paid any cash dividends on our common stock and we do not anticipate paying any cash dividends in the foreseeable future. Consequently, we use an expected dividend yield of zero in the Black-Scholes option valuation model.

Expected Forfeiture Rate. We estimate our forfeiture rate based on an analysis of our actual forfeitures and will continue to evaluate the adequacy of the forfeiture rate based on actual forfeiture experience, analysis of employee turnover behavior and other factors. The impact from a forfeiture rate adjustment will be recognized in full in the period of adjustment, and if the actual number of future forfeitures differs from that which was estimated, we may be required to record adjustments to stock-based compensation expense in future periods. We recognize compensation expense on a straight-line basis over the requisite service period. We elected to use the simplified method to calculate the beginning pool of excess tax benefits.

Other Comprehensive Income (loss)

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

Recent Accounting Pronouncements

Recently Issued Accounting Standards

In June 2018, the Financial Accounting Standards Board, or FASB, issued Accounting Standards Update, or ASU, 2018-07, Improvements to Nonemployee Share-Based Payment Accounting, to simplify the accounting for nonemployee share-based payment transactions by expanding the scope of Accounting Standards Codification, or ASC, Topic 718, Compensation - Stock Compensation, to include share-based payment transactions for acquiring goods and services from nonemployees. Under the new standard, most of the guidance on stock compensation payments to nonemployees would be aligned with the requirements for share-based payments granted to employees. This standard is effective for annual reporting periods beginning after December 15, 2018, including interim reporting periods within those annual reporting periods, with early adoption permitted. We expect to adopt this standard beginning in 2019. While we continue to assess the potential impact of this standard, we do not expect the adoption of this standard to have a material impact on our consolidated financial statements.

In February 2018, the FASB issued ASU 2018-02, Income Statement – Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income, that allows for an entity to elect to reclassify the income tax effects on items within accumulated other comprehensive income resulting from U.S. tax reform to retained earnings. The guidance is effective for fiscal years beginning after December 15, 2018 with early adoption permitted, including interim periods within those years. We expect to adopt this standard beginning in 2019. While we continue to assess the potential impact of this standard, we do not expect the adoption of this standard to have a material impact on our consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, Leases. The guidance in ASU 2016-02 supersedes the lease recognition requirements in ASC Topic 840, Leases. ASU 2016-02 requires an entity to recognize assets and liabilities arising from a lease for both financing and operating leases, along with additional qualitative and quantitative disclosures. ASU 2016-02 is effective for fiscal years beginning after December 15, 2018, with early adoption permitted. In July 2018, the FASB issued ASU No. 2018-11, “Targeted Improvements - Leases (Topic 842)”. This update provides an optional transition method that allows entities to elect to apply the standard prospectively at its effective date, versus recasting the prior periods presented. If elected, an entity would recognize a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption. We intend to adopt the optional transition method and we

expect to adopt this standard beginning in 2019. We have performed a preliminary assessment of the impact of the adoption of the amendments in these updates on our consolidated financial position and results of operations for our leases, which primarily consist of our O'Brien lease. Based on that assessment, we have estimated that the adoption of Topic 842 will result in the significant recognition of right-of-use assets and lease liabilities as of January 1, 2019. Also, the impact from the adoption of Topic 842 to our accumulated deficit as of January 1, 2019 and to our consolidated results of operations for the year ending December 31, 2019 are not expected to be material.

Recently Adopted Accounting Standards

In November 2016, the FASB issued ASU 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash, which requires restricted cash to be presented with cash and cash equivalents on the statement of cash flows and disclosure of how the statement of cash flows reconciles to the balance sheet if restricted cash is shown separately from cash and cash equivalents on the balance sheet. ASU 2016-18 is effective for interim and annual periods beginning after December 15, 2017, with early adoption permitted. We adopted this standard effective January 1, 2018 using the retrospective transition method by restating our consolidated statements of cash flows to include restricted cash of $4.5 million in the beginning and ending cash, cash equivalents, and restricted cash balances for all periods presented. As a result of adoption, net cash flows for the year ended December 31, 2018 did not change as a result of including restricted cash with cash and cash equivalents when reconciling the beginning-of-period and end-of-period amounts presented on the statements of cash flows.

In May 2014, the FASB issued ASU No. 2014-09, "Revenue from Contracts with Customers (Topic 606)" as modified by subsequently issued ASUs 2015-14, 2016-08, 2016-10, 2016-12 and 2016-20 (collectively ASC 606). ASC 606 superseded existing revenue recognition standards with a single model unless those contracts are within the scope of other standards, such as leases, insurance, collaboration arrangements and financial instruments. The revenue recognition principle in ASC 606 is that an entity recognizes revenue when its customer obtains control of promised goods or services, in an amount that reflects the consideration which the entity expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements that an entity determines are within the scope of Topic 606, the entity performs the following five steps: (i) identify the contract(s) with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when (or as) the entity satisfies a performance obligation. On January 1, 2018, we adopted ASC 606 using the modified retrospective method with the cumulative effect of adoption recognized as an adjustment to our accumulated deficit on January 1, 2018. Prior period financial statements and disclosures have not been restated and continue to be reported under the accounting standards in effect for those periods. The adoption of ASC 606 did not have a material impact on our consolidated financial position, results of operations, equity or cash flows as of the adoption date or for the year ended December 31, 2018. In addition, the standard requires disclosure of the nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers.

Upon adopting ASC 606, the incremental direct costs of obtaining a contract are now deferred and amortized over the period of contract performance or a longer period if renewals are expected and the renewal commission is not commensurate with the initial commission. We classify deferred commissions as "Prepaid expenses and other current assets" in our consolidated balance sheets.

The cumulative effect of the changes made to our consolidated January 1, 2018 balance sheet for the adoption of ASC 606 was as follows (in thousands):

Balance Sheet	Balance at December 31, 2017	Adjustments Due to ASC606	Balance at January 1, 2018
Assets			
Prepaid expenses and other current assets	$ 2,249	$ 189	$ 2,438
Liabilities and Stockholders' Equity			
Accumulated deficit	(879,733)	189	(879,544)

In accordance with ASC 606, the disclosure of the impact of adoption on our consolidated statement of operations and comprehensive loss, consolidated balance sheets, and consolidated statements of cash flows is as follows (in thousands):

	Year Ended December 31, 2018		
Statement of Operations and Comprehensive Loss	As Reported	Balances Without Adoption of ASC606	Effect of Change Higher/(Lower)
Operating Expense:			
Sales, general and administrative	$ 63,489	$ 63,547	$ (58)

	As of December 31, 2018		
Balance Sheet	As Reported	Balances Without Adoption of ASC606	Effect of Change Higher/(Lower)
Assets			
Prepaid expenses and other current assets	$ 2,832	$ 2,585	$ 247
Liabilities and Stockholders' Equity			
Accumulated deficit	$ (982,106)	$ (981,859)	$ 247

	Year Ended December 31, 2018		
Statement of Cash Flows	As Reported	Balances Without Adoption of ASC606	Effect of Change Higher/(Lower)
Cash Flows from Operating Activities			
Net loss	$ (102,562)	$ (102,620)	$ 58
Adjustments to reconcile net loss to net cash used in operating activities			
Prepaid expenses and other current assets	$ (290)	$ (348)	$ 58

At December 31, 2018, we had $0.2 million of deferred commissions included in “Prepaid expenses and other current assets” which will be recognized as the related revenue is recognized. Additionally, as a practical expedient, we expense costs to obtain a contract as incurred if the amortization period would have been a year or less.

A summary of our revenue by category for the year ended December 31, 2018, 2017 and 2016 is as follows (in thousands):

	Year Ended December 31,		
(in thousands)	2018	2017 (1)	2016 (1)
Instrument revenue	$ 28,492	$ 38,626	$ 40,956
Consumable revenue	37,863	41,404	23,653
Product revenue	66,355	80,030	64,609
Service and other revenue	12,271	13,438	13,971
Collaboration revenue	—	—	12,134
Total revenue	$ 78,626	$ 93,468	$ 90,714

(1) As noted above, prior period amounts have not been adjusted under the modified retrospective method of ASC 606.

NOTE 3. CONTRACTUAL REVENUE

In September 2013, we entered into a development, commercialization and license agreement with F. Hoffman-La Roche Ltd. ("Roche Agreement"), pursuant to which we accounted for, and recognized as revenue, the up-front payment received thereunder using the proportional performance method over the periods in which the delivery of elements pursuant to the Roche Agreement occurs. We recognized revenue under the Roche Agreement using a straight-line convention over the service periods of the deliverables as this method approximated our performance of services pursuant to the Roche Agreement, of which $12.1 million was recognized in 2016. Roche terminated this agreement in December 2016 and no further payments are expected to be received and no additional revenue was recognized.

