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, 2019

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 001-39206

Schrödinger, Inc.

(Exact name of Registrant as specified in its Charter)

Delaware	**95-4284541**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
120 West 45th Street, 17th Floor New York, NY	**10036**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (212) 295-5800

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common stock, par value $0.01 per share	SDGR	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 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 such files). YES ☒ NO ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, 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.

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 ☒

The Registrant did not have a public float on the last business day of its most recently completed second fiscal quarter because there was no public market for the Registrant's common equity as of such date.

As of March 12, 2020, there was 50,101,169 shares of common stock and 13,164,193 shares of limited common stock outstanding.

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K, or this Annual Report, contains forward-looking statements within the meaning of the U.S. Private Securities Litigation Reform Act and Section 21E of the Securities Exchange Act of 1934, as amended, that involve substantial risks and uncertainties. All statements, other than statements of historical fact, contained in this Annual Report, including statements regarding our strategy, future operations, future financial position, future revenue, projected costs, prospects, plans and objectives of management, are forward-looking statements. The words “anticipate,” “believe,” “contemplate,” “continue,” “could,” “estimate,” “expect,” “intend,” “may,” “might,” “plan,” “potential,” “predict,” “project,” “should,” “target,” “will,” “would” or the negative of these words or other similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words.

The forward-looking statements in this Annual Report include, among other things, statements about:

- the potential advantages of our physics-based computational platform;
- our strategic plans to accelerate the growth of our software business;
- our research and development efforts for our internal drug discovery programs and our computational platform;
- the initiation, timing, progress, and results of our internal drug discovery programs or the drug discovery programs of our collaborators;
- our plans to discover and develop product candidates and to maximize their commercial potential by advancing such product candidates ourselves or in collaboration with others;
- our plans to leverage the synergies between our businesses;
- the timing of, the ability to submit applications for and the ability to obtain and maintain regulatory approvals for any product candidates we or one of our collaborators may develop;
- our drug discovery collaborations and our estimates or expectations regarding any milestone or other payments we may receive from such collaborations;
- our expectations regarding our ability to fund our operating expenses and capital expenditure requirements with our cash, cash equivalents, and marketable securities;
- the potential advantages of our drug discovery programs;
- the rate and degree of market acceptance of our software solutions;
- the rate and degree of market acceptance and clinical utility of our products;
- our estimates regarding the potential market opportunity for our software solutions and any product candidate we or any of our collaborators may in the future develop;

- our marketing capabilities and strategy;
- our intellectual property position;
- our ability to identify technologies with significant commercial potential that are consistent with our commercial objectives;
- our expectations related to the use of our cash, cash equivalents, and marketable securities;
- our expectations related to the key drivers of our performance;
- the impact of government laws and regulations;
- our competitive position and expectations regarding developments and projections relating to our competitors and any competing products, technologies, or therapies that are or become available;
- our ability to maintain and establish collaborations or obtain additional funding;
- our reliance on key personnel and our ability to identify, recruit, and retain skilled personnel; and
- our expectations regarding the time during which we will be an emerging growth company under the Jumpstart our Business Startup Acts of 2012.

We may not actually achieve the plans, intentions, or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions, and expectations disclosed in the forward-looking statements we make. We have included important factors in the cautionary statements included in this Annual Report, particularly in "Item 1A. Risk Factors", that we believe could cause actual results or events to differ materially from the forward-looking statements that we make. Moreover, we operate in a competitive and rapidly changing environment. New risks and uncertainties emerge from time to time, and it is not possible for us to predict all risks and uncertainties that could have an impact on the forward-looking statements contained in this Annual Report. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, collaborations, joint ventures, or investments we may make or enter into.

You should read this Annual Report and the documents that we file with the Securities and Exchange Commission, or the SEC, with the understanding that our actual future results may be materially different from what we expect. The forward-looking statements contained in this Annual Report are made as of the date of this Annual Report, and we do not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by applicable law.

In addition, statements that “we believe” and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based upon information available to us as of the date of this Annual Report, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete. Our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements.

This Annual Report includes statistical and other industry and market data that we obtained from industry publications and research, surveys, and studies conducted by third parties as well as our own estimates of potential market opportunities. All of the market data used in this Annual Report involves a number of assumptions and limitations, and you are cautioned not to give undue weight to such data. Industry publications and third-party research, surveys, and studies generally indicate that their information has been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. Our estimates of the potential market opportunities for our product candidates include several key assumptions based on our industry knowledge, industry publications, third-party research, and other surveys, which may be based on a small sample size and may fail to accurately reflect market opportunities. While we believe that our internal assumptions are reasonable, no independent source has verified such assumptions.

Unless the context otherwise requires, we use the terms “company,” “we,” “us” and “our” in this Annual Report to refer to Schrödinger, Inc. and its consolidated subsidiaries.

PART I

Item 1. Business.

Overview

We are transforming the way therapeutics and materials are discovered.

Our differentiated, physics-based software platform enables discovery of high-quality, novel molecules for drug development and materials applications more rapidly, at lower cost, and with, we believe, a higher likelihood of success compared to traditional methods. Our software is used by biopharmaceutical and industrial companies, academic institutions, and government laboratories around the world, and we are the leading provider of computational software solutions for drug discovery. We also apply our computational platform to a broad pipeline of drug discovery programs in collaboration with biopharmaceutical companies, some of which we co-founded. In addition, we are using our platform to advance a pipeline of internal, wholly-owned drug discovery programs.

Traditional drug discovery and development efforts have become increasingly complex, lengthy, capital-intensive, and are prone to high failure rates. Traditional drug discovery relies upon many rounds of costly and time-consuming manual molecule design, chemical synthesis, and experimental testing. One of the primary reasons for long timelines, high costs, and high failure rates in drug discovery is that predicting properties of molecules in advance of chemical synthesis is extremely complex and not amenable to traditional approaches.

Over the past 30 years and with the concerted efforts of hundreds of our scientists and software engineers, we have developed a physics-based computational platform that is capable of predicting critical properties of molecules with a high degree of accuracy. This key capability enables drug discovery teams to design and selectively synthesize molecules with more optimal properties, reducing the average time and costs required to identify a development candidate and increasing the probability that a drug discovery program will enter clinical development. Furthermore, we believe that development candidates with more optimized property profiles will have a higher probability of success in clinical development. Additionally, since the physics underlying the properties of drug molecules and materials is the same, we have been able to extend our computational platform to materials science applications in fields such as aerospace, energy, semiconductors, and electronic displays.

We offer our customers a variety of software solutions that accelerate all stages of molecule discovery, design, and optimization. In 2019, all of the top 20 pharmaceutical companies, measured by 2018 revenue, licensed our solutions, accounting for $23.9 million, or 28%, of our total 2019 revenue. The widespread adoption of our software, supported by our global team of sales, technical, and scientific personnel, has driven steady growth in our software revenue. Biopharmaceutical companies are increasingly adopting our software at a larger scale, and we anticipate this scaling-up will drive future revenue growth. Our ability to expand within our customer base is best demonstrated by the increasing number of our customers with an annual contract value, or ACV, in excess of $100,000. We had 103, 122, and 131 such customers, which represented 75%, 77%, and 78% of our total ACV, for the years ended December 31, 2017,

2018, and 2019, respectively. In addition, our customer retention rate for our customers with an ACV over $100,000 for the year ended December 31, 2019 and for each of the previous six fiscal years was 96% or higher. We believe the growth in the number of our customers demonstrates that companies are increasingly recognizing the power and efficiency of our platform while the retention in this group is indicative of the continued value of our platform. See “Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations—Key Factors Affecting Our Performance” for additional information regarding ACV and customer retention rate.

We also leverage our platform and capabilities across a portfolio of collaborative and wholly-owned drug discovery programs spanning a wide range of disease targets and indications. Our drug discovery group is comprised of a multidisciplinary team of over 70 experts in protein science, biochemistry, biophysics, medicinal and computational chemistry, and discovery scientists with expertise in preclinical and early clinical development. During the year ended December 31, 2019, we collaborated on more than 25 drug discovery programs with more than ten different biopharmaceutical companies, including a number of companies we co-founded. These collaborations generate drug discovery revenue, including research funding payments, and discovery and development milestones, and have the potential to produce additional milestone payments, option fees, and future royalties. Furthermore, since mid-2018, we have launched five internal, wholly-owned programs. We are leveraging our computational platform with the goal of rapidly advancing the discovery of best-in-class and first-in-class therapies. Our current programs are focused on discovering and developing inhibitors for targets in DNA damage response pathways and genetically defined cancers. In the future we expect to expand into other therapeutic areas. We plan to begin to initiate investigational new drug, or IND, -enabling studies for our programs by the first half of 2021. While our revenue-generating collaborations are an important component of our business, our strategy is to pursue an increasing number of wholly-owned programs and strategically evaluate on a program-by-program basis entering into clinical development ourselves or out-licensing programs to maximize commercial opportunities.

We generated revenue of $66.6 million and $85.5 million in 2018 and 2019, respectively, representing year-over-year growth of 28%. Our net loss was $28.4 million and $25.7 million for the years ended December 31, 2018 and 2019, respectively.

Strategy

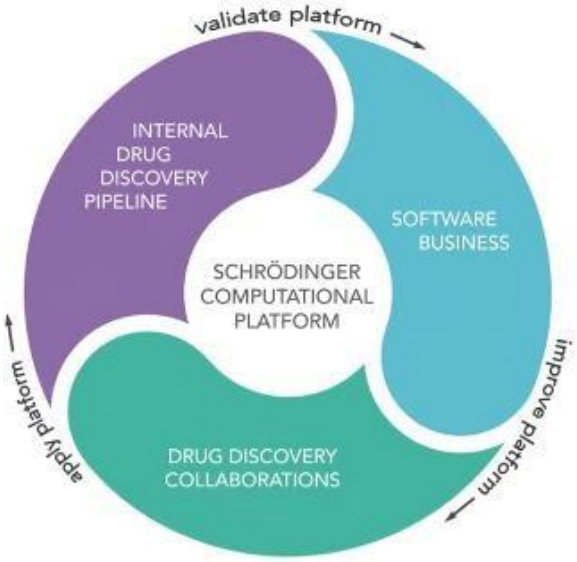
Our mission is to improve human health and quality of life by transforming the way therapeutics and materials are discovered. Our physics-based approach and differentiated software solutions enable the discovery of novel molecules for drug development and materials applications more rapidly, at lower cost, and with, we believe, a higher likelihood of success compared to traditional methods. We license our software to biopharmaceutical and industrial companies, government laboratories, and academic institutions globally. We are also using our software and internal capabilities across a diverse portfolio of drug discovery programs.

Our strategies for fulfilling our mission are as follows:

- ***Advance the science that underlies our computational platform:*** We have emerged as the leader in the field of physics-based computational drug discovery, and we believe our computational platform is far ahead of that of our nearest competitors. As of December 31, 2019, we had approximately 400 employees, roughly half of whom have Ph.D. degrees. We intend to maintain our industry-leading position by introducing new capabilities and refining our software to further strengthen our technology and advance the science underlying our platform.
- ***Accelerate growth of our software business:*** We have experienced steady growth in our software revenues, achieving $66.7 million in revenue in 2019, primarily driven by broad adoption of our software solutions by the biopharmaceutical industry and the expansion of our materials science business.
    - *Life science software business:* In 2019, all of the top 20 pharmaceutical companies, measured by 2018 revenue, licensed our solutions, accounting for $23.9 million, or 28%, of our 2019 revenue, and these companies have been our customers for an average of 15 years. However, we estimate that even our very largest customers are currently purchasing only enough software to optimally enable one or two drug discovery projects, which typically represents a small fraction of their drug discovery projects. Our ability to expand within our customer base is best demonstrated by the increasing number of our customers with an ACV of over $100,000. We had 103, 122, and 131 such customers for the years ended December 31, 2017, 2018, and 2019, respectively. In addition, we had nine, 11, and 10 customers for the years ended December 31, 2017, 2018, and 2019, respectively, with an ACV of over $1.0 million. We intend to leverage our existing relationships with our customers to drive larger-scale adoption of our solutions. Further, we believe there remains a large opportunity for growth as there are thousands of biopharmaceutical companies that could benefit from our solutions.
    - *Materials science software business:* Beyond drug discovery, our solutions can be leveraged for broad application to address industrial challenges in molecule design, including in the fields of aerospace, energy, semiconductors and electronic displays. We intend to continue growing this business through increased brand awareness and a build-out of industry-specific functionality.
- ***Accelerate growth of our drug discovery business:*** We also apply our computational platform across a diversified portfolio of more than 30 drug discovery programs through collaborations with companies we have co-founded, with biopharmaceutical companies, and through our own internal efforts on wholly-owned programs. Our collaborations generate revenues through research funding, pre-clinical and clinical milestones as well as the potential for option fees, commercial milestones, and future royalties. We also benefit from equity positions in our co-founded companies. Our drug discovery group comprises over 70 scientists, including biologists, medicinal chemists, biochemists, crystallographers, drug metabolism and pharmacokinetics scientists, and pharmacologists.

- We are actively working with our collaborators to discover novel therapies. We also intend to add new collaborations that offer scientific synergies and favorable economic terms.
- We plan to progress our existing wholly-owned programs and continue to add new programs that leverage our computational platform. As we progress these programs, we will strategically evaluate on a program-by-program basis entering into clinical development ourselves or out-licensing programs to maximize commercial opportunities.

- ***Leverage the synergies between our businesses:*** We believe that there are significant synergies within our business. We leverage the feedback that we receive from our software customers, collaborators, and internal drug discovery experts to improve the functionality of our platform, which we believe supports increased customer adoption of our solutions and more rapid advancement of our collaborative and wholly-owned drug discovery programs. In addition, the success of our collaborators in advancing drug discovery programs provides significant validation of our platform and approach, which we believe increases the attractiveness of our platform to customers, helps us establish new collaborations, and validates the potential of our own internal drug discovery programs.



Central to our ability to pursue these distinct lines of business is a firewall policy consisting of a set of well-established protocols and technology measures designed to ensure that the intellectual property of our software customers and drug discovery collaborators remains confidential and segregated.

Industry Overview

Traditional drug discovery and development efforts have become increasingly complex, lengthy, capital-intensive, and are prone to high failure rates. Traditional drug discovery involves experimental screening of existing libraries of molecules to find molecules with detectable activity, or "hit molecules," followed by many rounds of chemical synthesis to attempt to optimize those hit molecules to a development candidate that can be advanced into clinical development. Efforts to optimize initial hit molecules for a drug discovery project involve costly and iterative synthesis and testing of molecules seeking to identify a molecule with the required property profile. The optimal profile has the acceptable balance of properties such as potency, selectivity, solubility, bioavailability, half-life, permeability, drug-drug interaction potential, synthesizability, and toxicity. These properties are often inversely correlated, meaning that optimizing one property often de-optimizes others. The challenge of optimizing hit molecules is amplified by the limited number of molecules that can be feasibly tested across these properties with traditional methods. As a result, this optimization process often fails to yield a molecule with a satisfactory property profile to be a development candidate, which is why many drug discovery programs fail to advance into clinical development.

The traditional approach to drug discovery takes too long, is too prone to failure, and is too costly. Successfully reaching an IND application filing requires on average five to six years, and the average success rates suggest two out of three projects will fail. Accounting for such failures, the average cost to complete a successful IND filing is $35 million.

A typical drug discovery project only has the budget and time to synthesize and assay fewer than 10,000 molecules, because the cost and timelines associated with interrogating a greater number of molecules is impractical. This small sampling of molecules represents a minuscule fraction of the total number of molecules that could potentially be synthesized. Exploring such a limited number of molecules reduces the likelihood of identifying molecules with the desired property profile, which we believe leads to development candidates with higher failure rates.

Being able to predict molecular properties before initiating costly and time-consuming experimental synthesis would accelerate drug discovery, reduce costs, and increase the probability of success. If it were possible to accurately predict critical properties of molecules, fewer molecules would have to be experimentally synthesized and tested. As a result, larger pools of molecules could be analyzed allowing for more selective synthesis of molecules, leading to higher-quality molecules. In addition, with predictive computational methods, better selections of molecules would be synthesized through exploration of larger portions of chemical space, leading to higher-quality molecules that would in turn have a higher probability of progressing through clinical development and obtaining regulatory approval for commercial sale.

There have been many attempts to improve the efficiency of the drug discovery process by using computational methods to predict properties of molecules. One of the primary computational methods that many companies have attempted to deploy is machine learning, often referred to as artificial intelligence, or AI. One of the main benefits of machine learning is its ability to rapidly process data at scale. However, machine learning on its own has significant limitations and has therefore had a limited impact on improving the efficiency of the drug

discovery process. Machine learning requires input data, referred to as a training set, to build a predictive model. This model is expected to accurately predict properties of molecules similar to the training set, but cannot extrapolate to molecules that are not similar to the training set. Accordingly, since the number of possible molecules that could be synthesized is effectively infinite, machine learning can only cover a minuscule fraction of the total number of molecules that could potentially be synthesized.

The other primary computational method that has been attempted involves using fundamental, "first-principles" physics-based methods, which require a deep and thorough understanding of the specific property to be computed. However, physics-based methods are difficult to develop and can be slow compared to machine learning. Further, to apply such methods to design molecules that will bind with high affinity to a particular protein target, the three-dimensional structure of that protein must be generated with sufficient atomic detail to enable application of these physics-based approaches, which is referred to as being "structurally enabled," and such structures have been historically difficult to obtain. Another factor preventing computational chemistry from realizing its promise has been limited compute speed. However, despite all of these challenges, physics-based methods have a significant advantage over machine learning in that they do not require a training set and can, in principle, compute properties for any molecule.