NOTE 4. CASH AND CASH EQUIVALENTS AND INVESTMENTS

The following table summarizes our cash, cash equivalents and investments as of December 31, 2018 and December 31, 2017 (in thousands):

	As of December 31, 2018			
	Amortized Cost	Gross unrealized gains	Gross unrealized losses	Fair Value
Cash and cash equivalents:				
Cash and money market funds	$ 18,844	$ —	$ —	$ 18,844
Total cash and cash equivalents	18,844	—	—	18,844
Investments:				
Commercial paper	53,493	—	(24)	53,469
Corporate debt securities	10,223	3	(12)	10,214
Asset backed securities	—	—	—	—
US government & agency securities	19,830	—	(3)	19,827
Total investments	83,546	3	(39)	83,510
Total cash, cash equivalents and investments	$ 102,390	$ 3	$ (39)	$ 102,354
Long-term restricted cash:				
Cash	$ 4,500	$ —	$ —	$ 4,500

	As of December 31, 2017			
	Amortized Cost	Gross unrealized gains	Gross unrealized losses	Fair Value
Cash and cash equivalents:				
Cash and money market funds	$ 14,858	$ —	$ —	$ 14,858
Commercial paper	1,649	—	—	1,649
Total cash and cash equivalents	16,507	—	—	16,507
Investments:				
Commercial paper	20,408	—	(14)	20,394
Corporate debt securities	9,043	—	(9)	9,034
US government & agency securities	16,946	—	(9)	16,937
Total investments	46,397	—	(32)	46,365
Total cash, cash equivalents and investments	$ 62,904	$ —	$ (32)	$ 62,872
Long-term restricted cash:				
Cash	$ 4,500	$ —	$ —	$ 4,500

The following table summarizes the contractual maturities of our cash equivalents and available-for-sale investments, excluding money market funds, as of December 31, 2018:

(in thousands)	Fair Value
Due in one year or less	$ 82,023
Due after one year through five years	1,487
Total	$ 83,510

Substantially all of our marketable debt investments are classified as current based on the nature of the investments and their availability for use in current operations.

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

NOTE 5. BALANCE SHEET COMPONENTS

Inventory

As of December 31, 2018 and 2017, our inventory consisted of the following components:

	December 31,	
(in thousands)	2018	2017
Purchased materials	$ 6,222	$ 8,884
Work in process	7,341	9,994
Finished goods	4,315	4,187
Inventory	$ 17,878	$ 23,065

Property and Equipment, Net

As of December 31, 2018 and 2017, our property and equipment, net, consisted of the following components:

	December 31,	
(in thousands)	2018	2017
Laboratory equipment and machinery	$ 24,111	$ 24,703
Leasehold improvements	29,821	29,728
Computer equipment	9,484	8,301
Software	4,734	4,615
Furniture and fixtures	2,422	2,382
Construction in progress	608	385
	71,180	70,114
Less: Accumulated depreciation	(37,107)	(32,194)
Property and equipment, net	$ 34,073	$ 37,920

Depreciation expense during the years ended December 31, 2018, 2017 and 2016 was $7.2 million, $8.4 million and $3.9 million, respectively.

Accrued Expenses

As of December 31, 2018 and 2017, our accrued expenses consisted of the following components:

(in thousands)	December 31, 2018	2017
Salaries and benefits	$ 8,523	$ 7,570
Accrued product development costs	561	2,034
Accrued Tenant Improvements for Menlo Park building	694	—
Inventory accrual	499	626
Accrued professional services and legal fees	1,588	1,368
Other	958	1,020
Accrued expenses	$ 12,823	$ 12,618

NOTE 6. NOTES PAYABLE

Facility Agreement

Under the terms of our February 2013 debt agreement with Deerfield (the “Facility Agreement”), we received $20.5 million and issued promissory notes in the aggregate principal amount of $20.5 million (the “Notes”). The Notes bear simple interest at a rate of 8.75% per annum, payable quarterly in arrears commencing on April 1, 2013 and on the first business day of each January, April, July and October thereafter. The Facility Agreement has a maximum term of seven years. We received net proceeds of $20.0 million, representing $20.5 million of gross proceeds, less a $500,000 facility fee, before deducting other expenses of the transaction. On June 23, 2017, pursuant to a partial exercise by the Notes holders of their right to elect to receive up to 25% of the net proceeds from any financing that

includes an equity component, we paid $4.5 million of outstanding principal, together with accrued and unpaid interest, to one of the Note holders with proceeds from our underwritten public equity offering. As of December 31, 2018, we had an outstanding principal amount of $16.0 million remaining on the Notes. The principal is due to be repaid in February 2020.

The Facility Agreement also contains various representations and warranties, and affirmative and negative covenants, customary for financings of this type, including restrictions on our ability to incur additional indebtedness or liens on our assets, except as permitted under the Facility Agreement. In addition, the Facility Agreement requires us to maintain consolidated cash and cash equivalents on the last day of each calendar quarter of not less than $2.0 million. As security for our repayment of our obligations under the Facility Agreement, we granted the lenders a security interest in substantially all of our property and interests in property.

Subject to certain exceptions set forth in the Facility Agreement, holders representing a majority of the aggregate principal amount of the outstanding Notes issued pursuant to the Facility Agreement may elect to receive up to 25% of the net proceeds from any financing that includes an equity component. To the extent we raise additional capital in the future through the sale of common stock, including without limitation, sales of common stock pursuant to an "at-the-market" offering program, we may be obligated, at the election of the holders of the Notes, to pay 25% of the net proceeds from any such financing activities as partial payment of the Notes.

Financing Derivative

A number of features embedded in the Notes required accounting for as a derivative, including the indemnification of certain withholding taxes and the acceleration of debt upon (i) a qualified financing, (ii) an event of default, (iii) a Major Transaction, and (iv) the exercise of the warrant via offset to debt principal. These features represent a single derivative (the "Financing Derivative") that was bifurcated from the debt instrument and accounted for as a liability at fair value, with changes in fair value between reporting periods recorded in other income (expense), net.

The estimated fair value of the Financing Derivative was determined by comparing the difference between the fair value of the Notes with and without the Financing Derivative by calculating the respective present values from future cash flows using a 9.6% and 10.3% weighted average market yield at December 31, 2018 and 2017, respectively. The estimated fair value of the Financing Derivative as of December 31, 2018 and 2017 was $0 and $0.2 million, respectively.

Notes

We initially recorded the Notes and Warrants at $14.1 million and $6.4 million, respectively, based upon the relative fair value allocation of the $20.5 million of proceeds. The carrying value of the Notes at the inception of the debt was $12.8 million, resulting in an original issue discount of $7.7 million.

As of both December 31, 2018 and December 31, 2017, we had an outstanding principal amount of $16.0 million for the Notes, net of debt discount of $1.3 million and $2.4 million, respectively, resulting in a net $14.7 million and $13.6 million recorded as "Notes payable, non-current" on the consolidated balance sheets as of December 31, 2018 and 2017, respectively, with repayment of all outstanding principal due in 2020.

As of December 31, 2018, payments due under the Facility Agreement, which include interest and principal, are as follows:

Years ending December 31,	Amount (in thousands)
2019	1,400
2020	16,491
Total remaining payments	17,891
Less: interest and discounts	(3,232)
Notes payable	$ 14,659

NOTE 7. COMMITMENTS AND CONTINGENCIES

Lease

On July 22, 2015, we entered into a lease agreement (the “O’Brien Lease”) with respect to our facility located at 1305 O’Brien Drive, Menlo Park, California (the “O’Brien Premises”). The term of the O’Brien Lease is one hundred thirty-two (132) months. In December 2016, we entered into an amendment to the O’Brien Lease which defined the commencement date of the lease to be October 25, 2016, notwithstanding that such substantial completion did not occur until the first quarter of 2017. Base monthly rent was abated for the first six (6) months of the lease term and thereafter was $540,000 per month during the first year of the lease term, with specified annual increases thereafter until reaching $711,000 per month during the last twelve (12) months of the lease term. If the rent is not received within five days of the due date there will be an additional sum equal to 5% of the amount overdue as a late charge. Any amount not paid within 10 days after receipt of landlord’s written notice will bear interest from the date due until paid, at the lesser rate of (1) the prime rate of interest as published in the Wall Street Journal, plus 2% or (2) the maximum rate allowed by law, in addition to the late payment charge. We were required to establish a letter of credit for the benefits of the landlord and to submit $4.5 million as a deposit for the letter of credit

in October 2015; and, as such, $4.5 million was recorded at such time and continued to be recorded in “Long-term restricted cash” in the consolidated balance sheet as of both December 31, 2018 and December 31, 2017.