Our Platform

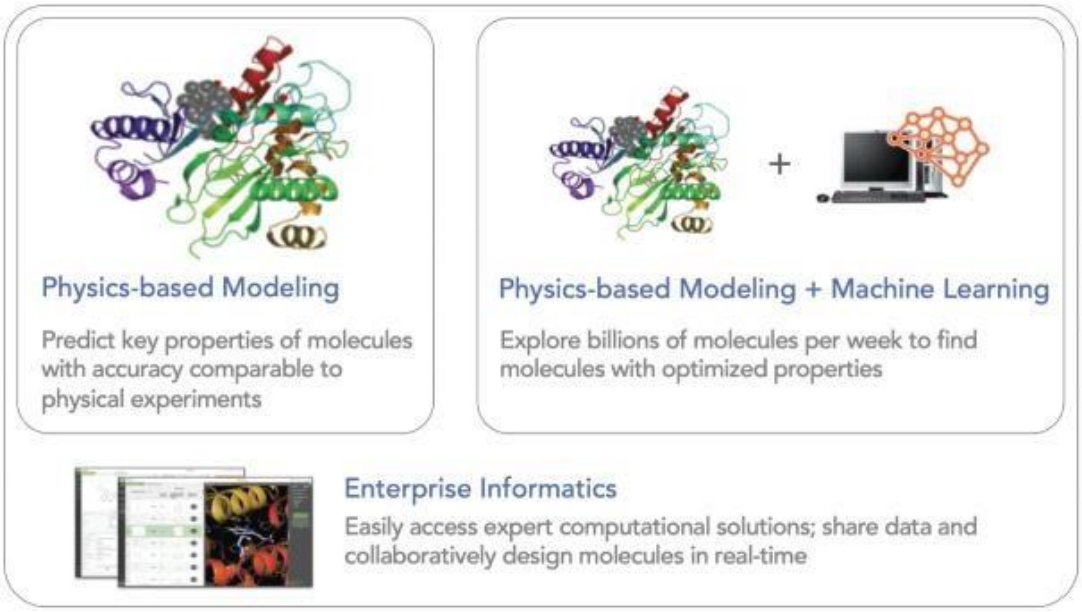
Over the past 30 years and with the concerted effort of hundreds of our scientists and software engineers, we have developed a computational platform that is capable of predicting critical properties of molecules with a high degree of accuracy. We have built our platform on a foundation of rigorous, physics-based methods, combined with the rapid data processing and scaling advantages of machine learning, that together provide a significant advantage over traditional methods. We believe that physics-based simulation is at a strategic inflection point as a result of the increased availability of massive computing power, combined with a more sophisticated understanding of models and algorithms and the growing availability of high-resolution protein structures.

We have demonstrated that our software platform can have a transformative impact on the drug discovery process by:

- reducing the average time and cost required to identify a development candidate; and
- increasing the probability of drug discovery programs entering clinical development.

Based on our collaborative drug discovery efforts to date, we believe that the development candidates discovered using our platform have a higher probability of successfully progressing through clinical development than the industry average.

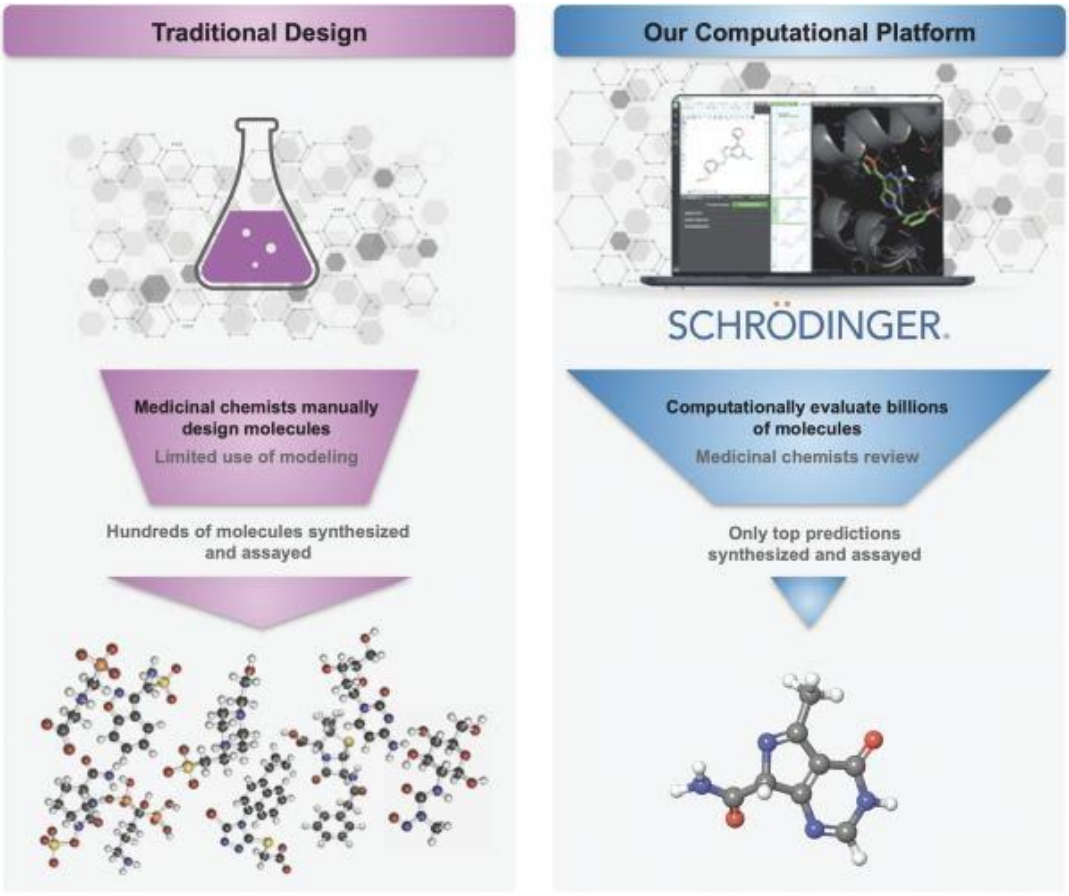
As shown below, we achieve these outcomes by tightly integrating our predictive physics-based methods, which have a high degree of accuracy, with machine learning, which is highly scalable. In addition, our platform enables real-time collaboration on drug discovery projects to inform decision-making and fully benefit from the predictive capabilities of our computational platform.



Our computational platform provides the following significant technological advantages over traditional approaches to drug discovery, all of which enable shortening timelines, decreasing costs, and increasing the probability of success of drug discovery efforts:

- **Speed.** Our platform is able to evaluate molecules in hours rather than the weeks that it typically takes to synthesize and assay molecules in the laboratory.
- **Scale.** Our platform can explicitly evaluate billions of molecules per week, whereas traditionally operated discovery projects only synthesize approximately one thousand molecules per year, thereby increasing the probability that we find a novel molecule with the desired property profile.
- **Quality.** In a peer-reviewed study, our platform was tested against traditional methods for selecting tight-binding molecules and resulted in an eight-fold increase in the number of molecules with the desired affinity.

The figure below compares the optimization process of drug discovery using traditional methods and our approach.



Our computational platform includes a broad array of proprietary capabilities:

- **Faster Lead Discovery**: the ability to rapidly identify potent molecules suitable to initiate hit-to-lead and lead optimization efforts via solutions for virtual screening of extremely large libraries of molecules, as well as physics-based replacement of the central core of a molecule, known as scaffold hopping, to identify novel, highly potent molecules unavailable in library collections;
- **Accurate Property Prediction**: the ability to assess key properties of drug-like molecules using physics-based calculations with accuracy comparable to that of experimental laboratory assays, to facilitate optimization of drug properties, including drug potency, selectivity, and bioavailability;
- **Large-Scale Molecule Exploration**: the ability to computationally ideate and explore novel, high-quality drug-like molecules for consideration by discovery project teams utilizing computational enumeration and generative machine learning techniques that are trained and constructed to yield molecules that are synthetically feasible;

- **Large-Scale Molecule Evaluation**: the ability to scale our calculations of key drug properties to ultra-large idea sets of over a billion molecules to enable more rapid and successful identification of high-quality drug candidate molecules via integration of next-generation machine-learning methods with our physics-based techniques, as well as large-scale utilization of internal and cloud computing resources; and
- **Integrated Data Management and Visualization**: the ability to generate, access, and analyze the data derived from complex calculations integrated with assay data through a powerful and user-friendly graphical interface.

Recognition of our scientific advances has come through customer adoption, and in citations of publications in peer reviewed journals. For example, the initial paper describing our ligand-protein docking program, Glide, published in 2004 is currently the most cited paper in the history of the *Journal of Medicinal Chemistry*, a premier journal in its field. Glide continues to be broadly used as a hit-finding technology throughout the biopharmaceutical industry by our customers. We have made many similar scientific advances in fields including druggability assessment, affinity calculation, protein structure refinement, and molecule ideation and design. These advances were achieved by our team of hundreds of Ph.D.-level scientists and software engineers with extensive input from our Scientific Advisory Board, or SAB, which includes thought leaders in computational chemistry, physics-based simulations, statistical mechanics, and machine learning.

Also critically important to the advances we have made are the performance gains offered by using graphical processing unit, or GPU, computing and the cloud. Our platform is capable of running on all major cloud providers and taking advantage of their combined compute power. Combining the dramatic effects of GPU and cloud computing with our integrated physics-based and machine learning technologies enables shortening timelines, decreasing costs, and increasing the probability of success of drug discovery efforts.

Our computational platform is also applicable to new problems of interest and new fields of study. Since the underlying physics that drives a biologic to bind to its target is no different than the physics that drives a small drug molecule to bind to a protein, we have been able to successfully apply these technologies to the discovery of biologics. Similarly, the physics underlying the properties of materials is no different than the physics underlying the properties of drug molecules. Therefore, we have successfully applied our computational platform to materials science applications, including in the fields of aerospace, energy, semiconductors, and electronic displays.

Software Business

Overview

We are transforming drug discovery and materials design by driving widespread adoption of our computational platform by biopharmaceutical and industrial companies, academic institutions, and government laboratories globally.

We are the leading provider of computational software solutions for drug discovery to the biopharmaceutical industry. In 2019, all of the top 20 pharmaceutical companies, measured by 2018 revenue, licensed our solutions, accounting for $23.9 million, or 28%, of our total 2019 revenue. Additionally, in 2019, our software was used by researchers around the world at more than 1,350 academic institutions. The widespread adoption of our software is supported by an approximately 130-person global team of sales, technical, and scientific personnel. Our direct sales operations span across the United States, Europe, Japan and India, and we have sales distributors in other important markets, including China and South Korea.

We have a diverse and large existing customer base, ranging from startup biotechnology companies to the largest global pharmaceutical companies as well as an increasing number of materials science customers. Our ten largest software customers represented approximately 28% of our software revenue in 2019, and no single software customer represented more than 5% of our software revenue. We continue to expand our customer base as we promote the education and recognition of the potential of our computational platform across industries. As of December 31, 2019, we had 1,266 active customers, which we define as the number of customers who had an ACV of at least $1,000 in a given fiscal year, and the figure below shows the growth in the number of our active customers since 2013.

We believe there is significant opportunity to expand the adoption of our platform within our growing customer base. Biopharmaceutical companies are increasingly adopting our software at a larger scale, and we anticipate that this scaling-up will drive future revenue growth. Our ability to expand within our customer base is best demonstrated by the increasing number of our customers with an ACV over $100,000. We had 103, 122, and 131 of such customers for the years ended December 31, 2017, 2018, and 2019, respectively. In addition, for the year ended December 31, 2019, we had 10 customers with ACV of $1.0 million or more. We believe biopharmaceutical companies are increasingly recognizing and applying the power and efficiency of our platform.

Furthermore, we believe our sales and marketing approach and the quality of our software solutions help us cultivate longstanding relationships and reoccurring sales. This is demonstrated by the length of our key relationships, with the average tenure of our 10 largest customers in 2019 being over 17 years. Furthermore, our ability to expand our customer relationships over time is exemplified by our ability to retain our customers with an ACV over $100,000. For the year ended December 31, 2019 and for each of the previous six fiscal years, our year-over-year customer retention rate for our customers with an ACV over $100,000 was 96% or higher. We believe the continued expansion of our customer base coupled with our ability to expand our customers' use of our software will continue to drive revenue growth. The figure below shows the different ways in which we are accelerating our growth.

See "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations—Key Factors Affecting Our Performance" for additional information regarding ACV and customer retention rate.

Our Software Solutions for Drug Discovery

We offer our customers a variety of software solutions that accelerate all stages of molecule discovery, design, and optimization pursuant to agreements with terms typically for one year. Our licenses give our customers the ability to execute a certain number of calculations across specified software solutions. Certain of our key software solutions are highlighted below, along with the particular stage of drug discovery in which they are employed:

- **Target Identification and Validation:** the identification and evaluation of a protein target that might be worthwhile to pursue as the subject of a drug discovery campaign.
  - **WaterMap** characterizes the locations and energetics of water molecules occupying the binding site of, or solvating, a target protein. From this analysis, one can infer the druggability of a protein, as well as uncover opportunities to significantly increase binding affinity by exploiting the water structure in the binding site.
  - **SiteMap** allows binding site identification and evaluation to help locate potential protein binding sites, including allosteric sites, and predict the approximate druggability of those sites.
- **Hit Discovery**: the identification of hit molecules.
  - **FEP+** is our free energy calculation software. In hit discovery, this software can be used to replace the central core of earlier known tight binding molecules to identify novel, highly potent molecules unavailable in library collections. Often these molecules have much higher binding affinity and have a better property profile than typical hit molecules.
  - **Glide** is our virtual screening program that is used to screen libraries of molecules to find hit molecules likely to bind a particular protein target in a specific conformation.
  - **WScore** is our next-generation virtual screening program that utilizes a more accurate and robust description of protein-ligand interaction solvation effects. This and other novel features enable WScore to more reliably find hit molecules for challenging protein targets when screening libraries of molecules.
  - **Shape** uses the three-dimensional structure and shape of earlier known hit molecules to find new hits when screening libraries of molecules.
  - **AutoQSAR/DeepChem** uses modern machine-learning methods trained to earlier known hit molecules to find novel hits when screening libraries of molecules.
  - **Induced fit docking**, or **IFD**, can computationally predict the binding mode of molecules to a binding site of a protein, including predicting how the conformation of the protein binding site may reorganize upon binding the molecule.
- **Hit to Lead and Lead Optimization:** Hit to lead is the stage at which small molecule hits are evaluated and undergo limited optimization to identify promising lead molecules. Lead optimization improves on the property profile of lead molecules by designing new analogs with improved potency, reduced off-target activities, and favorable physicochemical/metabolic properties.
  - **FEP+** is our free energy calculation software. In the hit to lead and lead optimization phases of drug discovery, FEP+ is used to predict the binding affinity of ligands to proteins with accuracy approaching that of physical experiments. It allows precise rank-ordering of large libraries of virtual molecules so that only the most potent molecules are synthesized in a program, which can save time and reduce cost. FEP+ can also be used to calculate the binding selectivity, solubility, and

mutational resistance profiles of molecules, which are key properties for the optimization of bioavailability, toxicology, and efficacy.

- **AutoQSAR/DeepChem** uses modern machine-learning methods to produce predictive quantitative structure-activity relationship, or QSAR, models. This allows more accurate methods, such as FEP+, to be applied at a much greater scale but with less accuracy to much larger sets of molecules than would otherwise be possible and enables predictive QSAR models of other properties to be developed and deployed on drug discovery projects.
- **PathFinder** is an enumeration tool that enables the rapid exploration of synthetically tractable ligands. When PathFinder is deployed in conjunction with multiparameter optimization, machine learning, and FEP+ simulations, it provides a streamlined approach to create and evaluate large sets of synthetically tractable, lead-like, potent ligands.

- **Software Solutions Used Throughout the Drug Discovery Process:**
  - **LiveDesign** is our user-friendly enterprise informatics solution that enables interactive and collaborative molecule design, aggregation and sharing of data, and end-to-end discovery project coordination between chemists, modelers, and biologists.
  - **Maestro** is our user-friendly modeling environment, which allows expert modelers to utilize our advanced modeling solutions.

Our Software Solutions for Materials Science

We also sell software licenses to customers engaged in molecule design for industrial purposes. The software solutions for our materials science customers leverage much of the same technology as our software for biopharmaceutical companies. In addition, similar to traditional drug discovery efforts, traditional approaches to discovering new molecules in these fields also suffer from long timelines, and it can take as long as 10 to 20 years to bring new materials to the market. We are focused on leveraging our technology to transform the way new materials are discovered, and we believe that materials science companies are only beginning to recognize the potential of computational methods. We are continuing to build a team of subject matter experts to further drive adoption of our computational platform in each of the following areas in which we currently operate:

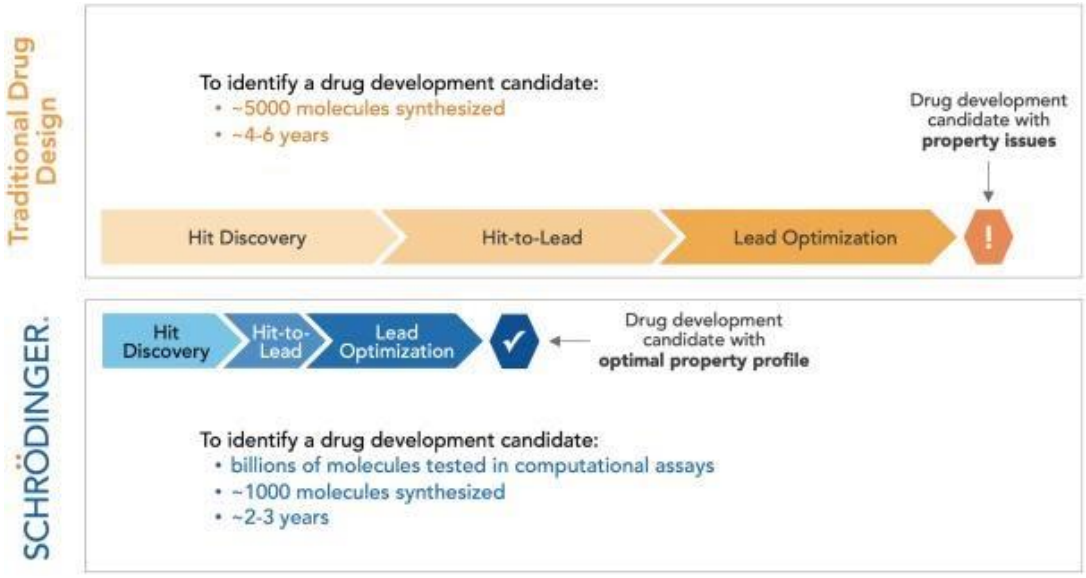
- **mobile electronics and displays**—organic electronics (OLED);
- **aerospace and defense**—polymers, composites;
- **microelectronics**—semiconductors, thin film processing;
- **oil and gas**—catalysis, reactivity;
- **energy**—alternative energy, batteries; and
- **consumer packaged goods**—soft matter, formulations.

Drug Discovery Business

Overview

We are using our computational platform in both collaborative and wholly-owned drug discovery programs. Traditional drug discovery and development efforts have become increasingly complex, lengthy, capital-intensive, and are prone to high failure rates. Decreasing returns on investments in drug research and development have created a significant opportunity for us to leverage our computational platform to design and discover new medicines. In drug discovery stages, our platform can reduce the time and cost required to identify a development candidate with a more optimized property profile as compared to traditional methods. We believe that these candidates with more optimized property profiles will have a higher probability of success in clinical development.

The figure below illustrates the advantages in time, cost, and molecule quality of our computational drug design approach over traditional drug discovery approaches.



Our Drug Discovery Expertise

Our drug discovery group is comprised of a team of over 70 experts in protein science, biochemistry, biophysics, medicinal and computational chemistry, and discovery scientists with expertise in preclinical and early clinical development. Many of our scientists have decades of biopharmaceutical industry experience across multiple disciplines and areas of expertise and deploy our computational platform across an array of disease targets and indications. Our differentiated, physics-based platform empowers our integrated team of experts to design better molecules, in shorter timeframes, and at a lower cost than traditional drug design.

Our Drug Discovery Collaborations

Over the last decade, leveraging our platform and expertise, we have steadily grown our portfolio of collaborations with biopharmaceutical companies that have provided us with significant income and have the potential to produce additional milestone payments, option fees, and future royalties. These programs pursue design of clinical candidates across a wide range of therapeutic target protein classes and indications. Many of these programs are pursuing novel molecules for targets where a low-dose small molecule inhibitor or activator with optimal drug-like properties has been difficult to achieve or where selectivity for the target of interest has been difficult to achieve relative to other proteins. We have steadily grown our pipeline of collaborations by selectively entering into drug discovery collaborations with high potential from a large number of opportunities. Among the key factors that we use to select collaborators are whether the targets are well-validated, have high therapeutic potential, and are amenable to the strengths of our computational platform, and whether or not the collaborator brings complementary capabilities, all of which we believe contribute to an increased probability of success.

Our collaboration with Nimbus Therapeutics, LLC, or Nimbus, which we co-founded in 2009, is an example of the strength of our collaboration strategy and the power of our computational platform. Based on structural insights related to a novel allosteric binding site and our computational assays, Nimbus, in collaboration with us, was able to identify a unique series of acetyl-CoA carboxylase, or ACC, allosteric protein-protein interaction inhibitors with favorable pharmaceutical properties that inhibit the activity of the ACC enzyme. Nimbus achieved proof of concept in a Phase 1b clinical trial of its ACC inhibitor, firsocostat. In 2016, Nimbus sold the program to Gilead Sciences, Inc., or Gilead, in a transaction valued at approximately $1.2 billion, comprised of an upfront payment and earnouts. Of this amount, $601.3 million has been paid to Nimbus to date, and we received a total of $46.0 million in cash distributions in 2016 and 2017. We are eligible to receive up to $46 million in future cash distributions on the remaining approximately $600 million of earn outs, if and when such earn outs are achieved. However, the likelihood and timing of such payments, if any, are not possible for us to predict as the achievement of the development and regulatory milestones under the transaction agreement is uncertain and outside of our control. In December 2019, Gilead announced topline results from its Phase 2 clinical trial which included firsocostat, both as a monotherapy and in combination with other investigational therapies, in which the primary endpoint was not met. Gilead announced that it was continuing to analyze the data from the trial and determine next steps. We do not know how this development will affect Nimbus' right to receive earnout payments from Gilead or our right to receive cash distributions from Nimbus.

Morphic Holding, Inc., or Morphic, was founded in 2014 and leverages our computational platform, together with unique insights into the structure and function of integrins discovered by Professor Timothy A. Springer, to develop novel therapeutics. Based on unique structure-function insights, Morphic, in collaboration with us, was able to design an oral inhibitor of the alpha 4 beta 7 integrin, which is an established target for autoimmune diseases. The currently approved therapeutic for this target is a monoclonal antibody that is approved for intravenous administration. Morphic became a publicly-traded company in June 2019. According to Morphic's public filings, its alpha 4 beta 7 inhibitor small molecules exhibited high potency and

selectivity for alpha 4 beta 7, oral absorption, and pharmacokinetic properties in preclinical studies. In addition, according to Morphic's public filings, it has been able to establish preclinical pharmacological proof of concept, including observed effects on T-cell trafficking similar to a comparator alpha 4 beta 7 antibody with its alpha 4 beta 7 inhibitor small molecules. Based on these disclosed preclinical results and its on-going IND-enabling studies, Morphic has stated that it expects to file an IND for its alpha 4 beta 7 program in the middle of 2020 and then advance the program into clinical development for the treatment of inflammatory bowel disease, or IBD. Morphic has also disclosed that it is progressing a partnered alpha v beta 6 program toward clinical development for the treatment of idiopathic pulmonary fibrosis, or IPF. The most advanced product candidate in this program is MORF-720, a selective oral first-in-class alpha v beta 6-specific integrin inhibitor. In preclinical models of IPF, Morphic reported that it observed that administration of its alpha v beta 6 inhibitor was associated with local inhibition of TGF-beta, a clinically prominent pro-fibrotic cytokine. Morphic has stated that it expects to file an IND for its partnered alpha v beta 6 program in the second half of 2020.

Furthermore, our collaboration with Agios Pharmaceuticals, Inc. that leveraged our computational platform resulted in two U.S. Food and Drug Administration, or FDA, approved therapies, Tibsovo (vosidenib) for the treatment of adult patients with acute myeloid leukemia (AML) who have an isocitrate dehydrogenase-1 (IDH1) mutation as detected by an FDA-approved test, and IDHIFA (enasidenib), which is being marketed by Agios' collaborator, Celgene Corporation, a wholly-owned subsidiary of Bristol-Myers Squibb Company, and is indicated for certain adult patients with relapsed refractory AML who have an isocitrate dehydrogenase-2 (IDH2) mutation as detected by an FDA-approved test. We do not have any financial interest, such as the right to receive royalties or other payments, with respect to either of these approved therapies.

Through access to the maximum potential scale of our computational platform and our drug discovery and software development teams, our collaborators receive the following key benefits:

- **Immediate utilization of our platform:** Ability to immediately and efficiently leverage the full benefits of our computational platform, without the need for training or ramp-up time, thereby enabling accelerated drug discovery.
- **Access to massive compute power**: Ability to run our computational software on one of the largest GPU clusters dedicated to drug design in the industry, thereby avoiding the time and cost needed to build this infrastructure on their own.
- **Early access to cutting-edge functionality**: Real-time access to emerging solutions as they are being developed.
- **Target exclusivity**: Under our collaboration agreements, we agree to design drugs for a particular protein target or targets using our computational platform and knowhow exclusively for the collaborator.

Collaboration Agreements

We have entered into a number of collaborations with biopharmaceutical companies under which our collaborators are pursuing research in a number of therapeutics areas, including without limitation, various programs in oncology, antifungal diseases, fibrosis, inflammatory bowel disease, metabolic disease, autoimmune disease, immune-oncology, cardiopulmonary disease and tuberculosis. Our current collaborators include Ajax Therapeutics, Inc., Bright Angel Therapeutics Inc., Faxian Therapeutics, LLC, Morphic Holding, Inc., Nimbus Therapeutics, LLC, Ono Pharmaceuticals Co., LTD., Petra Pharma Corp., Sanofi S.A., ShouTi Inc., Sun Pharma Advanced Research Company Ltd., TB Alliance and Takeda Pharmaceuticals Company Limited, or Takeda. With the exception of Takeda, where we retain all intellectual property rights until Takeda exercises its option to acquire a program, all of the programs being pursued under these collaborations are fully owned and controlled by each respective collaborator. Our opportunity to receive potential revenues from any of these programs is generally limited to research funding payments, development, regulatory, and commercial milestones, option fees to license projects and royalties on commercial sales, if any. We are not responsible for advancing their preclinical or clinical development or their commercialization, if approved.

Equity Stakes. We have received equity consideration in certain of our collaborators, and from time to time, we have also made additional equity investments in certain of these collaborators. As noted above, all of these programs are fully owned and controlled by each respective collaborator, with the exception of Faxian, which is a 50/50 joint venture. The following table presents our equity stakes in our collaborators that are greater than 1.0% on an issued and outstanding basis as of December 31, 2019:

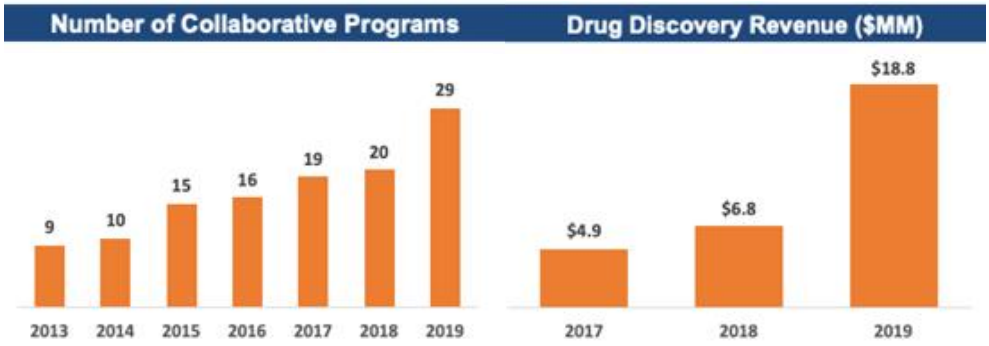
Company	Ownership %
Ajax Therapeutics, Inc.	8.7%
Bright Angel Therapeutics Inc.	33.3%
Faxian Therapeutics, LLC (JV)	50.0%
Morphic Holding, Inc. (1)	2.7%
Nimbus Therapeutics, LLC (2)	7.4%
Petra Pharma Corp.	5.5%
ShouTi Inc.	8.7%

(1) Based on the number of shares of common stock outstanding as of February 27, 2020, as reported on Morphic's Annual Report on Form 10-K, for the year ended December 31, 2019, as filed with the SEC on February 27, 2020.
(2) On a fully diluted unit basis.

Financial Rights. In addition to our equity stakes in certain of our collaborators, we also have rights to various payments on a collaborator-by-collaborator agreement basis including research funding payments, discovery, development, and commercial milestones, potential option fees to license projects, and potential royalties in the single-digit range. Under certain of our collaboration agreements, we are also eligible to receive a percentage of our collaborators' sublicense revenue.

The figures below show the number of collaborative programs we have worked on in each given year, as well as the amount of revenue we have generated from our collaborations through

the combination of research funding payments, discovery and development milestones, and other fees for the periods presented.



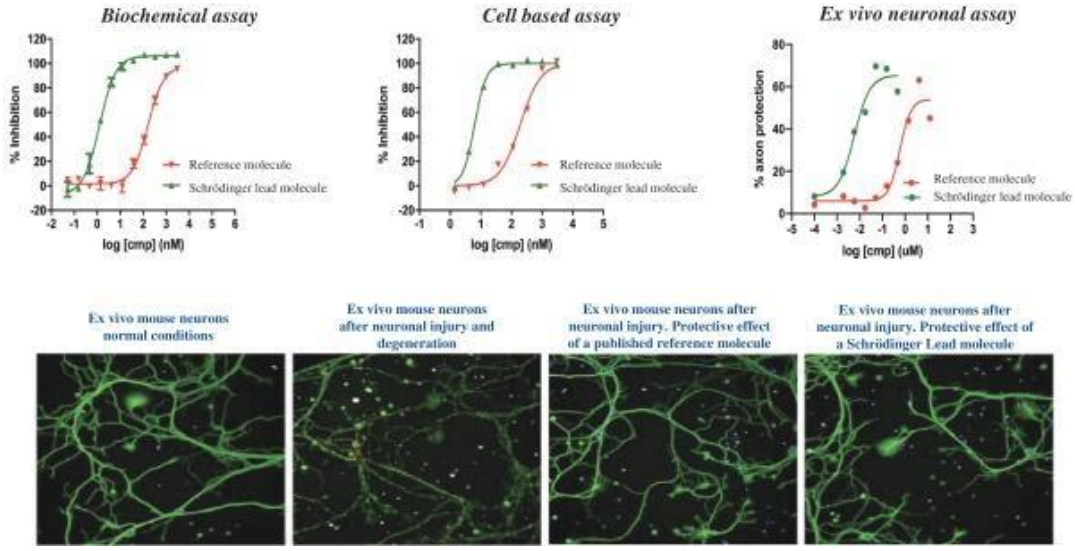
Most of our collaborative programs are currently still in the discovery stages. Generally, the size of the payments we are eligible to receive from a collaborative program increases as the program advances. As a result of the broader validation of our platform, we intend to pursue an increasing number of wholly-owned programs, and we will continue evaluating new collaborative programs that fit our selection criteria and where the collaborator's particular expertise has the potential to create substantial value. Importantly, our current collaboration agreements typically also contemplate additional program targets being added, allowing our collaborators to potentially increase the number of programs under our current collaboration agreements.

However, because these collaborations are not under our control, we cannot predict whether or when we might achieve any event-based increases in research funding payments, milestone payments, royalty or other payments under these collaborations or estimate the full amount of such payments, and we may never receive any such payments. For a further discussion of the risks we face with respect to receipt of any of these payments, please refer to "Item 1A. Risk Factors—Risks Related to Drug Discovery—We may never realize return on our investment of resources and cash in our drug discovery collaborations."

How We Work with Our Collaborators. Generally, our existing collaboration agreements provide that we agree to design drugs for a particular target or targets using our computational platform and knowhow exclusively for the collaborator. The collaborator retains the intellectual property related to any molecules developed under the collaboration. Generally, our collaborators are not contractually required to provide us with, nor do we expect generally to receive, access to nonpublic information regarding key developments related to the advancement of these collaboration programs, such as clinical trial results, including safety and efficacy data, regulatory communications, or commercialization plans and strategies. To the extent we do receive such information, our collaboration agreements generally require us to maintain the confidentiality of information we receive under the collaboration.

As our collaboration strategy has evolved, we are seeking to take more direct control and responsibility for all aspects of a drug discovery project and own a higher percentage of the value generated in the completed programs. For example, under our collaboration with Takeda, after mutual agreement on the target(s) of interest, our drug discovery group conducts all drug discovery research and pharmacology activities through the development candidate stage. Takeda has the option to acquire the program at either the lead optimization stage or development candidate stage and to develop and commercialize product candidate(s) from the program. Importantly, under the collaboration with Takeda, we control the drug discovery process and retain all intellectual property rights to any product candidates that are discovered under the program until Takeda exercises its option to acquire the program. The collaboration with Takeda anticipates drug discovery research on up to six targets. Three programs have been initiated to date in schizophrenia, oncology, and neurodegenerative disease with multiple milestone payments achieved. Two of these programs continue to advance while the program in schizophrenia is no longer an active collaboration and all rights to this program will continue to be retained by us.

The program in neurodegenerative disease is focused on the discovery of a best-in-class compound toward a protein involved in neuronal degeneration. As shown in the figures below, our lead molecule showed inhibition of the protein's activity at 100-fold lower concentrations in biochemical and cell based assays and *ex vivo* in a preclinical neuronal injury protection assay when compared to a published benchmark molecule.