The landlord was obligated to construct certain warm shell improvements at the landlord’s cost and expense and provide us with a tenant improvement allowance in the amount of $12.6 million. Construction was completed in phases and we began moving into the O’Brien Premises during January 2017. By the end of the first quarter of 2017, improvements associated with the entire O’Brien Premises were substantially completed. As a result, during the first quarter of 2017 we capitalized $28.8 million of tenant improvements, of which $12.6 million was paid by the landlord as a tenant improvement allowance. As the $12.6 million tenant improvement allowance is accounted for as a lease incentive, we recorded the $12.6 million to “Deferred rent, non-current”, which will be amortized over the lease term of approximately 11 years. In addition, as the premises were completed in phases in 2017, tenant improvements were placed into service in phases once construction was substantially complete and the related asset was ready for its intended use.

As of December 31, 2018, the future annual minimum lease payments under all noncancelable operating leases with remaining terms in excess of one year are as follows:

Years ending December 31,	Amount (in thousands)
2019	$ 6,930
2020	7,056
2021	7,272
2022	7,488
2023	7,704
Thereafter	31,518
Total minimum lease payments	$ 67,968

Rent expense for the years ended December 31, 2018, 2017 and 2016 was $6.2 million, $6.3 million and $0.2 million, respectively. We are also required to pay our share of operating expenses with respect to the facilities in which we operate.

In addition, we had other purchase commitments of an estimated amount of approximately $13.1 million as of December 31, 2018, consisting 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, and acquisition and licensing of intellectual property. 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.

Contingencies

We become subject to 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.

Legal Proceedings

Legal Proceedings Regarding the Merger

In connection with the proposed acquisition of us by Illumina, five lawsuits were filed, with each lawsuit naming us and our directors as defendants. Three putative class action complaints, captioned Wang v. Pacific Biosciences of California, Inc., et al., No. 3:18-cv-7450 (N.D. Cal.), Morrison v. Pacific Biosciences of California, Inc., et al., No. 3:18-cv-7654 (N.D. Cal.), and Speiser v. Pacific Biosciences of California, Inc., et al., No. 3:19-cv-0072 (N.D. Cal.), were filed in the United States District Court for the Northern District of California on December 11, 2018, December 20, 2018, and January 4, 2019, respectively. A fourth putative class action complaint, captioned Rosenblatt v. Pacific Biosciences of California, Inc., et al., No. 1:18-cv-2005 (D. Del.), was filed in the United States District Court for the District of Delaware on December 18, 2018. An individual complaint, captioned Washington v. Pacific Biosciences of California, Inc., et al., No. 5:18-cv-7614 (N.D. Cal.), was filed in the United States District Court for the Northern District of California on December 19, 2018. Each of the lawsuits asserted claims under Section 14(a) and Section 20(a) of the Securities Exchange Act of 1934 in connection with the disclosures contained in our preliminary proxy statement on Schedule 14A, filed with the Securities Exchange Commission (the “SEC”) on December 5, 2018, our definitive proxy statement on Schedule 14A, filed with the SEC on December 18, 2018, or both. The complaints sought a variety of equitable and injunctive relief including, among other things, enjoining the consummation of the acquisition and awarding the plaintiffs costs and attorneys’ fees.

Although we believed that the claims were without merit, we agreed to make supplemental disclosures in exchange for plaintiffs’ agreement that the supplemental disclosures would moot their claims. We made these supplemental disclosures in a proxy statement amendment on Schedule 14A, filed with the SEC on January 18, 2019.

On January 29, 2019, all parties to each of the lawsuits reached an agreement pursuant to which we would pay a total of $300,000 in attorneys' fees to the plaintiffs. On January 29, 2019, each plaintiff filed a voluntary dismissal of his or her lawsuit. As of December 31, 2018, we accrued a total amount of $240,000 for the four lawsuits filed in 2018.

USITC Proceedings

On November 2, 2016, we filed a complaint against Oxford Nanopore Technologies Ltd. ("ONT Ltd."), Oxford Nanopore Technologies, Inc. ("ONT Inc.") and Metrichor, Ltd. ("Metrichor" and, together with ONT Ltd. and ONT Inc., "ONT") with the U.S. International Trade Commission ("USITC") for patent infringement. On December 5, 2016, the USITC provided notice that an investigation had been instituted based on the complaint. We sought exclusionary relief with respect to several ONT products, including ONT's MinION and PromethION devices. The complaint was based on our U.S. Patent No. 9,404,146, entitled "Compositions and methods for nucleic acid sequencing" which covers novel methods for sequencing single nucleic acid molecules using linked double-stranded nucleic acid templates, providing improved sequencing accuracy. On March 1, 2017, we filed an amended complaint to add a second patent in the same patent family, U.S. Patent No. 9,542,527, which was granted on January 10, 2017, to the investigation. We sought, among other things, an exclusion order permanently barring entry of infringing ONT products into the United States, and a cease and desist order preventing ONT from advertising and selling infringing products in the United States. On May 23, 2017, the Administrative Law Judge ("ALJ") assigned to the matter issued an order construing certain claim terms of the asserted patents. On June 8, 2017, ONT filed a summary determination motion to terminate the proceedings based on the ALJ's claim construction decision, and we did not oppose the motion. The ALJ granted the motion on July 19, 2017, and, on July 31, 2017, we filed a petition to review with the USITC to correct what we believe was an incorrect construction of the claims. On September 5, 2017, the USITC issued a notice granting our petition to review the ALJ's claim construction decision. On February 7, 2018, the USITC issued a notice indicating that it had determined to adopt the ALJ's claim construction and terminating the investigation. On February 13, 2018, we filed a petition to appeal the USITC's ruling to the U.S. Court of Appeals for the Federal Circuit. ("Federal Circuit"). An oral hearing for this appeal was held on February 8, 2019. On February 12, 2019, the Federal Circuit filed a judgement affirming the USITC claim construction under Federal Circuit Rule 36 without a written opinion.

U.S. District Court Proceedings

On March 15, 2017, we filed a complaint in the U.S. District Court for the District of Delaware against ONT Inc. for patent infringement (C.A. No. 17-cv-275 ("275 Action")). The complaint is based on our U.S. Patent No. 9,546,400 (the "'400 Patent"), entitled "Nanopore sequencing using n-mers" which covers novel methods for nanopore sequencing of nucleic acid molecules using the signals from multiple monomeric units. This patent was granted on January 17, 2017. We are seeking remedies including injunctive relief, damages and costs. On May 8, 2017, the defendants filed a motion to dismiss the complaint, alleging that the asserted patent claims recite patent ineligible subject matter. On November 9, 2017, the judge denied ONT Inc.'s motion to dismiss. On June 1, 2018, we filed a motion for leave to amend the complaint to add ONT Ltd. as a defendant. On August 20, 2018, the judge granted our motion, and on August 23, 2018, we filed an amended complaint, adding ONT Ltd. as a defendant in the 275 Action. On September 24, 2018, ONT Ltd. filed a motion to dismiss the amended complaint, alleging failure to state a claim.

On September 12, 2018, ONT Inc. filed its answer, defenses and counterclaims in the 275 Action, seeking declaratory judgements of non-infringement and invalidity of the '400 Patent and unenforceability of the '400 Patent based on alleged inequitable conduct before the U.S. Patent and Trademark Office ("USPTO"), as well as antitrust, false advertising, and unfair competition counterclaims. On September 25, 2018, it was stipulated that the motion to dismiss ONT Inc.'s counterclaims that we submitted in the 1353 Action would also serve as our motion to dismiss ONT Inc.'s counterclaims in the 275 Action.

Related to the 275 Action, on March 15, 2018, ONT Inc. filed a petition to institute an inter partes review with the Patent Trial and Appeal Board ("PTAB") of the USPTO, alleging invalidity of the '400 Patent. On July 5, 2018, we filed a preliminary response outlining for the PTAB why the petition should be denied, and no review should be instituted. On September 25, 2018, the PTAB denied ONT Inc.'s petition for institution of the inter partes review for all claims of the '400 Patent.