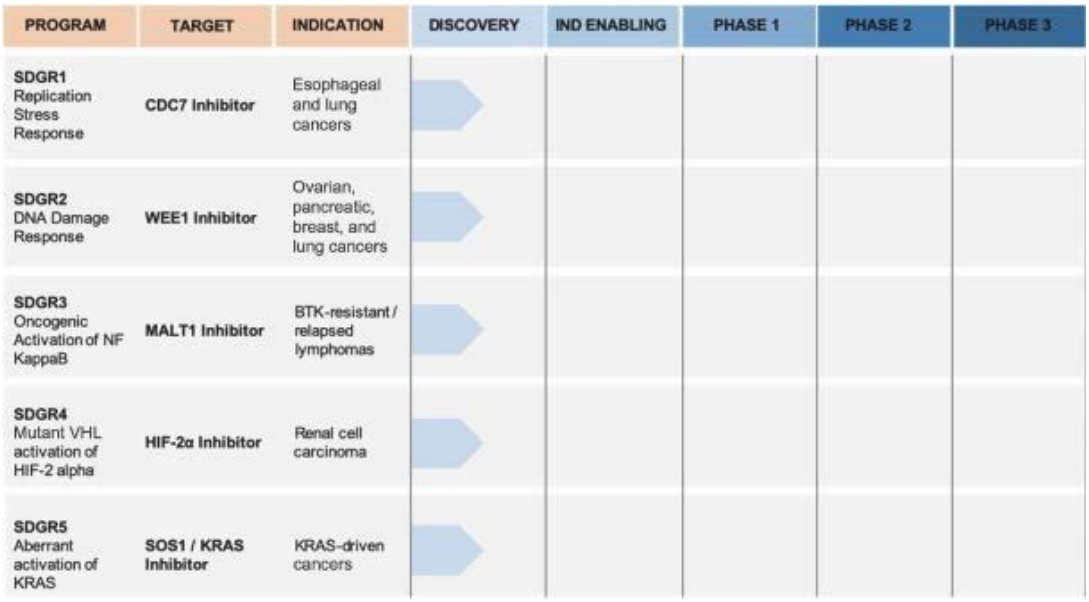


Our Internal, Wholly-Owned Drug Discovery Programs

Since mid-2018, we have launched a total of five internal, wholly-owned programs. We expect to begin to initiate IND-enabling studies in our programs by the first half of 2021, first in oncology and then potentially in other areas. Our strategy is to pursue an increasing number of wholly-owned programs and strategically evaluate on a program-by-program basis entering into clinical development ourselves or out-licensing programs to maximize commercial opportunities.

Our Pipeline

We are leveraging our computational platform with the aim of rapidly advancing the discovery of best-in-class and first-in-class therapeutics. Our first cohort of internal programs is focused on discovering and developing inhibitors for targets in DNA damage response pathways and genetically defined cancers. The following is a summary of our internal, wholly-owned drug discovery programs:



Our Approach to Target Selection

Our selection of targets is based on an extensive analysis of human targets and drug discovery programs. We analyze targets using automated methods at scale. The key steps we take in prioritizing programs involve:

- **Structural and modeling enablement**. We use our computational platform to analyze protein structure quality as well as druggability of binding sites across thousands of target proteins in parallel. For a subset of high-quality structures of interest, we confirm amenability to our computational platform.

- **Evaluation of therapeutic potential**. Our selection of targets is strongly influenced by the level of validation of the target, including analysis of human genetics and prior clinical data.
- **Identification of unsolved design challenges**. We determine whether there are property profile challenges that could be solved by the application of our computational platform and provide a clinically meaningful differentiated, best-in-class or first-in-class product opportunity.
- **Assessment of potential value of pathways and mechanisms.** We evaluate industry and commercial interest as well as the clinical utility with the aim of prioritizing programs with high commercial and therapeutic potential.

Using this comprehensive analysis, we have identified a large number of protein targets that we believe are amenable to our technology. We continue to evaluate a number of additional targets using this analysis methodology.

DNA Damage and Replication Stress Response Programs

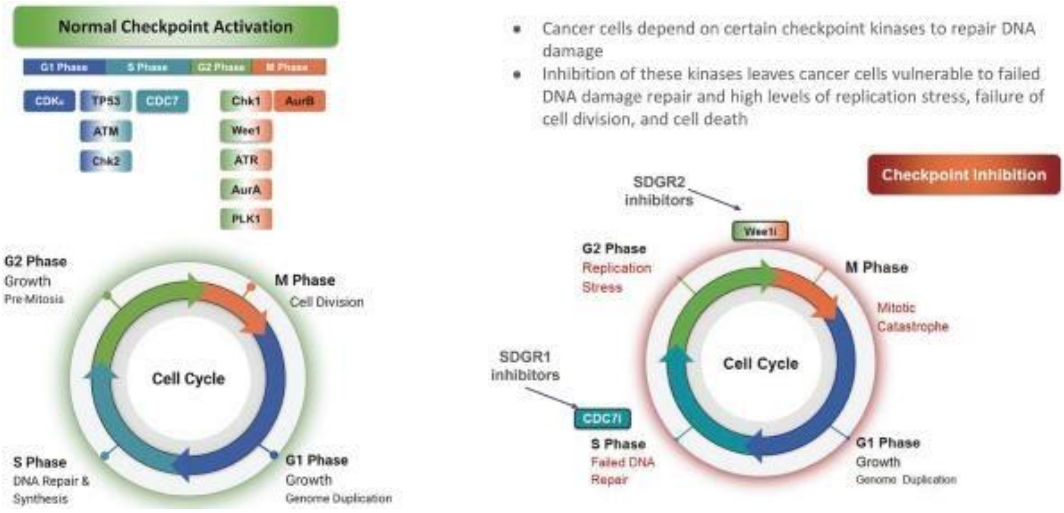
Our first two drug discovery programs are focused on targets that mediate DNA repair, cell cycle regulation, replication stress responses, and apoptosis, or programmed cell death. Numerous structurally-enabled targets exist within cellular machinery that mediate these functions, including the targets of our programs, cell division cycle 7-related protein kinase, or CDC7, and Wee1 protein kinase. We made the decision to focus on these targets following third-party clinical success of other DNA damage response and cell cycle checkpoint inhibitors, such as poly(ADP-ribose) polymerase, or PARP, inhibitors and CDK4/6 kinase inhibitors.

Healthy cells are programmed to respond to DNA damage through various pathways. The cell cycle is managed and regulated by several checkpoint kinases. For example, during the “S phase” of the cycle, checkpoint activation arrests the cell cycle and allows the cell sufficient time to repair damaged DNA before the initiation of cell division. This process prevents the propagation of cells with aberrant DNA.

Rapid cell division driven by cancer-causing genes known as oncogenes and mutations in tumor suppressor genes fuels cancer cell growth. The ability of cancer cells to sense and repair damaged DNA is impaired making them more susceptible to DNA damage and dependent on fewer repair pathways.

In order to achieve successful cell division, cancer cells depend on certain checkpoint kinases to repair DNA damage. This includes checkpoint kinases usually active during the S phase. Inhibition of these kinases leaves cancer cells vulnerable to failed DNA damage repair and high levels of replication stress, failure of cell division, and cell death. Combining the inhibition of multiple DNA damage response mechanisms has the potential to heighten the damage sustained by cancer cells and lead to durable efficacy.

The figure below illustrates the impact of checkpoint inhibition on cancer cells.



SDGR1 Program—CDC7 Kinase Inhibitors

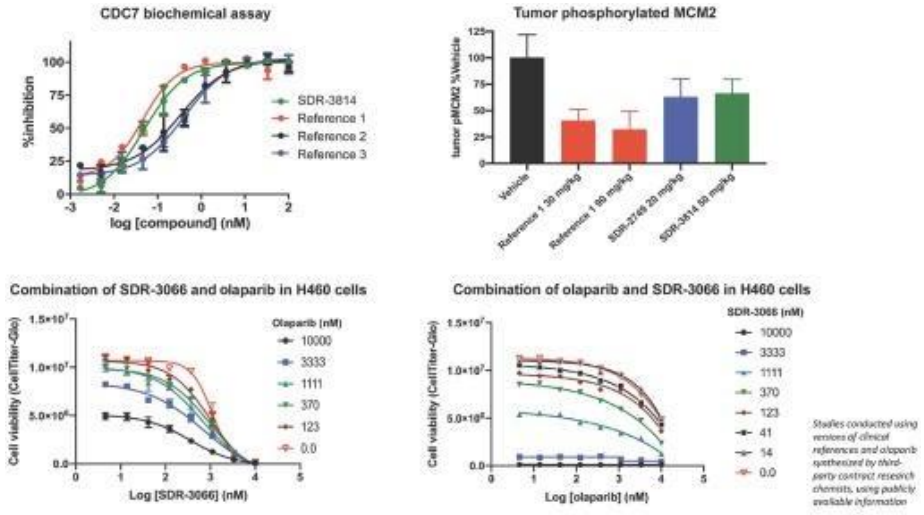
We are developing tight-binding, selective, novel small molecule inhibitors of CDC7 for the treatment of advanced solid tumors, including esophageal and lung cancers and potentially brain metastases. CDC7 is a serine/threonine protein kinase that has been shown to be a required step in DNA replication initiation. CDC7 levels are high in certain adenocarcinomas, and CDC7 is thought to be linked to these cancer cells' proliferative capacity and ability to bypass normal DNA damage responses.

CDC7 phosphorylates and activates the enzymes responsible for DNA replication initiation. Disruption of CDC7 activity in cancer cells leads to delayed DNA replication, cell cycle abnormalities, and cell death.

The antiproliferative potential of CDC7 inhibition was validated by a third party in Phase 1 clinical trials of a CDC7 inhibitor in which responses were observed in patients, including those with bladder and pancreatic cancer. Prior to this positive result, existing CDC7 inhibitors were not sufficiently tight-binding, lacked selectivity, and demonstrated poor pharmacokinetic properties.

In order to maximize the number of cancer cells in cell cycle arrest, very tight-binding inhibitors are required to achieve durable clinical impact as monotherapy or in the context of clinical combinations. Using our computational platform, we have identified multiple tight-binding, selective, and novel CDC7 inhibitor series. We have progressed this program from conception to optimized lead molecules in approximately ten months.

As shown in the figure below, our early molecules demonstrated inhibition of a downstream biomarker of CDC7, intratumoral phosphorylated MCM2, or pMCM2, that was used as an endpoint in recent third party clinical trials of a CDC7 inhibitor. Furthermore, one series of our molecules displayed high levels of brain penetration in preclinical assays, which may provide an opportunity for the treatment of brain metastases in solid tumor patients. Combination of our early molecules and the Wee1 inhibitor AZD1775 (adavosertib), which is undergoing clinical trial testing in cancer patients, showed additive anti-proliferative effect in Colo205 cells, or human colon adenocarcinoma cells. Combination of another of our molecules and olaparib, an FDA-approved PARP inhibitor marketed as LYNPARZA by AstraZeneca, also showed additive anti-proliferative effects in H460 cells, or human non-small-cell lung cancer cells. Additive effects were also shown in combination with ceralasertib, an ataxia telangiectasia and Rad3-related, or ATR, inhibitor in Colo205 cells.



SDGR2 Program—Wee1 Kinase Inhibitors

Wee1 is a gatekeeper checkpoint kinase that prevents cellular progression through the cell cycle allowing time for DNA repair before cell division takes place. We are therefore developing tight-binding, selective Wee1 inhibitors with optimized physicochemical properties that we believe will be well suited for combinations with other DNA damage response therapies such as PARP and ATR inhibitors for the treatment of ovarian, pancreatic, breast, and lung cancers.

Wee1 acts as a negative regulator of entry into mitosis at the G2/M transition by protecting the nucleus from CDC2, an important activator that triggers cell division. Wee1 is one of the two mechanisms known by which the G2 checkpoint is initiated in response to DNA damage. Blockade at the G2 checkpoint is especially important, as some tumors rely on DNA repair at the G2 checkpoint. Thus, inhibition of Wee1 can trigger massive DNA breakage and apoptosis in tumor cells.

A Wee1 inhibitor currently being investigated in Phase 2 clinical trials by a third party has shown clinically meaningful tumor regression with partial responses and stable disease in ovarian cancer and small cell lung carcinoma, and is being studied in combinations with chemotherapy, PARP inhibitors, and immunotherapy.

A prior third party Wee1 inhibitor that has advanced to clinical trials may have off-target effects resulting from inhibition of polo-like kinase 1, or PLK1, and inactivation of a liver enzyme, CYP3A4, which is responsible for elimination of drug and drug metabolites from the body, making dosing and combinations more challenging. We believe our computational platform can be used to identify tight-binding molecules with optimized drug-like properties that exhibit neither of these liabilities.

We have identified Wee1 inhibitor lead molecules that are tight-binding and 100-fold more selective for Wee1 versus PLK1, and have exhibited a favorable property profile, including no observable inactivation of CYP3A4. We were able to achieve these outcomes within the first six months of project work. As of October 30, 2019 only 192 molecules have been synthesized from a pool of over 1 billion computationally evaluated molecule design ideas.

We are also pursuing *in vitro* Wee1 and PARP inhibitor combination studies to prepare for proof of concept studies in patient-derived tumor mouse models. In addition, we have demonstrated that combining CDC7 and Wee1 inhibitors leads to additive anti-proliferative effects in cancer cell models, which we believe may have implications for future clinical combination trials. We believe that our selective Wee1 inhibitors, with an optimized CYP3A4 profile, are well positioned for combination therapy.

Genetically-Defined Cancers

Our next three drug discovery programs are focused on genetically-defined cancers. Alterations in the DNA sequence of a cancer cell genome, including mutations, genomic amplification, and rearrangements are responsible for the initiation and progression of most cancers.

SDGR3 Program—MALT1 Inhibitors

We are developing novel MALT1 inhibitors for the treatment of patients with non-Hodgkin’s lymphoma and chronic lymphocytic leukemia who are resistant to or have relapsed on Bruton’s tyrosine kinase, or BTK, inhibitors, a currently-approved therapy for lymphoma patients. Constant activation of nuclear factor-kappa B, or NF-κB, a key signaling molecule in B cells, is a hallmark of several subtypes of lymphoma. MALT1 is a protein that is downstream of BTK in the NF-κB signaling pathway and when rearranged, drives lymphoma cell growth.

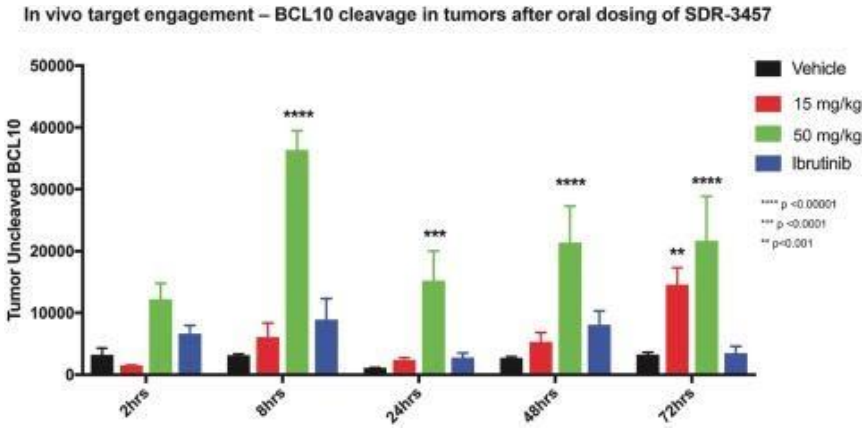
The anti-proliferative effect of covalent BTK inhibitors, such as ibrutinib and acalabrutinib, provides clinical and commercial proof-of-concept that inhibiting NF-κB signaling can be effective for the treatment of B-cell malignancies with elevated B-cell receptors signaling, including chronic lymphocytic leukemia, Waldenström’s macroglobulinemia, mantle cell lymphoma and marginal zone lymphoma. However, a common active site mutation in patients following long-term BTK inhibitor treatment prevents covalent binding of ibrutinib and acalabrutinib to BTK leading to loss of efficacy.

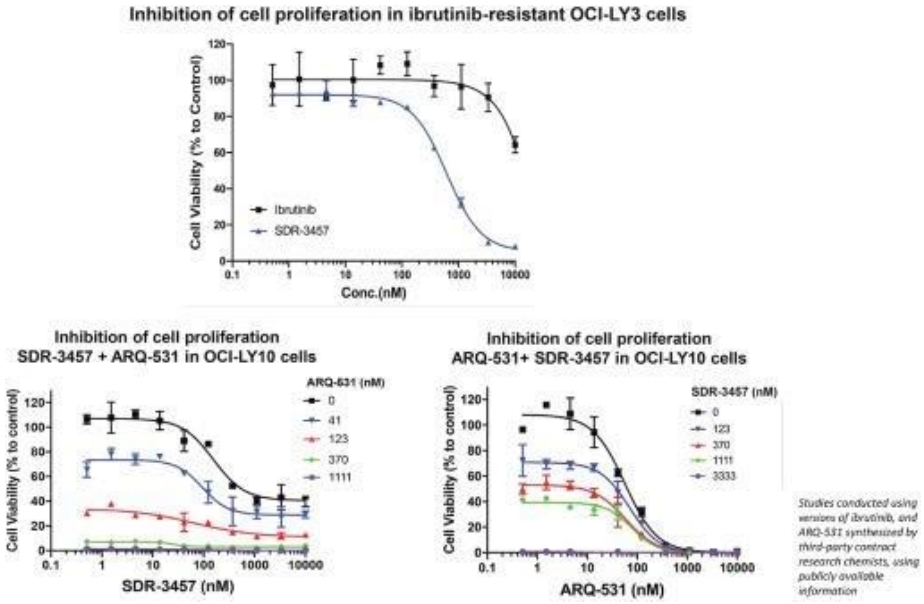
Activated B-cell, or ABC, a subtype of diffuse large B-cell lymphoma, or ABC DLBCL, is the most common type of aggressive non-Hodgkin B-cell lymphoma. ABC DLBCL is associated with a number of mutations that trigger a constitutively active NF-kB signaling pathway, which often is mediated by increased MALT1 protease activity. Among these mutations is a gain of function mutation or amplification of MALT1, which has also been identified in ABC DLBCL patients.