On September 25, 2017, we filed a second complaint in the U.S. District Court for the District of Delaware against ONT Inc. for patent infringement (C.A. No. 17-cv-1353 ("1353 Action")). The complaint is based on our U.S. Patent No. 9,678,056 (the "'056 Patent") entitled "Control of Enzyme Translation in Nanopore Sequencing", granted June 13, 2017, and U.S. Patent No. 9,738,929 (the "'929 Patent") entitled "Nucleic Acid Sequence Analysis", granted August 22, 2017. We are seeking remedies including injunctive relief, damages and costs. On December 14, 2017, the defendants filed a motion to dismiss the complaint, alleging that the asserted patent claims in the '929 Patent recite patent ineligible subject matter. On March 22, 2018, the judge denied ONT Inc.'s motion to dismiss. On March 28, 2018, we added a claim for infringement of our U.S. Patent No. 9,772,323 (the "'323 Patent"), entitled "Nanopore sequencing using n-mers." On June 1, 2018, we filed a motion for leave to amend the complaint to add ONT Ltd. as a defendant. On August 20, 2018, the judge granted our motion, and on August 23, 2018 we filed an amended complaint, adding ONT Ltd. as a defendant in the 1353 Action. On September 24, 2018, ONT filed a motion to dismiss the amended complaint, alleging failure to state a claim.

On April 25, 2018, ONT Inc. filed its answer, defenses and counterclaims in the 1353 Action, seeking declaratory judgements of non-infringement and invalidity of the '056 and '323 Patents and unenforceability of the '056 and '323 Patents based on alleged inequitable conduct before the USPTO, as well as antitrust, false advertising, and unfair competition counterclaims. On June 15, 2018, we filed a motion to dismiss ONT Inc.'s counterclaims in the 1353 Action and, on June 18, 2018, we filed a motion to bifurcate and stay discovery on ONT Inc.'s antitrust counterclaims in the 1353 Action. On February 19, 2019, the judge granted our motion to dismiss ONT's antitrust, false advertising, and unfair competition counterclaims.

Related to the 1353 Action, on September 24, 2108, ONT Inc. filed a first petition to institute an inter partes review with the PTAB of the USPTO, alleging invalidity of the ’929 Patent. On September 25, 2018, ONT filed a second petition to institute an inter partes review of the ’929 Patent based on the same art and arguments as the first petition. ONT Inc. subsequently filed a motion to withdraw the first petition, which motion was granted. On January 11, 2019, we filed a preliminary response to the second petition outlining for the PTAB why the petition should be denied, and no review should be instituted.

Also related to the 1353 Action, on September 25, 2018, ONT Inc. filed a petition to institute an inter partes review with the PTAB of the USPTO, alleging invalidity of the ’056 Patent. On February 13, 2019, we filed a preliminary response to the second petition outlining for the PTAB why the petition should be denied and no review should be instituted.

A claim construction (or “Markman”) hearing for the U.S. District Court matters was held on December 17, 2018. A trial for the U.S. District Court matters is scheduled to occur in March 2020.

UK and German Court Proceedings

On February 2, 2017, we filed a claim in the High Court of England and Wales against ONT Ltd. and Metrichor for infringement of Patent EP(UK) 3 045 542 (the “’542 Patent”), which is in the same patent family as the patents asserted in the USITC action referred to above. We sought remedies including injunctive relief, damages, and costs. On March 27, 2017, the defendants in the case filed their defense and counterclaim, denying infringement and seeking a declaration that the asserted patent is invalid. We filed our reply and defense to counterclaim on April 12, 2017. A case management conference was held on June 13, 2017. On August 31, 2017 we added a claim for infringement of a newly granted divisional, EP(UK) 3 170 904 (the “’904 Patent”). On December 22, 2017, ONT Ltd. added to the action a request for declaration of non-infringement of its 1D2 product. On January 12, 2018 we served reply to ONT Ltd.’s request for a declaration of non-infringement, asserting infringement of both patents by ONT’s 1D2 product. A trial for these matters was scheduled to occur in May 2018.

On April 21, 2017, ONT Ltd. and Harvard University filed a claim against us in the High Court of England and Wales for infringement of Patent EP(UK) 1 192 453 (the “’453 Patent”), a patent owned by Harvard University and entitled “Molecular and atomic scale evaluation of biopolymers,” and for which ONT Ltd. alleges it holds an exclusive license. ONT Ltd. and Harvard University sought remedies including injunctive relief, damages, and costs. On April 25, 2017, ONT Ltd. announced that it also had filed a claim against us in the District Court of Mannheim, Germany, for infringement of the German version of the patent. On November 2, 2017, we filed our statement of defense in the German infringement matter and we also filed a separate nullity action in Germany to establish that the ’453 Patent is invalid. On December 6, 2017, we filed a cross-complaint in the German infringement matter alleging ONT Ltd.’s infringement in Germany of our ’542 Patent. The trial date for the German infringement matter and cross-complaint was set for July 27, 2018. A trial for the UK matter was scheduled to occur in March 2019.

On May 8, 2018, the parties entered a settlement of all UK and German court proceedings pending as of such date. Under the terms of the settlement, ONT agreed not to make, dispose of, use or import any “2D” nanopore sequencing products, or to induce or assist others to carry out a “2D” sequencing process, in the UK or Germany, through the end of 2023. During this time, we agreed not to assert the ’542 Patent and ’904 Patent against either ONT or its customers in the UK or Germany. Accordingly, the High Court of England and Wales entered an order staying our UK action against ONT through the end of 2023. As part of the settlement, ONT and Harvard University dismissed their UK and German actions under the ’453 Patent and agreed not to assert the ’453 Patent against us or our customers through the end of 2023. We correspondingly agreed to dismiss our separate German nullity action seeking to invalidate the ’453

Patent, which expires on June 22, 2020.

Related to these proceedings, on August 15, 2017, ONT Ltd. filed a notice of opposition to our ’542 Patent with the European Patent Office, and on August 16, 2017, an anonymous party filed a second notice of opposition to the same patent, each alleging invalidity of the patent. On April 5, 2018, we filed our response to the combined opposition. On January 22, 2019, an oral hearing in the matter occurred and the European Patent Office rendered a decision in favor of the opponents. We believe the European Patent Office erred in its decision, which we intend to appeal. The ’542 Patent will remain in effect while the appeal is pending. Furthermore, our settlement agreement with ONT Ltd. and Harvard University remains in effect.

Also related to these proceedings, on May 16, 2018, ONT Ltd. filed a notice of opposition to our ’904 Patent with the European Patent Office alleging invalidity of the ’904 Patent. On October 11, 2018, we filed our response to the opposition. An oral hearing in the matter is scheduled for July 16, 2019.

Litigation is inherently unpredictable, and it is too early in the proceedings to predict the outcome of these lawsuits or any impact they may have on us. As such, the estimated financial effect associated with these complaints cannot be made as of the date of filing of this Annual Report on Form 10-K. Litigation is a significant ongoing expense with an uncertain outcome, and has been in the past and may in the future be a material expense for us. Management believes this investment is important to protect our intellectual property position, even recognizing the uncertainty of the outcome.

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.

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 judgements, fines, settlements and expenses related to claims arising against such directors and officers to the fullest extent permitted under Delaware law, our bylaws and 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 fund raising 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 connection with such fund raising 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 at December 31, 2018.

NOTE 8. INCOME TAXES

We are subject to income taxes in the United States and certain states in which we operate, and we use estimates in determining our provisions for income taxes. Significant management judgement 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 judgements 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.

During the years ended December 31, 2018, 2017, and 2016 income before taxes from U.S. operations were ($103.1) million, ($92.7) million and ($74.0) million, respectively, and income before taxes from foreign operations was $0.8 million, $1.0 million and ($0.3) million, respectively.

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

	Years ended December 31,		
	2018	2017	2016
Statutory tax rate	21.0 %	35.0 %	35.0 %
State tax rate, net of federal benefit	3.5	8.6	5.4
Stock-based compensation	(1.6)	(1.9)	(1.6)
Tax credits	2.0	3.6	5.0
Remeasurement of deferred taxes due to tax reform	-	(123.3)	-
Other	(0.1)	0.3	(0.9)
Change in valuation allowance	(24.8)	77.7	(42.9)
Total	- %	- %	- %

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,	
Deferred tax assets:	2018	2017
Net operating loss carryforwards	$ 212,424	$ 194,440
Research and development credits	42,635	39,145
Accruals and reserves	19,356	14,480
Deferred rent	3,315	3,360
Total deferred tax assets	277,730	251,425
Less: Valuation allowance	(275,540)	(249,202)
Total deferred tax assets:	2,190	2,223
Fixed assets	(2,190)	(2,223)
Total deferred tax liabilities	(2,190)	(2,223)
Net deferred tax assets	$ —	$ —

At December 31, 2018, we maintained a full valuation allowance against all of our deferred tax assets which totaled $275.5 million, including net operating loss carryforwards and research and development credits of $212.4 million and $42.6 million, respectively.

Due to uncertainties surrounding the realization of deferred tax assets through future taxable income, we have provided a full valuation allowance and, therefore, have not recognized any benefits from net operating losses and other deferred tax assets.

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. Accordingly, we have provided a full valuation allowance against our net deferred tax assets as of December 31, 2018 and 2017, respectively.

For the year ended December 31, 2018, our valuation allowance increased to $275.5 million primarily because of an increase to our net operating losses, and credits and changes in book to tax timing differences. For the year ended December 31, 2017, our valuation allowance decreased to $249.2 million primarily due to the Tax Cuts and Job Act of 2017.

As of December 31, 2018, we had a net operating loss carryforward for federal income tax purposes of approximately $832 million, portion of which will begin to expire in 2024. We had a total state net operating loss carryforward of approximately $566.6 million, which have expiration dates of 2018 and beyond. 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 $33.7 million, which will begin to expire in 2024 if not utilized and state research credits of approximately $34.4 million which have no expiration date. These tax credits are subject to the same limitations discussed above.

As of December 31, 2018, our total unrecognized tax benefit was $20.4 million.

A reconciliation of the beginning and ending unrecognized tax benefit balance is as follows (in thousands):

Decrease in balance related to tax positions taken in prior year	$ (44)
Increase in balance related to tax positions taken during current year	1,827
Balance as of December 31, 2015	18,735
Increase in balance related to tax positions taken in prior year	1,942
Decrease in balance related to tax positions taken in current year	(3,892)
Balance as of December 31, 2016	16,785
Decrease in balance related to tax positions taken in prior year	—
Increase in balance related to tax positions taken during current year	2,001
Balance as of December 31, 2017	18,786
Decrease in balance related to tax positions taken in prior year	—
Increase in balance related to tax positions taken during current year	1,661
Balance as of December 31, 2018	$ 20,447

Our practice is to recognize interest and/or penalties related to income tax matters in income tax expense. As of December 31, 2018 and 2017, 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, 2015 to present and December 31, 2014 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.

On December 22, 2017, the 2017 Tax Cuts and Jobs Act (Tax Act) was enacted into law and the new legislation contains several key tax provisions that affected us, including a one-time mandatory transition tax on accumulated foreign earnings and a reduction of the corporate income tax rate to 21% effective January 1, 2018, among others. We are required to recognize the effect of the tax law changes in the period of enactment, such as determining the transition tax, remeasuring our U.S. deferred tax assets and liabilities as well as reassessing the net realizability of our deferred tax assets and liabilities. In December 2017, the SEC staff issued Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cuts and Jobs Act (SAB 118), which allowed us to record provisional amounts during a measurement period not to extend beyond one year of the enactment date. As a result, we previously provided a provisional estimate of the effect of the Tax Act in our financial statements. In the fourth quarter of 2018, we completed our analysis to determine the effect of the Tax Act and recorded immaterial adjustments as of December 31, 2018.

NOTE 9. 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, 2018 and 2017, 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.

"At-the-Market" Offering

For the year ended December 31, 2017, we issued 3.2 million shares of our common stock at an average price of $3.86 per share through our "at-the-market" offering program, resulting in net proceeds of $11.9 million.

We terminated our "at-the-market" offering program in June 2017. We paid a commission equal to 3% of the gross proceeds from the sale of shares of our common stock under the sales agreement.

Underwritten Public Equity Offerings

In August 2017, we filed a shelf registration statement on Form S-3 with the SEC pursuant to which we may, from time to time, sell up to an aggregate of $150.0 million of our common stock, preferred stock, depository shares, warrants, units or debt securities. On August 18, 2017, the registration statement was declared effective by the SEC, which allows us to access the capital markets for the three-year period following this effective date.

In June 2017, we issued and sold a total of 17.7 million shares of our common stock at a price to the public of $3.10 per share in an underwritten public offering. We paid a commission equal to 4% of the gross proceeds from the sale of shares of our common stock under the underwriting agreement. The total proceeds to us from the offering, after deducting the underwriting commission and offering expenses, were approximately $52.5 million.

For the year ended December 31, 2018, we issued 30.6 million shares of our common stock through our two underwritten public offerings with an average offering price of $3.38 per share. The total net proceeds to us from the two offerings, after deducting the underwriting commissions and offering expenses, were approximately $97.5 million.

Subject to certain exceptions set forth in our Facility Agreement, holders of our Notes may elect to receive up to 25% of the net proceeds from financing activities that include an equity component as prepayment of the Notes to be applied first, to accrued and unpaid interest and second, to principal. However, in both February 2018 and September 2018, holders representing a majority of the aggregate principal amount of the outstanding Notes waived such right in connection with the issuance and sale of shares of common stock in our public offering. In June 2017, pursuant to a partial exercise by the Notes holders of this right, we repaid $4.5 million of outstanding principal, together with accrued and unpaid interest, to one of the Notes holders with proceeds from our underwritten public equity offering.

Warrants

In connection with the execution of the Facility Agreement, we issued immediately exercisable warrants to purchase 5.5 million shares of common stock at an exercise price per share initially equal to $2.63, all of which were net exercised during 2016 resulting in the issuance of approximately 4.2 million shares. The cashless net exercise of the warrants did not result in any additional funds being collected by us. As of December 31, 2018 and 2017, no warrants remained outstanding.

Equity Plans

As of December 31, 2018, we had three active equity plans: 1) the 2010 Equity Incentive Plan or “2010 Plan,” 2) the 2010 Outside Director Equity Incentive Plan or “2010 Director Plan,” and 3) the 2010 ESPP, all of which we adopted upon the effectiveness of our initial public offering in October 2010. Prior to the adoption of these plans, we granted options pursuant to the 2004 Equity Incentive Plan and 2005 Stock Plan. Upon termination of the predecessor plans, the shares available for grant at the time of termination and shares subsequently returned to the plans upon forfeiture or option termination, were transferred to the successor plan in effect at the time of share return.

Under the 2010 Plan, with the approval of the Compensation Committee of the Board of Directors, we may grant restricted stock, Restricted Stock Units (“RSU”), stock appreciation rights and new shares of common stock upon exercise of stock options.

2010 Equity Incentive Plan and Outside Director Equity Incentive Plan

Stock options granted under the 2010 Plan may be either Incentive Stock Option ("ISO") or Non-Qualified Stock Option ("NSO"). ISOs may be granted only to employees. NSOs may be granted to employees, consultants and directors. Stock options under the 2010 Plan may be granted with a term of up to ten years and at prices no less than the fair market value of our common stock on the date of grant. To date, stock options granted to existing employees generally vest over four years on a monthly basis and stock options granted to new employees vest at a rate of 25% upon the first anniversary of the vesting commencement date and 1/48th per month thereafter. In January 2019, an additional 7.5 million shares were reserved under the 2010 Plan.

Stock options granted under the 2010 Director Plan provide for the grant of NSOs. Stock options under the 2010 Plan may be granted with a term of up to ten years and at prices no less than the fair market value of our common stock on the date of grant. To date, stock options granted to existing directors generally vest over one year on a monthly basis and stock options granted to new directors generally vest over three years at a rate of one-third upon the first anniversary of the vesting commencement date and 1/36th per month thereafter.

As of December 31, 2018 we had an aggregate of 11.3 million shares of common stock reserved for future issuance under the 2010 Plan and 2010 Director Plan.

Stock Options

The following table summarizes stock option activity for all stock option plans for the year ended December 31, 2018 (in thousands, except per share amounts):

		Stock Options Outstanding		
	Shares available for grant	Number of shares	Exercise price	Weighted average exercise price
Balances, December 31, 2017	6,795	25,404	$ 1.16 – 16.00	$ 6.10
Additional shares reserved	6,976			
Options granted	(4,204)	4,204	$ 2.47 – 4.28	$ 2.57
Options exercised	—	(1,720)	$ 1.16 – 7.05	$ 3.73
Options canceled	2,712	(2,712)	$ 1.16 – 16.00	$ 6.19
Balances, December 31, 2018	12,279	25,176	$ 1.16 – 16.00	$ 5.66

The expired options as of December 31, 2018 totaled 1.2 million with exercise price range from $1.16 to $16.00 and weighted average exercise price per share of $7.15.