We have used our computational platform to rapidly identify novel, tight-binding MALT1 small-molecule allosteric inhibitors with drug-like properties. Furthermore, we have been able to demonstrate that our MALT1 inhibitors show additive effects when combined with BTK inhibitors in ABC DLBCL lymphoma cell lines. We achieved these outcomes in less than four months from project initiation.

In OCI-LY3 cells, which are resistant to BTK inhibitors, our current MALT1 inhibitors showed dose responsive anti-proliferative effects compared to ibrutinib, strongly suggesting the potential of our inhibitors to benefit patients with acquired resistance due to long term BTK inhibitor treatment.

Our MALT1 inhibitors demonstrated *in vivo* target engagement with decreased tumor B-cell lymphoma 10 (BCL 10) cleavage in a mouse model bearing OCI-LY10 cell derived tumors after oral daily dosing. Further, additive anti-proliferative effects were observed when combining our inhibitors with ibrutinib and acalabrutinib in preclinical studies of OCI-LY10 cells, which are responsive to BTK inhibitors. Additional combination studies were conducted with a next generation BTK inhibitor, ARQ-531, a third-party investigational reversible non-covalent inhibitor of BTK that inhibits wild type and ibrutinib-resistant BTK-C481S mutants. Our MALT1 inhibitors showed additive effects when combined with ARQ-531 in preclinical studies. This supports the potential for our MALT1 inhibitors to be combined with BTK inhibitors to treat patients with B-cell malignancies who no longer respond to existing BTK inhibitors.





SDGR4 Program—HIF-2 alpha Inhibitor

We are developing a HIF-2 alpha inhibitor for the treatment of renal cell carcinoma as monotherapy or in combination with immunotherapy agents, PD-1 or PDL-1 antibodies, and potentially other indications, such as pulmonary hypertension. HIF-2 alpha, also known as EPAS1, is one of several master regulators of intratumoral hypoxia and control hypoxia-mediated pathological processes in tumors, including angiogenesis, pH homeostasis, cell migration/invasion, stem cell pluripotency, immune evasion, and therapy resistance. The work elucidating the underlying biology of this mechanism was awarded the 2019 Nobel Prize in Physiology and Medicine.

In third-party studies, clinical proof of concept was recently demonstrated for the role of HIF-2 alpha inhibition in patients with clear cell renal cell carcinoma, or CCRCC, caused by a germline mutation in the Von Hippel-Lindau tumor suppressor gene. We have used our computational platform to design molecules that are predicted to be tight-binding, highly selective, orally bioavailable inhibitors of the HIF-2 alpha interaction with aryl hydrocarbon receptor nuclear translocator, or ARNT. We plan to continue advancing these molecules through preclinical testing. Prolonged treatment of CCRCC patients with a HIF-2 alpha inhibitor resulted in resistance through a mutation (G323E) identified in approximately 20% of patients in a third-party Phase 1 clinical trial sub-study, consistent with observations from pre-clinical models. In designing our molecules, we are modeling the impact of this and other potential resistance mutations.

SDGR5 Program—SOS1/KRAS Inhibitor

We are developing a SOS1/KRAS protein-protein interaction inhibitor for the treatment of KRAS-driven cancers. SOS1, or Son of sevenless-1, is involved in the activation and regulation of KRAS. Oncogenic mutant KRAS stimulates the growth of some of the most intractable tumors, such as lung, pancreatic, and colon cancer. Strategies to disrupt the persistently active Ras pathway have focused on targeting Cys12 of the oncogenic mutant KRAS G12C with covalent inhibitors. Disruption of the SOS1/KRAS interaction has emerged as an alternative approach based on third party preclinical data. Our initial efforts suggest that we can leverage our computational platform to identify a novel development candidate for this target to capitalize on this first-in-class opportunity.

Future Programs

We have identified a large number of protein targets that we believe are amenable to our computational platform, which creates a large and growing inventory of targets that we can potentially advance into discovery programs. Our drug discovery group also intends to pursue targets with strong biological validation and therapeutic potential that currently lack protein structures of sufficient quality to permit the use of our computational platform for drug discovery. We are actively pursuing strategic alliances with collaborators that have the ability to generate high-quality protein structures for these targets, which will enable us to initiate discovery efforts.

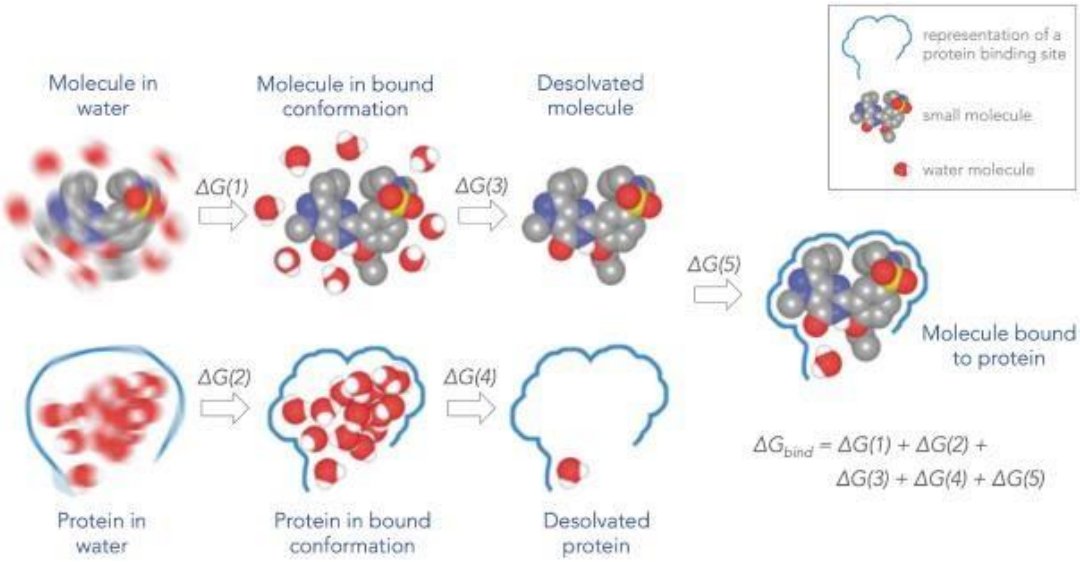
Genomic instability of malignant cells leads to genetic mutations that can drive resistance to kinase inhibitors, creating the need for second and third generation drugs targeting the same disease. Our computational platform has been shown to be capable of predicting the impact that mutations in the kinase domain have on drug binding, potency, and drug sensitivity. Use of our platform to assess and evaluate the impact of clinical mutations on drug potency can be a powerful tool for drug discovery. We believe that deploying our platform at scale with access to genomic profiling data for patients puts us in a strong position to predict the impact of active-site resistance mutations with clinically relevant accuracy to optimize the design of molecules that are robust against common resistant mutations.

Technical Details of Our Key Technologies

Calculation of key drug properties using physics-based methods

Over the past 30 years and with the concerted effort of hundreds of our scientists and software engineers, we have developed a physics-based computational platform that is capable of predicting the binding affinity of a drug molecule with a high degree of accuracy. The binding affinity of a drug molecule to a target protein is the key driving force of its *in vivo* efficacy. Specifically, when a drug binds to a target protein, the affinity with which it binds directly affects the extent to which it will modulate the function of the protein. Therefore, the ability to predict the binding affinity of a drug molecule to a target protein with a high degree of accuracy can significantly accelerate discovery of new efficacious medicines.

Accurately calculating the binding affinity of a drug molecule to a protein is enormously complex and requires a full characterization of all the physical contributions to the binding. These contributions include the deformation and/or rigidification of the small molecule into the bound conformation (ΔG(1) in the figure below) and the rigidification of the protein in the bound conformation (ΔG(2)), the removal of waters surrounding the molecule (ΔG(3)) and the removal of waters within the protein binding site (ΔG(4)), and finally the interactions achieved between the molecule and protein when binding to form the protein-molecule complex (ΔG(5)).



We have developed a solution to consistently assess all of these contributions to binding with a high degree of accuracy, building on a method called “free energy perturbation.” Free energy perturbation perturbs, or transforms, an initial molecule into another molecule of interest and evaluates how that transformation changes binding affinity to a particular protein target. Our solution for conducting these calculations is called FEP+. FEP+ is enabled by the following differentiated constituent technologies:

- classical molecular mechanics force field with broad coverage of drug-like molecules with a high degree of accuracy;
- an automated workflow allowing for force field coverage to be extended on the fly utilizing our accurate quantum mechanics software;
- computationally efficient molecular dynamics engine that runs on GPUs;
- efficient, enhanced sampling methods that allow the calculation to be converged with reduced simulation times;
- automated atom-mapping and interaction-mapping assignment; and
- ability to scale these calculations to leverage large cloud computing environments.

All of these constituent technologies are necessary to achieve the accuracy, scalability and applicability of our free energy perturbation implementation.

In a recent peer-reviewed study including approximately 3,000 molecules across approximately 90 distinct projects, FEP+ exhibited an error profile that indicates its affinity predictions approach the accuracy of running a laboratory experiment. FEP+ is also able to perform these computations more rapidly than experimental assays. Computational assessment of a molecule utilizing FEP+ requires approximately 24 hours of computation on a GPU or only a few hours on a computer that contains eight GPUs. In comparison, it often takes weeks to synthesize a drug-like molecule and assay its binding affinity for the target of interest in a laboratory. As a result, our FEP+ solution can be used to explore very large numbers of molecules to identify drug candidates much more rapidly than would be possible solely using experimental approaches.

In a peer-reviewed article published in collaboration with a large biopharmaceutical company, the ability of FEP+ to prioritize molecules for synthesis expected to bind more tightly than an initial hit was compared with several other industry-standard approaches. We found that FEP+ succeeded in prioritizing the synthesis of molecules with improved binding affinity with eight times greater success than any other technique tested. This evidence supports the essential role that FEP+ can play in advancing drug discovery programs.

Enumeration of extremely large libraries of molecules

We have developed methods to enumerate extremely large libraries of molecules with our PathFinder software solution, thereby allowing our software customers, our drug discovery collaborators, and our internal drug discovery team to explore a much larger portion of chemical space than is possible through manual design. The chemical enumeration technology we have developed incorporates over a hundred known chemical reactions that can, in a fully automated fashion, computationally explore billions of alterations of a molecule of interest.

Scaling accurate physics-based calculations to extremely large libraries of molecules

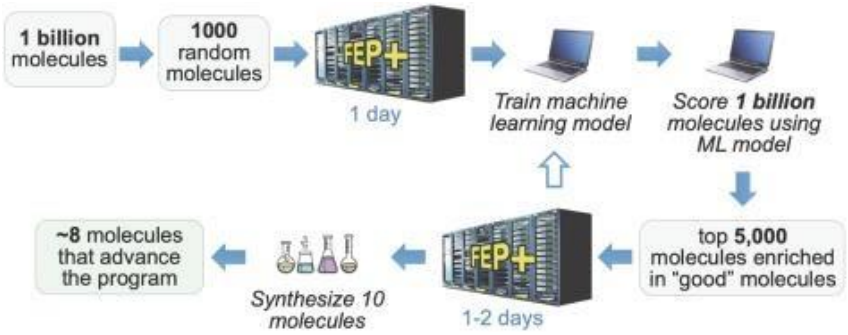
Although FEP+ calculations have been shown to be accurate, it is not possible to apply these calculations to billions of molecules given the current availability of computing resources. To address this problem, we developed an approach that leverages the accuracy of FEP+, but allows for exploration of billions of molecules in a reasonable amount of time by leveraging machine learning. We have succeeded in integrating our physics-based molecule scoring with highly computationally efficient modern machine-learning methods. This combined approach allows us to apply our physics-based calculations to much larger sets of molecules than would otherwise be computationally tractable. This allows us to both increase the speed and likelihood of identifying clinically viable molecules.

Advances in deep learning, a type of machine learning, in the past several years have required very large data sets as input to train the model. In a drug discovery program, the experimental data is typically sparse and expensive to procure, which is particularly problematic given that relevant drug-like chemical space is effectively infinitely large, estimated to be 10^60

molecules. For this reason, we believe that it would be extremely difficult to realize competitive advantage in a drug discovery program by using a platform exclusively based on machine learning or deep learning. Instead, we have developed an approach to integrate physics-based and machine-learning based scoring methodologies that allows the machine learning model to interactively prioritize additional molecules for physics-based analyses, known as active learning. Active learning retains the computational efficiency of machine learning while also taking advantage of the accuracy of the physics-based method. One can evaluate the utility of any particular prediction method with regard to both its accuracy and its computational efficiency. Modern machine learning methods, such as deep learning, do provide a small improvement over conventional machine learning methods. However, for much of its history, conventional molecular simulations were much less computationally efficient than machine learning but not that much more accurate.

In developing FEP+, we were able to resolve deficiencies in early attempts to develop physics-based methods. FEP+ calculations are much more accurate than either conventional machine learning or modern machine learning when scoring molecules structurally distinct from the training set data. In addition, by integrating FEP+ with our machine learning implementation, which we refer to as AutoQSAR / DeepChem, we developed a solution that we refer to as Active Learning FEP+. Active Learning FEP+ combines the accuracy of free energy calculations with the speed of machine learning calculations and can be used to explore up to billions of molecules within a few days. By further combining this functionality with our ability to enumerate large sets of molecules provided by PathFinder and our ability to build and manage complex workflows utilizing cloud resources, we are able to deploy these capabilities at scale to advance projects.

Active Learning FEP+ is depicted in the figure below.



FEP+ is used to build a local model for a large library of molecules instead of relying on experimental data to provide the training set for the machine learning model. That machine learning model is then used to filter the large library of molecules down to a number that is small enough to be able to prioritize with FEP+. The result is that it takes only a few days to prioritize one billion molecules rather than one million days.

Rapid identification of novel active hit molecules suitable to initiate hit-to-lead and lead optimization efforts

Several hit-finding technologies we have developed are routinely used to identify active hit molecules to initiate small molecule drug discovery programs. In our hit-finding campaigns, we and our software customers typically utilize:

- modern machine learning models trained to the two-dimensional structures of known active molecules using our software solution, AutoQSAR/DeepChem;
- shape-based methods trained to the known or computationally deduced three-dimensional bioactive conformations of known active molecules using our software solution, Shape;
- structure-based docking methods that evaluate the number and kind of interactions possible utilizing a static atomistic representation of the experimentally determined three-dimensional structure of the target protein receptor using our software solutions, Glide and WScore; and
- free energy calculations using our software solution FEP+, which provides a fully dynamic atomistic representation of the target protein receptor.

These four approaches are complementary to each other, and their integrated use has led to successful hit-finding campaigns for dozens of protein targets in our collaborative and wholly-owned drug discovery programs. There are also numerous reports in the literature and in patents of our software customers utilizing some combination of these approaches to identify hit molecules.

AutoQSAR/DeepChem is trained to find known active molecules in a search through a molecule library and operates solely on the two-dimensional structure of the molecule. From this training process, AutoQSAR/DeepChem learns to identify substructures in the molecules that may lead to activity. Then when applied to large libraries of molecules, these methods can identify molecules with measurable activity against the target protein. These methods are highly efficient and can be used to screen one billion molecules in less than one day on a few hundred CPUs. However, one significant limitation is that machine learning methods cannot extrapolate into chemical space that differs from the training set and therefore, this method tends to identify molecules similar to already known molecules.

Shape is used to identify molecules with a similar shape to known active molecules. It has been shown that molecules with similar three-dimensional shapes can have similar activities. While the hit rates and computational efficiencies of Shape and AutoQSAR/DeepChem are generally comparable, the hit molecules returned by these techniques tend to be distinct and complementary rather than redundant. This allows results from Shape to augment the AutoQSAR/DeepChem results while still being efficient for screening a large library.

Glide and WScore use knowledge of three-dimensional structure of the binding site of the protein of interest, rather than the structure of active molecules, to evaluate the likelihood of a small molecule to bind a protein target. Glide and WScore evaluate molecules based on the number and kind of contacts made between the molecule and protein. These methods are much more computationally expensive than AutoQSAR/DeepChem or Shape, often requiring seconds to minutes of CPU computing time per molecule. However, they can be more readily applied to targets for which there is little or no earlier reported active molecules.

The fourth computational method we routinely use to identify hit molecules to initiate drug discovery programs is the FEP+ solution described above. When used in this context, FEP+ can be used to completely replace the core moiety of an earlier known molecule to yield a novel molecule with similar binding potency. This approach is much more computationally intensive than previous methods, often ~24 GPU hours per molecules, but is also much more accurate. Utilizing this approach on multiple programs, we have been able to identify novel nanomolar or picomolar inhibitors in the first few months of project chemistry that have property profiles typical of molecules only observed in the later hit-to-lead phases of drug discovery.