The following table summarizes information with respect to stock options outstanding and exercisable under the plans at December 31, 2018:

	Options Outstanding			Options Exercisable	
Exercise price	Number outstanding	Weighted average remaining contractual life (Years)	Weighted average exercise price	Number vested	Weighted average exercise price
$ 0.00 – 1.60	438,233	3.84	$ 1.18	438,233	$ 1.18
$ 1.60 – 3.20	6,141,372	7.30	$ 2.53	2,877,885	$ 2.47
$ 3.20 – 4.80	3,587,706	4.63	$ 4.07	3,064,649	$ 4.10
$ 4.80 – 6.40	6,390,401	6.98	$ 5.45	4,258,318	$ 5.53

$ 6.40 – 8.00	2,868,379	5.74	$ 7.19	2,604,086	$ 7.14
$ 8.00 – 9.60	3,560,966	5.24	$ 8.77	2,853,592	$ 8.76
$ 9.60 – 11.20	1,293,448	5.82	$ 10.20	1,035,715	$ 10.23
$ 11.20 – 12.80	449,502	2.00	$ 12.13	449,502	$ 12.13
$ 12.80 – 14.40	323,250	1.08	$ 13.94	3,227,035	$ 13.94
$ 14.40 – 16.00	122,750	1.49	$ 15.99	122,750	$ 15.99
	25,176,007	6.03	$ 5.66	18,027,465	$ 6.09

The aggregate intrinsic value of the outstanding and exercisable options presented in the table above totaled $58.0 million and $35.9 million, respectively. The aggregate intrinsic value represents the total pretax intrinsic value (i.e., the difference between $7.40, our closing stock price on the last trading day of our fourth quarter of 2018 and the 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, 2018. The aggregate intrinsic value changes at each reporting date based on the fair market value of our common stock. The weighted average remaining contractual life for exercisable options is 5.08 years.

The vested and expected to vest options as of December 31, 2018 totaled 22,475,000, with aggregate intrinsic value of $50.2 million, weighted average exercise price per share of $5.75 and weighted average remaining contractual life of 5.75 years.

The total intrinsic value of stock options exercised during the years ended December 31, 2018, 2017 and 2016 was $5.3 million, $1.7 million and $4.7 million, respectively.

The total fair value of stock options vested during the years ended December 31, 2018, 2017 and 2016 was $3.9 million, $6.4 million and $20.7 million, respectively.

Time-based RSUs

Beginning in the first quarter of 2018, the Compensation Committee of the Board of Directors has approved awards of RSUs with time-based vesting from the 2010 Plan to certain employees. Each RSU represents one equivalent share of our common stock to be awarded after the vesting period. These RSUs vest over four years at a rate of 25% annually. The fair value for these RSUs is 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. The number of RSUs vested includes shares of common stock that we will withhold on behalf of employees to satisfy the minimum statutory tax withholding requirements. RSUs that are expected to vest are net of estimated future forfeitures.

The following table summarizes the time-based RSUs activity for the year ended December 31, 2018 (in thousands, except per share amounts):

	Number of shares	Weighted average grant date fair value
RSUs outstanding at December 31, 2017	—	$ —
RSUs granted	413	3.14
RSUs released	—	—
RSUs forfeited	(42)	2.54
Unvested RSUs outstanding at December 31, 2018	371	$ 3.20

For the years ended December 31, 2018, we recognized compensation expense of $193,000 related to time-based RSUs.

Performance-based RSUs

During the first quarter of 2018, the Compensation Committee of the Board of Directors approved awards of RSUs with performance-based vesting from the 2010 Plan to certain employees. Each RSU represents one equivalent share of our common stock to be awarded upon vesting at the end of the performance periods, if specific performance goals set by the Compensation Committee of the Board of Directors are achieved. No RSUs with performance-based vesting will vest if the performance goals are not met. The fair value of these RSUs is based on the closing price of our common stock on the date of grant. We make a quarterly probability assessment as to whether the performance goals will be achieved. Changes in our assessment of the probability of vesting results in adjustments to stock-based compensation, which may include either a cumulative catch-up of expense or a reduction of expense depending on whether the likelihood of vesting has increased or decreased, that is recognized in the period such determination is made. The RSUs do not entitle participants to the rights of holders of common stock, such as voting rights, until the shares are issued. The number of RSUs vested includes shares of common stock that we will withhold on behalf of employees to satisfy the minimum statutory tax withholding requirements. RSUs that are expected to vest are net of estimated future forfeitures.

The following table summarizes the performance-based RSUs activity for the year ended December 31, 2018 (in thousands, except per share amounts):

	Number of shares	Weighted average grant date fair value
PSUs outstanding at December 31, 2017	—	$ —
PSUs granted	657	2.58
PSUs released	—	—
PSUs forfeited	(71)	2.54
Unvested PSUs outstanding at December 31, 2018	586	$ 2.58

For the year ended December 31, 2018, we recognized compensation expense of $614,000 related to performance-based RSUs.

2010 Employee Stock Purchase Plan

We adopted the ESPP in October 2010. Our 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 then be terminated and new offering period comes to place.

For the years ended December 31, 2018, 2017 and 2016, 1,674,960 shares, 1,289,663 shares and 1,259,239 shares of common stock were purchased under the ESPP, respectively. As of December 31, 2018, 1,952,507 shares of our common stock remain available for issuance under our ESPP. The ESPP provides for an annual increase to the shares available for issuance at the beginning of each calendar

year equal to 2% of the common shares then outstanding. During January 2019, an additional 3.0 million shares were reserved under the ESPP.

Per the terms of the Merger Agreement, the 2010 ESPP Plan will be terminated after the March 1, 2019 ESPP purchase. As a result, approximately $2.5 million of ESPP expense was accelerated and recognized in the fourth quarter of 2018.

Stock-based Compensation

Total stock-based compensation expense consists of the following (in thousands):

	Years Ended December 31,		
	2018	2017	2016
Cost of revenue	$ 3,124	$ 2,311	$ 2,133
Research and development	10,076	8,506	8,257
Sales, general and administrative	9,953	9,535	9,172
Total stock-based compensation expense	$ 23,153	$ 20,352	$ 19,562

As of December 31, 2018 and 2017, $0.7 million and $0.4 million of stock-based compensation cost was capitalized in inventory on our consolidated balance sheets, respectively.

The tax benefit of stock-based compensation expense was immaterial for the years ended December 31, 2018, 2017 and 2016.

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. For the years ended December 31, 2018, 2017 and 2016, the weighted average fair value at grant date per stock option was $1.50, $3.08 and $5.47, respectively. We recorded stock-based compensation expense for stock options of $15.5 million, $17.2 million and $15.7 million for the years ended December 31, 2018, 2017 and 2016, respectively.

For the years ended December 31, 2018, 2017 and 2016, the fair value of employee stock options was estimated using the following weighted average assumptions:

	Years Ended December 31,		
	2018	2017	2016
Expected term (years)	5.2 years	6.1 years	6.1 years

Expected volatility	66.8%	70.0%	70.0%
Risk-free interest rate	2.6%	2.1%	1.5%
Dividend yield	—	—	—

As of December 31, 2018, $14.3 million of total unrecognized compensation expense related to stock options was expected to be recognized over a weighted-average period of 2.0 years. Future option grants will increase the amount of compensation expense to be recorded in those future periods.

Cash received from option exercises for the years ended December 31, 2018, 2017 and 2016 was $6.3 million, $3.6 million and $2.5 million, respectively.

ESPP

We estimated the fair value of shares to be issued under the ESPP using the Black-Scholes option pricing model. For the years ended December 31, 2018, 2017 and 2016, weighted average fair value at grant date for shares to be issued under the ESPP was $1.47, $2.28 and $4.21, respectively. We recorded stock-based compensation expense for ESPP of $6.8 million, $3.1 million and $3.7 million for the years ended December 31, 2018, 2017 and 2016, respectively.

Per the terms of the Merger Agreement, the ESPP will be terminated after the March 1, 2019 ESPP purchase. As a result, approximately $2.5 million of ESPP expense was accelerated and recognized in the fourth quarter of 2018.