Computational analysis of the energetic properties of water molecules occupying molecule binding sites in proteins

Subtle structural variations in molecules can have a profound impact on binding affinity to the protein target. The effects of these structural variations can be explained by a detailed examination of the thermodynamics of binding, including the free energy changes resulting from displacing water molecules in the binding site. Our computational software solution WaterMap maps the locations and energetic properties of water molecules that occupy protein binding sites, provides insight into the properties of the binding site, and quantitatively describes the water-mediated forces driving the binding of small molecules. Further, such an analysis can be used to assess the propensity of drug-like molecules to bind to the protein target with high affinity. WaterMap presents the computed results graphically for easy visualization of the water molecules occupying a binding site and their energetic properties. This makes interpretation of binding affinity data more intuitive and provides insights to possible design routes to improve potency and selectivity.

Competition

The overall market for molecular discovery and design software is global, rapidly evolving, competitive, and subject to changing technology and shifting customer focus. The solutions and applications offered by our competitors vary in size, breadth, and scope.

We believe the principal competitive factors in our market include, among other things, accuracy of computations, level of customer satisfaction and functionality, ease of use, breadth and depth of solution and application functionality, brand awareness and reputation, modern and adaptive technology platform, integration, security, scalability and reliability of applications, total cost, ability to innovate and respond to customer needs rapidly, and ability to integrate with legacy enterprise infrastructures and third-party applications.

We believe that we compete favorably on the basis of these factors and that the effort and investment required to develop a computational, physics-based platform similar to ours will hinder new entrants that are unable to invest the necessary capital and time, and lack the breadth and depth of technical expertise required to develop competing technology. Our ability to remain competitive will largely depend on our ability to continue to improve our computational platform and demonstrate success in our drug discovery efforts.

Our software solutions face competition from commercial competitors in the business of selling simulation and modeling software to biopharmaceutical companies. These competitors include BIOVIA, a brand of Dassault Systèmes SE, or BIOVIA, Chemical Computing Group (US) Inc., Cresset Biomolecular Discovery Limited, OpenEye Scientific Software, Inc., Optibrium Limited, and Simulations Plus, Inc. We also have competitors in materials science, such as BIOVIA and Materials Design, Inc., and in enterprise software for the life sciences, such as BIOVIA, Certara USA, Inc., and Dotmatics, Inc. In some cases, these competitors are well-established providers of these solutions and have long-standing relationships with many of our current and potential customers, including large biopharmaceutical companies. In addition, there are academic consortia that develop physics-based simulation programs for life sciences and materials applications. In life sciences, the most prominent academic simulation packages include AMBER, CHARMm, GROMACS, GROMOS, OpenMM, and OpenFF. These packages are primarily maintained and developed by graduate students and post-doctoral researchers, often without the intent for commercialization. We also face competition from solutions that biopharmaceutical companies develop internally, smaller companies that offer products and services directed at more specific markets than we target, enabling these competitors to focus a greater proportion of their efforts and resources on these markets, as well as a large number of companies that have been founded with the goal of applying machine learning technologies to drug discovery.

The biopharmaceutical industry is characterized by rapidly advancing technologies, intense competition, and strong emphasis on proprietary products. While we believe that our computational platform, technology, knowledge, experience, and scientific resources provide us with competitive advantages, our drug discovery business faces potential competition from many sources, including major pharmaceutical, specialty biopharmaceutical companies, technology companies, academic institutions and government agencies, and public and private research institutions. Any product candidates that we or one of our collaborators successfully develop and commercialize will compete with existing therapies and new therapies that may become available in the future.

License Agreements with Columbia University

We have entered into several license agreements with Columbia University, or the Columbia License Agreements. The Columbia License Agreements establish our rights and obligations with respect to certain patents, software code, technology, and improvements thereto that we license from Columbia University and that are used in, and integrated into, our software solutions, and our physics-based computational platform. Our rights and obligations under, and the terms and conditions of, the Columbia License Agreements that we consider material to the operation of our business are described more fully below.

On November 1, 2008, we entered into an amendment, or the Royalty Amendment, to certain Columbia License Agreements, including each of the agreements described below. The Royalty Amendment simplified the royalties payable under each agreement on gross revenues generated from the use of any product which contains any code or software, or is covered by any patent, that we license from Columbia University, or a Licensed Product, in connection with a services agreement. We also pay royalties under the Columbia License Agreements on gross revenues generated from the sale, licensing or renting of our Licensed Products, which we calculate on a product-by-product basis. In the event that one or more Licensed Products are sold together with other products for a single aggregate license fee, we have agreed to pay to Columbia University the applicable royalty on the gross revenues attributable to each Licensed Product based on the relative list prices of each product covered by such license fee.

For a description of the royalties payable by us to Columbia University in connection with our services agreements, see "License Agreements with Columbia University—Services Royalty Amendment" below.

PS-GVB License Agreement

On May 5, 1994, we entered into a license agreement, or the 1994 Columbia Agreement, with Columbia University, which was amended on September 9, 2004 and November 1, 2008. The technology licensed under the 1994 Columbia Agreement is incorporated into our Jaguar quantum mechanical program, which we market and distribute as part of our physics-based computational platform. The 1994 Columbia Agreement grants us a worldwide, exclusive, license to the software code developed by Columbia University and incorporated into the electronic structure software program PS-GVB v1.0, or the PS-GVB Code, and all improvement to the PS-GVB v1.0 software program and PS-GVB Code developed by Columbia University, or the PS-GVB Improvements, including all PS-GVB Code and PS-GVB Improvements that are incorporated into any new products, new releases, and new versions related to the software, or the New PS-GVB Module Code, in each case, to reproduce, use, execute, copy, operate, sublicense, and distribute in connection with the marketing and sale of our products and services, to develop improvements thereto, and to conduct research and backup disaster recovery. We may only sublicense the PS-GVB Code, the PS-GVB Improvements, and the New PS-GVB Module Code, or the Licensed PS-GVB Software, to the extent they are incorporated into a product that is sold directly by us or that is distributed on our behalf. Under the 1994 Columbia Agreement, Columbia University retains the right to conduct, and to permit other academic and non-profit research institutions to conduct, research using the Licensed PS-GVB Software.

As consideration for entering into the 1994 Columbia Agreement, we have agreed to pay royalties to Columbia University in the low-single digit to low-double digit percentages based upon the contribution of Columbia University generated code to the applicable PS-GVB v1.0 software program on our, and our affiliates, gross revenues from the sale, licensing, or renting of the PS-GVB v1.0 software program, including any improvements and modifications thereto, regardless of whether such improvement or modification is marketed as a new version, new release, or new product, excluding any sales to Columbia University and any revenue generated under services agreements.

The 1994 Columbia Agreement and the licenses granted thereunder may be terminated by us or Columbia University only upon the other party's material breach of the agreement and such party's failure to cure such breach. Upon termination, any third party that has licensed the Licensed PS-GVB Software from us will retain the right to use such software, and we will have the perpetual right to continue to provide support to any such third parties in connection with their use of such software.

Fast Multipole RESPA License Agreement

On July 15, 1998, we entered into a license agreement, or the 1998 Columbia Agreement, with Columbia University, which was amended on September 4, 2004, and November 1, 2008. The 1998 Columbia Agreement grants us a worldwide, non-exclusive, license to the Fast Multipole RESPA code developed at Columbia University, or the RESPA Code, which was incorporated into the IMPACT software program used in our Glide ligand-protein docking program, PrimeX protein modelling program, QSite QM/MM program, and Combglide automated library generation program, and all improvements to the IMPACT software program, including any new versions and new releases thereof, that are developed by Columbia University, or the IMPACT Improvements, in each case, to reproduce, use, execute, copy, compile, operate, sublicense, and distribute in connection with the marketing and sale of our products and services, to develop improvements thereto, and to conduct research and backup disaster recovery. We may sublicense the RESPA Code and the IMPACT Improvements, or the Licensed IMPACT Software, to the extent it is incorporated into a product that is sold directly by us or that is distributed on our behalf. Under the 1998 Columbia Agreement, Columbia University retains the right to conduct, and to permit other academic and non-profit research institutions to conduct, research using the Licensed IMPACT Software.

As consideration for entering into the 1998 Columbia Agreement, we have agreed to pay royalties to Columbia University in the low-single digit to low-double digit percentages based upon the contribution of Columbia University generated code to the applicable IMPACT software program on our, and our affiliates, gross revenues from the sale, licensing, or renting of the IMPACT software program, including any improvements and modifications thereto and any new versions and new releases thereof, excluding any sales to Columbia University and revenue generated under services agreements.

The 1998 Columbia Agreement and the licenses granted thereunder may be terminated by us or Columbia University only upon the other party's material breach of the agreement and such party's failure to cure such breach. Upon termination, any third party that has licensed software from us subject to the 1998 Columbia Agreement will retain the right to use such software, and we will have the perpetual right to continue to provide support to any such third parties in connection with their use of such software.

Protein Folding License Agreement

In September 2001, we entered into a license agreement, or the 2001 Columbia Agreement, with Columbia University, which was amended on September 9, 2004 and November 1, 2008. The technology licensed under the 2001 Columbia Agreement is incorporated into our Prime protein modelling program, which we market and distribute as part of our physics-based computational platform. The 2001 Columbia Agreement grants us a worldwide, exclusive license to the protein folding code developed by Columbia University, or the Folding Code; all improvements to the Folding Code and to any of our products, software, or code that incorporates any part of the Folding Code, including any improvements thereto and new versions or new releases thereof, that are developed by Columbia University, or the Folding Code Improvements; and the issued patent covering the Folding Code, or the Folding Code Patent, in each case, to reproduce, use, execute, copy, compile, operate, sublicense, and distribute in connection with the marketing and sale of our products and services, to develop improvements thereto, and to conduct research and backup disaster recovery. We may sublicense the Folding Code, the Folding Code Improvements and the Folding Code Patent, or the Licensed Folding Code Software, to the extent it is incorporated into a product that is sold directly by us or that is distributed on our behalf. Under the 2001 Columbia Agreement, Columbia University retains the right to conduct, and to permit other academic and non-profit research institutions to conduct, research using the Licensed Folding Code Software.

As consideration for entering into the 2001 Columbia Agreement, we paid Columbia University a one-time, nominal license fee. In addition, we have paid royalties to Columbia University in low-single digit to low-double digit percentages based upon the contribution of Columbia University generated code to the applicable product, software program, or code on our, and our affiliates, gross revenues from the sale, licensing, or renting of any commercial product, software program, or code incorporating the Licensed Folding Code Software, excluding any sales to Columbia University and revenues generated under services agreements. Our obligation to pay any royalty under the 2001 Columbia Agreement, including any royalty paid pursuant to the Royalty Amendment, terminated with the expiration of the last to expire patent licensed under the 2001 Columbia Agreement in January 2014.

The 2001 Columbia Agreement and the licenses granted thereunder may be terminated by Columbia University only upon our material breach of the agreement and our failure to cure such breach. Upon termination, any third party that has licensed software from us subject to the 2001 Columbia Agreement will retain the right to use such software, and we will have the perpetual right to continue to provide support to any such third parties in connection with their use of such software.

PLOP License Agreement

On June 19, 2003, we entered into a license agreement, or the 2003 Columbia Agreement, with Columbia University, which was amended on November 1, 2008. The technology licensed under the 2003 Columbia Agreement is incorporated into our Prime and PrimeX protein modelling programs and our Membrane Permeability model, which we market and distribute as part of our physics-based computational platform. The 2003 Columbia Agreement grants us a worldwide, exclusive license to the protein local optimization program software code, or the PLOP Code, developed at Columbia University and the University of California and all software code comprising improvements to the PLOP Code that are developed by Columbia University or the University of California, or the PLOP Improvements, in each case, to reproduce, use, execute, copy, compile, operate, sublicense, and distribute in connection with the marketing and sale of our products and services, to develop improvements thereto, and to conduct research and backup disaster recovery. Pursuant to an interinstitutional agreement between Columbia University and the University of California, the University of California granted Columbia University the sole right to license the PLOP Code and PLOP Improvements and has agreed not to license the PLOP Code or PLOP Improvements to any third party for as long as the interinstitutional agreement remains in effect. We may sublicense the PLOP Code and PLOP Improvements to the extent they are incorporated into a product that is sold directly by us or that is distributed on our behalf. We are restricted from distributing the PLOP Code and PLOP Improvements source code without the prior written consent of Columbia University.

Columbia University and the University of California retain the right to use, and to permit other academic and non-profit research institutions to use, the PLOP Code and PLOP Improvements for teaching and academic research purposes.

As consideration for entering into the 2003 Columbia Agreement, we paid Columbia University a one-time, nominal license fee. In addition, we have agreed to pay royalties to Columbia University in low-single digit to low-double digit percentages based upon the contribution of Columbia University generated code to the applicable product, software program, or code on our, and our affiliates, gross revenues from the sale, licensing, leasing, or renting any commercial product, software program, or code incorporating the PLOP Code or any PLOP Improvements, excluding any sales to Columbia University or the University of California and revenues generated under services agreements. Our obligation to pay any royalty under the 2003 Columbia Agreement, including any royalty paid pursuant to the Royalty Amendment, will terminate on June 19, 2023.

Columbia University is responsible for the copyright registration of the PLOP Code and PLOP Improvements. We are responsible for paying all reasonable copyright registration and attorney fees in connection with such copyright registrations.

The 2003 Columbia Agreement and the licenses granted thereunder may be terminated by us or Columbia University only upon the other party’s material breach of the agreement and such party’s failure to cure such breach. Upon termination, any third party that has licensed software from us subject to the 2003 Columbia Agreement will retain the right to use such software, and we will have the perpetual right to continue to provide support to any such third parties in connection with their use of such software.

Water Site Analysis License

On May 27, 2008, we entered into a software and patent license agreement, or the 2008 Columbia Agreement, with Columbia University, which was amended on November 1, 2008. The 2008 Columbia Agreement grants us a worldwide license, exclusive in the field of computational chemistry software and related services, to (a) certain software that implements the water site analysis method, or the Water Site Software; (b) all patent rights covering the Water Site Software, or the Water Site Patents; and (c) any products that incorporate or include the Water Site Software, or that is covered by the Water Site Patents, or the Water Site Products, in each case, to reproduce, modify, distribute, and perform and display in connection with the development, marketing, and sale of our products and services, to conduct research using the Water Site Software, and to conduct backup disaster recovery. Our Water Site Products include our WaterMap Core program, which we market and distribute as part of our physics-based computational platform. We are restricted from distributing the Water Site Software source code without the prior written consent of Columbia University. Under the 2008 Columbia Agreement, Columbia University retains the right to use, and to permit other entities and individuals to use, the Water Site Software and Water Site Patents for academic and non-commercial educational purposes in the field of computational chemistry software and related services.

As consideration for entering into the 2008 Columbia Agreement, we paid Columbia University a one-time, nominal license fee. In addition, we have agreed to pay royalties to Columbia University in low-double digit percentages on our, and our affiliates, gross revenues from the sale, licensing, leasing, or renting of any Water Site Product, excluding any sales to Columbia University and revenues generated under services agreement. The royalties under the 2008 Columbia Agreement are paid on a product-by-product basis and vary based on whether or not the gross revenues are generated in countries of manufacture or sale in which the Water Site Product is covered by a Water Site Patent. In the event that there are multiple royalties payable on a single product, we are required to (i) pay the higher of the two royalties, if there are no more than two royalties payable on the particular Water Site Product or (ii) negotiate in good faith with Columbia University on a single royalty, if there are more than two royalties payable on the particular Water Site Product. In the event that we take action against Columbia University with respect to the validity or enforceability of any Water Site Patents, excluding any defensive actions or claims, the royalties paid under the 2008 Columbia Agreement will increase by a specified amount. Our obligation to pay any royalty under the 2008 Columbia Agreement, including any royalty paid pursuant to the Royalty Amendment, will terminate on May 27, 2028.

Columbia University is responsible for the prosecution and maintenance of the Water Site Patents in the jurisdictions that we specify. If we decide to discontinue the prosecution or maintenance of any Water Site Patent in any jurisdiction, but Columbia University objects to such discontinuation, our license to use such Water Site Patent will terminate in that jurisdiction; provided that, if we are using the Water Site Patent or Water Site Software in the jurisdiction at issue, Columbia University is obligated to discuss in good faith whether the licenses should instead be non-exclusive. Columbia University is also responsible for the enforcement of the Water Site Patent at its own expense and in its sole judgment; provided that, if we provide Columbia University with evidence of infringement of a Water Site Patent by a third party, and Columbia University fails to take appropriate enforcement action, we may initiate legal proceedings against the alleged infringer. We are responsible for reimbursing Columbia University for their reasonable expenses in connection with prosecuting and maintaining the Water Site Patents.

Unless terminated earlier, the 2008 Columbia Agreement will expire on a product by product and country by country basis upon the later of (i) the expiration of the last issued Water Site Patent, (ii) fifteen years from the date of the first commercial sale of a Water Site Product in a given country, and (iii) the expiration of the Water Site Software copyright. Columbia University may terminate the 2008 Columbia Agreement if we fail to cure a material breach, become subject to a voluntary or involuntary petition for bankruptcy or any other proceeding relating to insolvency, receivership or liquidation, or initiate any proceeding or assert any claim challenging the validity or enforceability of the Water Site Patents. Upon termination, any third party that has licensed a Water Site Product from us will retain the right to use such product, subject to the terms of their existing license agreement with us, and we will have the right to continue to provide support to any such third parties for the duration of their license agreement.