For the years ended December 31, 2018, 2017 and 2016, the fair value of shares to be issued under the ESPP was estimated using the following assumptions:

	Years Ended December 31,		
	2018	2017	2016
Expected term (years)	0.5 - 2.0	0.5 - 2.0	0.5 - 2.0
Expected volatility	65% - 67%	70.0%	70.0%
Risk-free interest rate	1.3%-2.7%	0.8%-1.4%	0.5%-0.9%
Dividend yield	—	—	—

Cash received through the ESPP for the years ended December 31, 2018, 2017 and 2016 was $3.4 million, $5.3 million and $5.2 million, respectively.

NOTE 10. NET LOSS PER SHARE

The following options outstanding, time-based RSUs and performance-based RSUs 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:

	Years Ended December 31,		
(in thousands)	2018	2017	2016
Options to purchase common stock	25,176	25,404	22,501
RSUs with time-based vesting	371	—	—
RSUs with performance-based vesting	586	—	—

NOTE 11. 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 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. Revenue by geographic region is based on the ship to address on the customer order.

A summary of our revenue by geographic location for the years ended December 31, 2018, 2017 and 2016 is as follows, with Roche related contractual revenue classified as revenue from the United States:

	Years Ended December 31,		
(in thousands)	2018	2017	2016
North America	$ 35,598	$ 40,641	$ 50,871
Europe (including the Middle East and Africa)	13,958	14,026	21,132
Asia Pacific	29,070	38,801	18,711
Total	$ 78,626	$ 93,468	$ 90,714

NOTE 12. UNAUDITED SELECTED QUARTERLY FINANCIAL DATA

The following tables summarize the unaudited quarterly financial data for the last two fiscal years:

	Fiscal 2018 Quarter Ended			
(in thousands, except per share data)	March 31,	June 30,	September 30,	December 31,
Total revenue	$ 19,362	$ 21,578	$ 18,160	$ 19,526
Total gross profit	7,296	8,862	3,192	5,746
Total operating expenses	31,245	30,607	27,862	36,369
Loss from operations	(23,949)	(21,745)	(24,670)	(30,623)
Net loss	(24,179)	(22,540)	(25,044)	(30,799)
Basic and diluted net loss per share	$ (0.20)	$ (0.17)	$ (0.19)	$ (0.21)
Weighted average shares used in computing net loss per share	123,768	131,882	135,130	149,314

	Fiscal 2017 Quarter Ended			
(in thousands, except per share data)	March 31,	June 30,	September 30,	December 31,
Total revenue	$ 24,915	$ 20,073	$ 23,545	$ 24,935
Total gross profit	8,937	8,001	8,227	9,494
Total operating expenses	32,236	32,388	29,796	30,023
Loss from operations	(23,299)	(24,387)	(21,569)	(20,529)
Net loss	(23,867)	(25,539)	(22,021)	(20,762)
Basic and diluted net loss per share	$ (0.26)	$ (0.26)	$ (0.19)	$ (0.18)
Weighted average shares used in computing net loss per share	92,970	97,360	115,771	116,259

NOTE 13. SUBSEQUENT EVENT

As disclosed in our Current Report on Form 8-K filed with the Securities and Exchange Commission on February 19, 2019, our board of directors (the “Board”) reinstated the base salaries and target bonus opportunities of Michael Hunkapiller, Ph.D., our Chief Executive Officer, and Susan K. Barnes, our Chief Financial Officer, as part of our annual executive compensation review process.

Increases in Base Salaries: On February 15, 2019, the following annual base salary increases for Dr. Hunkapiller and Ms. Barnes were implemented, effective January 1, 2019:

Name	2018 Base Salary	2019 Base Salary
Michael Hunkapiller, Ph.D.	$ 1.00	$ 582,900
Susan K. Barnes	$ 1.00	$ 401,500

2019 Performance Bonuses: In connection with the annual base salary increases noted above, for our 2019 fiscal year, Dr. Hunkapiller's annual target bonus opportunity was set at 100% of his base salary and Ms. Barnes' annual target bonus opportunity was set at 65% of her base salary. Consistent with prior years, Dr. Hunkapiller and Ms. Barnes did not participate in our 2018 bonus plan. The 2019 bonuses for both Dr. Hunkapiller and Ms. Barnes will be based upon the achievement of performance objectives that consist of corporate operational, product performance and financial metrics, each with separate, varied weightings, and that are aggressive, but attainable, and align the compensation of Dr. Hunkapiller and Ms. Barnes with the priorities for our company.

2019 RSU Grant: In addition, on February 15, 2019, we granted a restricted stock unit award to each of Dr. Hunkapiller and Ms. Barnes covering 38,750 shares of our common stock and 21,250 shares of our common stock, respectively (the "RSU Awards"). The RSU Awards are scheduled to vest on the earlier of the (i) one-year anniversary of the date of grant of the RSU Awards and (ii) the completion of the Merger, subject to the recipient's continued service with us through the vesting date.

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, and our chief financial 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). Under the supervision and with the participation of our management, including our Chief Executive Officer, Chief Financial Officer and Principal Accounting Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in Internal Control — Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (COSO). Based on our evaluation under this framework our management concluded that our internal control over financial reporting was effective as of December 31, 2018.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting identified in connection with the valuation required by paragraph (d) of Exchange Act Rules 13a–15 or 15d–15 that occurred during our fourth fiscal quarter that have materially affected or are reasonably likely to materially affect, our internal control over financial reporting.

The effectiveness of our internal control over financial reporting as of December 31, 2018, has been audited by Ernst &Young LLP, our independent registered public accounting firm, as stated in their report which is included as follows.

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REPORT OF INDEPENDENT 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, 2018, 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, 2018, 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 2018 consolidated financial statements of the Company and our report dated February 26, 2019 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 US 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

Redwood City, California

February 26, 2019

ITEM 9B.OTHER INFORMATION

None.

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 2019 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 2019 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 definitive proxy statement with respect to our 2019 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 definitive proxy statement with respect to our 2019 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 ACCOUNTING FEES AND SERVICES.

Information responsive to this item is incorporated herein by reference to our definitive proxy statement with respect to our 2019 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.

Exhibit Index

Exhibit Number	Description	Incorporated by reference herein		
		Form	Exhibit No.	Filing Date
2.1	Agreement and Plan of Merger, dated as of November 1, 2018, by and among Illumina, Inc., FC Ops Corp. and Pacific Biosciences of California, Inc.	8-K	2.1	November 5, 2018
3.1	Amended and Restated Certificate of Incorporation	10-K	3.1	March 23, 2011
3.2	Second Amended and Restated Bylaws of Pacific Biosciences of California, Inc.	8-K	3.1	November 5, 2018
4.1	Specimen Common Stock Certificate	S-1/A	4.1	October 1, 2010
10.1+	Form of Director and Executive Officer Indemnification Agreement	S-1	10.1	August 16, 2010
10.2+	2005 Stock Plan and forms of option agreements thereunder	S-1	10.3	August 16, 2010
10.3	2010 Equity Incentive Plan	S-1	10.4	August 16, 2010
10.4+	2010 Equity Incentive Plan forms of agreement	10-Q	10.1	May 2, 2018
10.5+	2010 Employee Stock Purchase Plan and forms of agreement thereunder	S-1	10.5	August 16, 2010
10.6+	2010 Outside Director Equity Incentive Plan	S-1	10.6	August 16, 2010
10.7+	2010 Outside Director Equity Incentive Plan forms of agreement	10-Q	10.2	May 2, 2018
10.8†	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
10.9†	License Agreement by and between the Registrant and GE Healthcare Bio-Sciences Corp., dated as of September 11, 2006	S-1/A	10.9	October 22, 2010
10.10†	Exclusive License Agreement by and between the Registrant and Indiana University Research and Technology Corporation, dated May 15, 2005	S-1/A	10.10	October 19, 2010
10.11	Industrial Lease Agreement by and between the Registrant and AMB Property, L.P., dated December 10, 2009	S-1	10.13	August 16, 2010
10.12	Third Amendment to the December 10, 2009 Industrial Lease by and between the Registrant and AMB Property, L.P. dated December 29, 2010	10-K	10.14	March 23, 2011
10.13	Industrial Lease Agreement by and between the Registrant and AMB Property, L.P., dated September 24, 2009	S-1	10.14	August 16, 2010
10.14	Third Amendment to the September 24, 2009 Industrial Lease by and between the Registrant and AMB Property, L.P. dated December 29, 2010	10-K	10.16	March 23, 2011
10.15	First Amendment to the September 24, 2009 Industrial Lease Agreement by and between the Registrant and AMB Property, L.P., dated as of May 19, 2010	S-1	10.15	August 16, 2010
10.16	Industrial Lease Agreement by and between the Registrant and AMB Property, L.P, dated February 8, 2010	S-1	10.16	August 16, 2010
10.17	First Amendment to the February 8, 2010 Industrial Lease by and between the Registrant and AMB Property, L.P. dated December 29,	10-K	10.19	March 23, 2011