Services Royalty Amendment

On November 1, 2008, we entered into the Royalty Amendment with Columbia University, which amended and simplified our royalty obligations under each of the Columbia License Agreements described in each of the foregoing sections. Pursuant to the Royalty Amendment, we have agreed to pay royalties to Columbia University in mid-single digit percentages on the service fees generated from services (excluding certain gross revenue, including revenue generated under agreements with Columbia University) that we, or our affiliates, perform using one or more Licensed Products under an agreement with a third party. Upon termination of any of the Columbia License Agreements for any reason other than our material breach, we will have the right to continue to use the Licensed Products to provide services under existing third-party service agreements, until the expiration or termination of such agreements.

Intellectual Property

We strive to protect and enhance the proprietary technology, inventions, and improvements that are commercially important to the development of our business, including by seeking, maintaining, and defending patent rights, whether developed internally or jointly, or licensed from third parties. We also rely on trade secrets, know-how, continuing technological innovation, collaboration opportunities, and in-licensing opportunities to develop, strengthen, and maintain our proprietary position in our field.

It is important to our future commercial success to obtain and maintain patent and other proprietary protection for commercially important technology, inventions, and know-how related to our business; defend and enforce our intellectual property rights, in particular our patent, trademark, and copyright rights; preserve the confidentiality of our trade secrets; and operate without infringing, misappropriating, or violating the valid and enforceable patents and proprietary rights of third parties. Our ability to stop third parties from making, using, selling, offering to sell, or importing any products we develop may depend on the extent to which we have rights under valid and enforceable patents or trade secrets that cover these activities.

The patent positions of companies like ours are generally uncertain and can involve complex legal, scientific, and factual issues. We cannot predict whether the patent applications we are currently pursuing will issue as patents in any particular jurisdiction or whether the claims of any issued patents will provide sufficient proprietary protection from competitors. We also cannot ensure that patents will issue with respect to any patent applications that we or our licensors may file in the future, nor can we ensure that any of our owned or licensed patents or future patents will be commercially useful in protecting our software, technology, computational platform, and any product candidates we develop. In addition, the coverage claimed in a patent application may be significantly reduced before a patent is issued, and its scope can be reinterpreted and even challenged after issuance. As a result, we cannot guarantee that any products we develop will be protected or remain protectable by enforceable patents. Moreover, any patents that we hold or may hold may be challenged, circumvented or invalidated by third parties. See "Item 1A. Risk Factors—Risks Related to Our Intellectual Property" for a more comprehensive description of risks related to our intellectual property.

Our strategy is to file patent applications directed to our key software and our key programs in an effort to secure our intellectual property positions vis-a-vis this software and these programs. The patent portfolio for our software business includes at least 13 published patent families. As of December 31, 2019, we owned or held exclusive license rights to approximately 60 patents and patent applications, including at least six issued or allowed U.S. cases, six pending U.S. non-provisional patent applications, nine issued or allowed non-U.S. cases, including three granted European patents which have been validated among multiple individual European Patent Convention nations and four non-European patents, six pending foreign patent applications, and three pending Patent Cooperation Treaty, or PCT, applications relating to our computational platform. While we believe that the specific and generic claims contained in our wholly-owned and licensed pending U.S., non-U.S., and PCT applications provide protection for various aspects of our computational platform, third parties may nevertheless challenge such claims. Any patents that are issued or that may issue from these families are expected to expire between 2026 and 2038, absent any adjustments or extensions. As of December 31, 2019, there were no published patent families related to our internal drug discovery business, and although several of our drug discovery collaborators have filed patent applications related to our collaborations that include employees of ours as inventors, including over 100 compound patents and patent applications since 2010, we do not own any intellectual property rights related to these inventions. As of December 31, 2019, three wholly-owned provisional applications have been filed.

Prosecution is a lengthy process, during which the scope of the claims initially submitted for examination by the U.S. Patent and Trademark Office may be significantly narrowed before issuance, if issued at all. We expect this may be the case with respect to some of our pending patent applications.

The term of individual patents depends upon the legal term of the patents in the countries in which they are obtained. In most countries in which we file, the patent term is 20 years from the earliest date of filing a non-provisional patent application, absent any adjustments or extensions.

In addition, in the United States, the term of a patent covering an FDA-approved drug may, in certain cases, be eligible for a patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984 as compensation for the loss of patent term during the FDA regulatory review process. The period of extension may be up to five years, but cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval. Only one patent among those eligible for an extension and only those claims covering the approved drug, a method for using it, or a method for manufacturing it may be extended. Similar provisions are available in Europe and in certain other jurisdictions to extend the term of a patent that covers an approved drug. It is possible that issued U.S. patents we may obtain in the future may be entitled to patent term extensions. If our use of product candidates or the product candidate itself receive FDA approval, we intend to apply for patent term extensions, if available, to extend the term of patents that cover the approved use or product candidate. We also intend to seek patent term extensions in any jurisdictions where available, however, there is no guarantee that the applicable authorities, including the FDA, will agree with our assessment of whether such extensions should be granted, and even if granted, the length of such extensions.

In addition to patent protection, as of December 31, 2019, we had approximately 40 copyright registrations covering our proprietary software code, and we rely upon unpatented trade secrets and confidential know-how and continuing technological innovation to develop and maintain our competitive position. However, trade secrets and confidential know-how are difficult to protect. We seek to protect our proprietary information, in part, using confidentiality agreements with any collaborators, scientific advisors, service providers, employees, and consultants and invention assignment agreements with our employees. We also have agreements requiring assignment of inventions with selected consultants, scientific advisors, and collaborators. These agreements may not provide meaningful protection. These agreements may also be breached, and we may not have an adequate remedy for any such breach. In addition, our trade secrets and/or confidential know-how may become known or be independently developed by a third party, or misused by any collaborator to whom we disclose such information. Despite any measures taken to protect our intellectual property, unauthorized parties may attempt to copy aspects of our products or to obtain or use information that we regard as proprietary. Although we take steps to protect our proprietary information, third parties may independently develop the same or similar proprietary information or may otherwise gain access to our proprietary information. As a result, we may be unable to meaningfully protect our trade secrets and proprietary information. See “Item 1A. Risk Factors—Risks Related to Our Intellectual Property” for a more comprehensive description of risks related to our intellectual property.

We also own numerous trademarks registered in the United States and foreign jurisdictions, including “Schrödinger” and “LiveDesign”. We pursue additional trademark registrations to the extent we believe doing so would be beneficial to our competitive position.

Sales and Marketing

Software Business

We commercialize our software solutions in various jurisdictions around the world through our software sales organization. We have sales operations in the United States, Europe, Japan, and India, and we also have established distribution channels in other important markets, including China and South Korea. These efforts are led by our approximately 130 person global team of sales, technical, and scientific personnel. Our marketing strategy leverages our strong base of scientific publications to support the continued growth of our computational platform into computational chemistry markets across industries and academia worldwide.

Drug Discovery Business

We have not established a commercial organization or developed distribution capabilities given the current stage of development of our internal, wholly-owned drug discovery programs. We plan to enter into agreements with biopharmaceutical companies that contribute to our ability to efficiently advance development candidates that we discover internally using our computational platform through to commercialization. We expect to utilize a variety of types of collaboration, distribution, and other arrangements with one or more of these third parties to develop and ultimately commercialize our development candidates. Over time, we may also create a commercial organization for drug product sales if and as we advance the development of any product candidates that we determine to commercialize ourselves.

Manufacturing

We do not own or operate manufacturing facilities for the production of any product candidates, nor do we have plans to develop our own manufacturing operations. We expect to rely on third-party contract manufacturers for all of our required raw materials, drug substance, and finished drug product for the preclinical and clinical development of any development candidates we develop ourselves.

Government Regulation and Product Approvals

Government authorities in the United States at the federal, state and local level, and in other countries and jurisdictions, including the European Union, extensively regulate, among other things, the research, development, testing, manufacture, pricing, reimbursement, quality control, approval, packaging, storage, recordkeeping, labeling, advertising, promotion, distribution, marketing, post-approval monitoring and reporting, and import and export of biopharmaceutical products. The processes for obtaining marketing approvals in the United States and in foreign countries and jurisdictions, along with compliance with applicable statutes and regulations and other regulatory authorities, require the expenditure of substantial time and financial resources.

Approval and Regulation of Drugs in the United States

In the United States, drug products are regulated under the Federal Food, Drug and Cosmetic Act, or FDCA, and applicable implementing regulations and guidance. The failure of an applicant to comply with the applicable regulatory requirements at any time during the product development process, including non-clinical testing, clinical testing, the approval process or post-approval process, may result in delays to the conduct of a study, regulatory review and approval, and/or administrative or judicial sanctions. These sanctions may include, but are not limited to, the FDA's refusal to allow an applicant to proceed with clinical trials, refusal to approve pending applications, license suspension or revocation, withdrawal of an approval, imposition of a clinical hold, issuance of warning letters and other types of letters, adverse publicity, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, refusals of government contracts, restitution, disgorgement of profits or civil, or criminal investigations and penalties brought by the FDA or the United States Department of Justice or other government entities, including state agencies.

An applicant seeking approval to market and distribute a new drug in the United States generally must satisfactorily complete each of the following steps before the product candidate will be approved by the FDA:

- preclinical testing including laboratory tests, animal studies, and formulation studies, which must be performed in accordance with the FDA's good laboratory practice, or GLP, regulations and standards;
- submission to the FDA of an IND for human clinical testing, which must become effective before human clinical trials may begin;
- approval by an independent institutional review board, or IRB, representing each clinical site before each clinical trial may be initiated;
- performance of adequate and well-controlled human clinical trials to establish the safety, potency, and purity of the product candidate for each proposed indication, in accordance with current good clinical practices, or GCP;
- preparation and submission to the FDA of a new drug application, or NDA, for a drug product which includes not only the results of the clinical trials, but also, detailed information on the chemistry, manufacture and quality controls for the product candidate and proposed labelling for one or more proposed indication(s);
- review of the product candidate by an FDA advisory committee, where appropriate or if applicable;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities, including those of third parties, at which the product candidate or components thereof are manufactured to assess compliance with current good manufacturing practices, or cGMP, requirements and to assure that the facilities, methods, and controls are adequate to preserve the product's identity, strength, quality, and purity;
- satisfactory completion of any FDA audits of the non-clinical and clinical trial sites to assure compliance with GCP and the integrity of clinical data in support of the NDA;

- payment of user fees and securing FDA approval of the NDA to allow marketing of the new drug product; and
- compliance with any post-approval requirements, including the potential requirement to implement a Risk Evaluation and Mitigation Strategy, or REMS, and the potential requirement to conduct any post- approval studies required by the FDA.

Preclinical Studies

Before an applicant begins testing a product candidate with potential therapeutic value in humans, the product candidate enters the preclinical testing stage, including *in vitro* and animal studies to assess the safety and activity of the drug for initial testing in humans and to establish a rationale for therapeutic use. Preclinical tests include laboratory evaluations of product chemistry, formulation, and stability, as well as other studies to evaluate, among other things, the toxicity of the product candidate. The conduct of the preclinical tests and formulation of the compounds for testing must comply with federal regulations and requirements, including GLP regulations and standards. The results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and plans for clinical trials, among other things, are submitted to the FDA as part of an IND. Some long-term preclinical testing, such as animal tests of reproductive adverse events and carcinogenicity and long-term toxicity studies may continue after the IND is submitted.

The IND and IRB Processes

Clinical trials involve the administration of the investigational product to human subjects under the supervision of qualified investigators in accordance with GCP requirements, which include, among other things, the requirement that all research subjects provide their voluntary informed consent in writing before their participation in any clinical trial. Clinical trials are conducted under written study protocols detailing, among other things, the inclusion and exclusion criteria, the objectives of the study, the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated. A protocol for each clinical trial and any subsequent protocol amendments must be submitted to the FDA as part of the IND.

An IND is an exemption from the FDCA that allows an unapproved product candidate to be shipped in interstate commerce for use in an investigational clinical trial and a request for FDA authorization to administer such investigational product to humans. Such authorization must be secured prior to interstate shipment and administration of any product candidate that is not the subject of an approved NDA. In support of a request for an IND, applicants must submit a protocol for each clinical trial, and any subsequent protocol amendments must be submitted to the FDA as part of the IND. In addition, the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and plans for clinical trials, among other things, must be submitted to the FDA as part of an IND. The FDA requires a 30-day waiting period after the filing of each IND before clinical trials may begin. This waiting period is designed to allow the FDA to review the IND to determine whether human research subjects will be exposed to unreasonable health risks. At any time during this 30-day period or thereafter, the FDA may raise concerns or questions about the conduct of the trials as outlined in the IND and impose a clinical hold or partial clinical hold. In these cases, the IND sponsor and the FDA must resolve any outstanding concerns before clinical trials can begin.

Following commencement of a clinical trial under an IND, the FDA may also place a clinical hold or partial clinical hold on that trial. Clinical holds are imposed by the FDA whenever there is concern for patient safety and may be a result of new data, findings, or developments in clinical, nonclinical, and/or chemistry, manufacturing, and controls, or CMC. A clinical hold is an order issued by the FDA to the sponsor to delay a proposed clinical investigation or to suspend an ongoing investigation. A partial clinical hold is a delay or suspension of only part of the clinical work requested under the IND. For example, a specific protocol or part of a protocol may not be allowed to proceed, while other protocols may be allowed. No more than 30 days after imposition of a clinical hold or partial clinical hold, the FDA will provide the sponsor a written explanation of the basis for the hold.

Following issuance of a clinical hold or partial clinical hold, a clinical trial may only resume after the FDA has so notified the sponsor. The FDA will base that determination on information provided by the sponsor correcting the deficiencies previously cited or otherwise satisfying the FDA that the clinical trial can proceed.

A sponsor may choose, but is not required, to conduct a foreign clinical study under an IND. When a foreign clinical study is conducted under an IND, all FDA IND requirements must be met unless waived. When a foreign clinical study is not conducted under an IND, the sponsor must ensure that such studies are conducted in accordance with GCP, including review and approval by an independent ethics committee, or IEC, and informed consent from subjects.

In addition to the foregoing IND requirements, an IRB representing each institution participating in the clinical trial must review and approve the plan for any clinical trial before it commences at that institution, and the IRB must conduct continuing review and reapprove the study at least annually. The IRB must review and approve, among other things, the study protocol and informed consent information to be provided to study subjects. An IRB must operate in compliance with FDA regulations. An IRB can suspend or terminate approval of a clinical trial at its institution, or an institution it represents, if the clinical trial is not being conducted in accordance with the IRB’s requirements or if the product candidate has been associated with unexpected serious harm to patients.

Additionally, some trials are overseen by an independent group of qualified experts organized by the trial sponsor, known as a data safety monitoring board or committee. This group provides authorization as to whether or not a trial may move forward at designated check points based on access that only the group maintains to available data from the study. Suspension or termination of development during any phase of clinical trials can occur if it is determined that the participants or patients are being exposed to an unacceptable health risk. Other reasons for suspension or termination may be made by us based on evolving business objectives and/or the competitive environment.

Information about clinical trials must be submitted within specific timeframes to the National Institutes of Health for public dissemination on its ClinicalTrials.gov website.

Human Clinical Trials in Support of an NDA

Clinical trials involve the administration of the investigational product candidate to human subjects under the supervision of a qualified investigator in accordance with GCP requirements, which include, among other things, the requirement that all research subjects provide their informed consent in writing before their participation in any clinical trial. Clinical trials are conducted under written clinical trial protocols detailing, among other things, the objectives of the study, inclusion and exclusion criteria, the parameters to be used in monitoring safety, and the effectiveness criteria to be evaluated.

Human clinical trials are typically conducted in three sequential phases, but the phases may overlap or be combined. Additional studies may also be required after approval.

Phase 1 clinical trials are initially conducted in a limited population to test the product candidate for safety, including adverse effects, dose tolerance, absorption, metabolism, distribution, excretion, and pharmacodynamics in healthy humans or in patients. During Phase 1 clinical trials, information about the investigational drug product's pharmacokinetics and pharmacological effects may be obtained to permit the design of well-controlled and scientifically valid Phase 2 clinical trials.

Phase 2 clinical trials are generally conducted in a limited patient population to identify possible adverse effects and safety risks, evaluate the efficacy of the product candidate for specific targeted indications and determine dose tolerance and optimal dosage. Multiple Phase 2 clinical trials may be conducted by the sponsor to obtain information prior to beginning larger and more costly Phase 3 clinical trials. Phase 2 clinical trials are well controlled, closely monitored and conducted in a limited patient population. A Phase 2 trial may be further subdivided to Phase 2a and Phase 2b trials. A Phase 2a trial is typically an exploratory (non-pivotal) study that has clinical efficacy, pharmacodynamics, or biological activity as the primary endpoint. A Phase 2b trial is a definite dose range finding study with efficacy as the primary endpoint.

Phase 3 clinical trials proceed if the Phase 2 clinical trials demonstrate that a dose range of the product candidate is potentially effective and has an acceptable safety profile. Phase 3 clinical trials are undertaken within an expanded patient population to further evaluate dosage, provide substantial evidence of clinical efficacy, and further test for safety in an expanded and diverse patient population at multiple, geographically dispersed clinical trial sites. A well-controlled, statistically robust Phase 3 clinical trial may be designed to deliver the data that regulatory authorities will use to decide whether or not to approve, and, if approved, how to appropriately label a drug. Such Phase 3 studies are referred to as "pivotal."