	2010			
10.18	Lease by and between the Registrant and Willow Park Holding Company I, L.P. dated December 17, 2010	10-K	10.20	March 23, 2011
10.19	Lease by and between the Registrant and AMB Property, L.P. dated December 17, 2010	10-K	10.21	March 23, 2011
10.20	Lease by and between the Registrant and Willow Park Holding Company II, L.P. dated December 17, 2010	10-K	10.22	March 23, 2011

Exhibit Number	Description	Incorporated by reference herein		
		Form	Exhibit No.	Filing Date
10.21+	Letter Relating to Employment Terms by and between the Registrant and Susan K. Barnes effective September 15, 2010	S-1/A	10.19	September 20, 2010
10.22+	Change in Control Severance Agreement by and between the Registrant and Susan K. Barnes effective September 9, 2010	S-1/A	10.20	September 20, 2010
10.23+	Letter Relating to Employment Terms by and between the Registrant and James Michael Phillips effective September 15, 2010	S-1/A	10.23	September 20, 2010
10.24+	Change in Control Severance Agreement by and between the Registrant and James Michael Phillips effective September 9, 2010	S-1/A	10.24	September 20, 2010
10.25+	Employment Agreement by and between the Registrant and Michael Hunkapiller dated January 5, 2012	10-K	10.32	March 1, 2012
10.26+	Change in Control Severance Agreement by and between the Registrant and Michael Hunkapiller dated January 5, 2012	10-K	10.33	March 1, 2012
10.27	Controlled Equity Offering Sales Agreement, dated October 5, 2012, by and between the Registrant and Cantor Fitzgerald & Co.	8-K	10.1	October 5, 2012
10.28	Amendment No. 1 to Controlled Equity Offering Sales Agreement, dated November 8, 2013, by and between the Registrant and Cantor Fitzgerald & Co.	8-K	10.1	November 12, 2013
10.29	Amendment No. 2 to Controlled Equity Offering Sales Agreement, dated February 3, 2015, by and between the Registrant and Cantor Fitzgerald & Co.	8-K	10.1	February 3, 2015
10.30+	Letter Agreement between the Registrant and Michael Hunkapiller, dated December 14, 2012	8-K	10.1	December 14, 2012
10.31+	Letter Agreement between the Registrant and Susan K. Barnes, dated December 14, 2012	8-K	10.2	December 14, 2012
10.32	Facility Agreement, dated February 5, 2013 by and among the Registrant and the entities listed on the signature pages thereof.	8-K	10.1	February 5, 2013
10.33	Security Agreement, dated February 5, 2013 by and among Pacific Biosciences of California, Inc. and the entities listed on the signature pages thereof.	8-K	10.3	February 5, 2013
10.34	Fifth Amendment to Lease Agreement with Peninsula Innovation Partners, LLC, dated March 30, 2015.	8-K	10.1	April 1, 2015
10.35	Fifth Amendment to Lease Agreement with Peninsula Innovation Partners, LLC, dated March 30, 2015.	8-K	10.2	April 1, 2015
10.36	Second Amendment to Lease Agreement with Peninsula Innovation Partners, LLC, dated March 30, 2015.	8-K	10.3	April 1, 2015
10.37	Second Amendment to Lease Agreement with Peninsula Innovation Partners, LLC, dated March 30, 2015.	8-K	10.4	April 1, 2015
10.38	Second Amendment to Lease Agreement with Peninsula Innovation Partners, LLC, dated March 30, 2015.	8-K	10.5	April 1, 2015
10.39	Second Amendment to Lease Agreement with Peninsula Innovation Partners, LLC, dated March 30, 2015.	8-K	10.6	April 1, 2015
10.40		8-K	10.7	April 1, 2015

	Third Amendment to Lease Agreement with Peninsula Innovation Partners, LLC, dated March 30, 2015.			
10.41	Lease Amendment Agreement by and between the Registrant and Peninsula Innovation Partners, LLC, dated July 23, 2015	10-Q	10.1	August 5, 2015

Exhibit Number	Description	Incorporated by reference herein		
		Form	Exhibit No.	Filing Date
10.42†	Lease Agreement by and between the Registrant and Menlo Park Portfolio II, LLC, dated July 22, 2015.	10-Q	10.2	August 5, 2015
10.43+	Letter Agreement between the Registrant and Michael Hunkapiller, dated May 17, 2016.	8-K	10.1	May 19, 2016
10.44+	Letter Agreement between the Registrant and Susan K. Barnes, dated May 17, 2016.	8-K	10.2	May 19, 2016
10.45†	Second Lease Amendment Agreement by and between the Registrant and Peninsula Innovation Partners, LLC, dated June 10, 2016.	10-Q	10.1	August 4, 2016
10.46+	Employment Agreement by and between the Registrant and Kevin Corcoran dated November 21, 2007.	10-K	10.48	March 6, 2017
10.47+	Change in Control Severance Agreement by and between the Registrant and Kevin Corcoran effective September 9, 2010.	10-K	10.49	March 6, 2017
10.48†	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
10.49	Third Lease Amendment Agreement by and between the Registrant and Peninsula Innovation Partners, LLC, dated January 27, 2017.	10-K	10.51	March 6, 2017
10.50	Fourth Lease Amendment Agreement by and between the Registrant and Peninsula Innovation Partners, LLC, dated May 31, 2017.	10-Q	10.1	August 2, 2017
10.51	Fifth Lease Amendment Agreement by and between the Registrant and Peninsula Innovation Partners, LLC, dated September 28, 2017.	10-Q	10.1	November 2, 2017
10.52+	Letter relating to Employment Terms by and between the Registrant and Kathy Ordoñez effective October 30, 2017.	10-Q	10.2	November 2, 2017
10.53+	Change in Control Severance Agreement by and between the Registrant and Kathy Ordoñez effective October 30, 2017.	10-Q	10.3	November 2, 2017
10.54	First Amendment of Facility Agreement between the Registrant and Deerfield Private Design Fund II, L.P., Deerfield Private Design	10-K	10.53	February 26, 2018

	International II, L.P. and Deerfield Special Situation Fund, L.P., dated November 30, 2017.
21.1	List of Subsidiaries of the Registrant
23.1	Consent of Independent Registered Public Accounting Firm
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
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
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
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
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Labels Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

+Indicates management contract or compensatory plan

†Confidential treatment has been requested for portions of this exhibit. These portions have been omitted from this Registration Statement and have been filed separately with the Securities and Exchange Commission.

*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

ITEM 16.FORM 10-K SUMMARY

None

Signatures

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, 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
By: /S/ SUSAN K. BARNES
Susan K. Barnes

Executive Vice President, Chief Financial Officer and Principal Accounting Officer

Date: February 26, 2019

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Michael Hunkapiller and Susan K. Barnes, jointly and severally, as his or her true and lawful attorney-in-fact and agent, with full power of substitution, each with power to act alone, to sign and execute on behalf of the undersigned any and all amendments to this Annual Report on Form 10-K, and to perform any acts necessary in order to file the same, with all exhibits thereto and other documents in connection therewith with the Securities and Exchange Commission, granting unto said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requested and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or their or his or her substitutes, shall do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, 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
/s/ Michael Hunkapiller Michael Hunkapiller	Executive Chairman, Chief Executive Officer and President	February 26, 2019
/s/ Susan K. Barnes Susan K. Barnes	Executive Vice President, Chief Financial Officer and Principal Accounting Officer	February 26, 2019
/s/ David Botstein David Botstein	Director	February 26, 2019
/s/ William W. Ericson	Director	February 26, 2019

William W. Ericson		
/s/ Christian Henry	Director	February 26, 2019
Christian Henry		
/s/ Randall S. Livingston	Director	February 26, 2019
Randall S. Livingston		
/s/ John F. Milligan	Director	February 26, 2019
John F. Milligan		
/s/ Marshall L. Mohr	Director	February 26, 2019
Marshall L. Mohr		
/s/ Kathy Ordoñez	Director	February 26, 2019
Kathy Ordoñez		
/s/ Lucy Shapiro	Director	February 26, 2019
Lucy Shapiro		