In some cases, the FDA may approve an NDA for a product candidate but require the sponsor to conduct additional clinical trials to further assess the product candidate's safety and effectiveness after approval. Such post-approval trials are typically referred to as Phase 4 clinical trials. These studies are used to gain additional experience from the treatment of a larger number of patients in the intended treatment group and to further document a clinical benefit in the case of drugs approved under Accelerated Approval regulations. Failure to exhibit due diligence with regard to conducting Phase 4 clinical trials could result in withdrawal of approval for products.

Progress reports detailing the results of the clinical trials must be submitted at least annually to the FDA and more frequently if serious adverse events occur. In addition, IND safety reports must be submitted to the FDA for any of the following: serious and unexpected suspected adverse reactions; findings from other studies or animal or *in vitro* testing that suggest a significant risk in humans exposed to the product; and any clinically important increase in the case of a serious suspected adverse reaction over that listed in the protocol or investigator brochure. Phase 1, Phase 2 and Phase 3 clinical trials may not be completed successfully within any specified period, or at all. Furthermore, the FDA or the sponsor may suspend or terminate a clinical trial at any time on various grounds, including a finding that the research subjects are being exposed to an unacceptable health risk. Similarly, an IRB can suspend or terminate approval of a clinical trial at its institution, or an institution it represents, if the clinical trial is not being conducted in accordance with the IRB's requirements or if the product has been associated with unexpected serious harm to patients. The FDA will typically inspect one or more clinical sites to assure compliance with GCP and the integrity of the clinical data submitted.

Concurrent with clinical trials, companies often complete additional animal studies. They must also develop additional information about the chemistry and physical characteristics of the drug as well as finalize a process for manufacturing the product in commercial quantities in accordance with cGMP requirements. The manufacturing process must be capable of consistently producing quality batches of the drug candidate and, among other things, must develop methods for testing the identity, strength, quality, purity, and potency of the final drug. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the drug candidate does not undergo unacceptable deterioration over its shelf life.

Review and Approval of an NDA

In order to obtain approval to market a drug product in the United States, a marketing application must be submitted to the FDA that provides sufficient data establishing the safety, purity, and potency of the proposed drug product for its intended indication. The application includes all relevant data available from pertinent preclinical and clinical trials, including negative or ambiguous results as well as positive findings, together with detailed information relating to the product's chemistry, manufacturing, controls, and proposed labeling, among other things. Data can come from company-sponsored clinical trials intended to test the safety and effectiveness of a use of a product, or from a number of alternative sources, including studies initiated by independent investigators. To support marketing approval, the data submitted must be sufficient in quality and quantity to establish the safety, purity, and potency of the drug product to the satisfaction of the FDA.

The NDA is a vehicle through which applicants formally propose that the FDA approve a new product for marketing and sale in the United States for one or more indications. Every new non-biologic drug product candidate must be the subject of an approved NDA before it may be commercialized in the United States. Biologic License Applications, or BLAs, are submitted for approval of biologic products. Under federal law, the submission of most NDAs is subject to an application user fee. The sponsor of an approved NDA is also subject to an annual program fee.

Certain exceptions and waivers are available for some of these fees, such as an exception from the application fee for products with orphan designation, an exception from the program fee when the program does not engage in manufacturing the drug during a particular fiscal year and a waiver for certain small businesses.

The FDA conducts a preliminary review of the application, generally within 60 calendar days of its receipt, and strives to inform the sponsor within 74 days whether the application is sufficiently complete to permit substantive review. The FDA may request additional information rather than accept the application for filing. In this event, the application must be resubmitted with the additional information. The resubmitted application is also subject to review before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth substantive review. The FDA has agreed to specified performance goals in the review process of NDAs. Under that agreement, 90% of applications seeking approval of New Molecular Entities, or NMEs, are meant to be reviewed within ten months from the date on which the FDA accepts the application for filing, and 90% of applications for NMEs that have been designated for Priority Review are meant to be reviewed within six months of the filing date. For applications seeking approval of products that are not NMEs, the ten-month and six-month review periods run from the date that the FDA receives the application. The review process and the Prescription Drug User Fee Act, or PDUFA, goal date may be extended by the FDA for three additional months to consider new information or clarification provided by the applicant to address an outstanding deficiency identified by the FDA following the original submission.

Before approving an application, the FDA typically will inspect the facility or facilities where the product is being or will be manufactured. These pre-approval inspections may cover all facilities associated with an NDA submission, including component manufacturing, finished product manufacturing, and control testing laboratories. The FDA will not approve an application unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. Additionally, before approving an NDA, the FDA will typically inspect one or more clinical sites to assure compliance with GCP.

In addition, as a condition of approval, the FDA may require an applicant to develop a REMS. A REMS uses risk-minimization strategies beyond the professional labeling to ensure that the benefits of the product outweigh the potential risks. To determine whether a REMS is needed, the FDA will consider the size of the population likely to use the product, the seriousness of the disease, the expected benefit of the product, the expected duration of treatment, the seriousness of known or potential adverse events, and whether the product is a new molecular entity.

The FDA may refer an application for a novel product to an advisory committee or explain why such referral was not made. Typically, an advisory committee is a panel of independent experts, including clinicians and other scientific experts, that review, evaluate and provide a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but the FDA considers such recommendations carefully when making decisions.

The FDA's Decision on an NDA

On the basis of the FDA's evaluation of the application and accompanying information, including the results of the inspection of the manufacturing facilities, the FDA may issue an approval letter or a complete response letter. An approval letter authorizes commercial marketing of the product with specific prescribing information for specific indications. A complete response letter generally outlines the deficiencies in the submission and may require substantial additional testing or information in order for the FDA to reconsider the application. If and when those deficiencies have been addressed to the FDA's satisfaction in a resubmission of the NDA, the FDA will issue an approval letter. The FDA has committed to reviewing such resubmissions in two or six months depending on the type of information included. Even with submission of this additional information, the FDA ultimately may decide that the application does not satisfy the regulatory criteria for approval.

If the FDA approves a new product, it may limit the approved indications for use of the product, require that contraindications, warnings, or precautions be included in the product labeling, or require that post-approval studies, including Phase 4 clinical trials, be conducted to further assess the drug's safety after approval. The agency may also require testing and surveillance programs to monitor the product after commercialization, or impose other conditions, including distribution restrictions or other risk management mechanisms, including a REMS, to help ensure that the benefits of the product outweigh the potential risks. REMS programs can include medication guides, communication plans for health care professionals, and elements to assure safe use, or ETASU. ETASU can include, but are not limited to, special training or certification for prescribing or dispensing, dispensing only under certain circumstances, special monitoring, and the use of patent registries. The FDA may prevent or limit further marketing of a product based on the results of post-market studies or surveillance programs. The FDA may require a REMS before or after approval if it becomes aware of a serious risk associated with use of the product. The requirement for a REMS can materially affect the potential market and profitability of a product. After approval, many types of changes to the approved product, such as adding new indications, changing manufacturing processes, and adding labeling claims, are subject to further testing requirements and FDA review and approval.

Patent Term Restoration and Extension

A patent claiming a new drug product may be eligible for a limited patent term extension under the Hatch- Waxman Act, which permits a patent restoration of up to five years for patent term lost during the FDA regulatory review. The restoration period granted on a patent covering a product is typically one-half the time between the effective date of a clinical investigation involving human beings is begun and the submission date of an application, plus the time between the submission date of an application and the ultimate approval date. Patent term restoration cannot be used to extend the remaining term of a patent past a total of 14 years from the product's approval date. Only one patent applicable to an approved product is eligible for the extension, and only those claims covering the approved product, a method for using it, or a method for manufacturing it, may be extended. Additionally, the application for the extension must be submitted prior to the expiration of the patent in question. A patent that covers multiple products for which approval is sought can only be extended in connection with one of the approvals. The United States Patent and Trademark Office reviews and approves the application for any patent term extension or restoration in consultation with the FDA.

Health Care Law and Regulation

Our collaborators who use our platform and we, if we develop a product, may be subject to broadly applicable healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we market, sell, and distribute our software and any products for which we obtain marketing approval. Restrictions under applicable federal and state health care laws and regulations, include the following:

- the federal health care Anti-Kickback Statute, which prohibits, among other things, persons and entities from knowingly and willfully soliciting, offering, paying, receiving, or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made, in whole or in part, under a federal health care program such as Medicare and Medicaid and similar state anti-kickback laws. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation;
- the federal civil and criminal false claims laws, including the civil False Claims Act (which can be enforced through civil whistleblower actions), and civil monetary penalties laws, which prohibit individuals or entities from, among other things, knowingly presenting, or causing to be presented, to the federal government, claims for payment that are false, fictitious, or fraudulent or knowingly making, using or causing to made or used a false record or statement to avoid, decrease, or conceal an obligation to pay money to the federal government. In addition, the government may assert that a claim including items and services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act;
- the federal and state laws and regulations that protect the privacy and security of health-related or other personal identifiable information that we may generate or receive, and that require disclosure of breaches in which such information is compromised by being lost or obtained or accessible by unauthorized persons, including, among others, laws and regulations implemented through informed consents for clinical research studies and the privacy and security standards imposed under the Health Insurance Portability and Accountability Act, or HIPAA, for certain individually identifiable health information of patients and health plan beneficiaries;
- the federal false statements statute, which prohibits knowingly and willfully falsifying, concealing, or covering up a material fact or making any materially false statement in connection with the delivery of or payment for health care benefits, items or services;

- the federal transparency requirements known as the federal Physician Payments Sunshine Act, under the Patient Protection and Affordable Care Act, as amended by the Health Care Education Reconciliation Act, or the ACA, which requires certain manufacturers of drugs, devices, biologics and medical supplies to report annually to the Centers for Medicare & Medicaid Services within the United States Department of Health and Human Services, information related to certain payments and other transfers of value made by that entity to physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members; and
- analogous state and foreign laws, such as state anti-kickback and false claims laws, which may apply to health care items or services that are reimbursed by non-government third-party payors, including private insurers.

Further, some state laws require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government in addition to requiring manufacturers to report information related to payments and other transfers of value to physicians and other health care providers or marketing expenditures. Additionally, some state and local laws require the registration of pharmaceutical sales representatives in the jurisdiction. State and foreign laws (such as the California Consumer Privacy Act of 2018 and the General Data Protection Regulation, or GDPR, regarding individuals in the European Union) also govern the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Violations of applicable healthcare laws and regulations may result in significant civil, criminal and administrative penalties, damages, disgorgement, fines, imprisonment, and possible exclusion of products from government funded healthcare programs, such as Medicare and Medicaid.

In addition to the health care laws set forth above, we may also be subject to additional federal laws, such as the U.S. Foreign Corrupt Practices Act of 1977, as amended, which prohibits, among other things, companies and their intermediaries from making, or offering or promising to make, improper payments to non-U.S. officials for the purpose of obtaining or retaining business or otherwise seeking favorable treatment.

General Data Protection Regulation

The collection, use, disclosure, transfer, or other processing of personal data regarding individuals in the European Union, including personal health data, is subject to the GDPR which became effective on May 25, 2018. The GDPR is wide-ranging in scope and imposes numerous requirements on companies that process personal data, including requirements relating to processing health and other sensitive data, obtaining consent of the individuals to whom the personal data relates, providing information to individuals regarding data processing activities, implementing safeguards to protect the security and confidentiality of personal data, providing notification of data breaches, and taking certain measures when engaging third-party processors. The GDPR also imposes strict rules on the transfer of personal data to countries outside the

European Union, including the United States, and permits data protection authorities to impose large penalties for violations of the GDPR, including potential fines of up to €20 million or 4% of annual global revenues, whichever is greater. The GDPR also confers a private right of action on data subjects and consumer associations to lodge complaints with supervisory authorities, seek judicial remedies, and obtain compensation for damages resulting from violations of the GDPR. Compliance with the GDPR will be a rigorous and time-intensive process that may increase the cost of doing business or require companies to change their business practices to ensure full compliance.

Pharmaceutical Insurance Coverage and Health Care Reform

In the United States and markets in other countries, patients who are prescribed treatments for their conditions and providers performing the prescribed services generally rely on third-party payers to reimburse all or part of the associated health care costs. Significant uncertainty exists as to the coverage and reimbursement status of products approved by the FDA and other government authorities. Thus, even if a product candidate of ours or one of our collaborators is approved, sales of the product will depend, in part, on the extent to which third-party payers, including government health programs in the United States such as Medicare and Medicaid, commercial health insurers and managed care organizations provide coverage and establish adequate reimbursement levels for the product. The process for determining whether a payer will provide coverage for a product may be separate from the process for setting the price or reimbursement rate that the payer will pay for the product once coverage is approved. Third-party payers are increasingly challenging the prices charged, examining the medical necessity and reviewing the cost-effectiveness of medical products and services and imposing controls to manage costs.

Third-party payers may limit coverage to specific products on an approved list, also known as a formulary, which might not include all of the approved products for a particular indication.

In order to secure coverage and reimbursement for any product that might be approved for sale, a company may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of the product, in addition to the costs required to obtain FDA or other comparable marketing approvals. Nonetheless, product candidates may not be considered medically necessary or cost effective. A decision by a third-party payer not to cover a product could reduce market acceptance once the product is approved and have a material adverse effect on sales, results of operations and financial condition. Additionally, a payer’s decision to provide coverage for a product does not imply that an adequate reimbursement rate will be approved. Further, one payer’s determination to provide coverage for a product does not assure that other payers will also provide coverage and reimbursement for the product, and the level of coverage and reimbursement can differ significantly from payer to payer.

In international markets, reimbursement and health care payment systems vary significantly by country, and many countries have instituted price ceilings on specific products and therapies. In some countries, the pricing of prescription pharmaceuticals is subject to governmental control. In these countries, pricing negotiations with governmental authorities can take considerable time

after the receipt of marketing approval for a product. To obtain coverage and adequate reimbursement or pricing approval in some countries, we may be required to conduct a clinical trial that compares the cost-effectiveness of our product to other available therapies.

The containment of health care costs also has become a priority of federal, state, and foreign governments and the prices of products have been a focus in this effort. Governments have shown significant interest in implementing cost-containment programs, including price controls, restrictions on coverage, reimbursement and requirements for substitution of generic products. Adoption of price controls and cost-containment measures, and adoption of more restrictive policies in jurisdictions with existing controls and measures, could further limit a company's revenue generated from the sale of any approved products including those that we are our collaborators may develop. Coverage policies and third-party reimbursement rates may change at any time. Even if favorable coverage and reimbursement status is attained for one or more products for which a company or its collaborators receive marketing approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Review and Approval of Medicinal Products in the European Union

In order to market any product outside of the United States, a company must also comply with numerous and varying regulatory requirements of other countries and jurisdictions regarding quality, safety, and efficacy and governing, among other things, clinical trials, marketing authorization, commercial sales, and distribution of products. Whether or not it obtains FDA approval for a product, an applicant will need to obtain the necessary approvals by the comparable non-U.S. regulatory authorities before it can commence clinical trials or marketing of the product in those countries or jurisdictions. The approval process ultimately varies between countries and jurisdictions and can involve additional product testing and additional administrative review periods. The time required to obtain approval in other countries and jurisdictions might differ from and be longer than that required to obtain FDA approval. Regulatory approval in one country or jurisdiction does not ensure regulatory approval in another, but a failure or delay in obtaining regulatory approval in one country or jurisdiction may negatively impact the regulatory process in others. Specifically, however, the process governing approval of medicinal products in the European Union generally follows the same lines as in the United States. It entails satisfactory completion of preclinical studies and adequate and well-controlled clinical trials to establish the safety and efficacy of the product for each proposed indication. It also requires the submission to the relevant competent authorities of a marketing authorization application, or MAA, and granting of a marketing authorization by these authorities before the product can be marketed and sold in the European Union.

Clinical Trial Approval

The Clinical Trials Directive 2001/20/EC, the Directive 2005/28/EC on GCP and the related national implementing provisions of the individual member states of the European Union, or EU Member States, govern the system for the approval of clinical trials in the European Union. Under this system, an applicant must obtain prior approval from the competent national authority of the EU Member States in which the clinical trial is to be conducted. Furthermore, the applicant may only start a clinical trial at a specific study site after the competent ethics

committee has issued a favorable opinion. The clinical trial application must be accompanied by, among other documents, an investigational medicinal product dossier (the Common Technical Document) with supporting information prescribed by Directive 2001/20/EC, Directive 2005/28/EC, where relevant the implementing national provisions of the individual EU Member States and further detailed in applicable guidance documents.

In April 2014, the new Clinical Trials Regulation, (EU) No 536/2014, was adopted. The Clinical Trials Regulation was published on June 16, 2014 but is not expected to apply until 2020. The Clinical Trials Regulation will be directly applicable in all the EU Member States, repealing the current Clinical Trials Directive 2001/20/EC and replacing any national legislation that was put in place to implement the Clinical Trials Directive. Conduct of all clinical trials performed in the European Union will continue to be bound by currently applicable provisions until the new Clinical Trials Regulation becomes applicable. The extent to which on-going clinical trials will be governed by the Clinical Trials Regulation will depend on when the Clinical Trials Regulation becomes applicable and on the duration of the individual clinical trial. If a clinical trial continues for more than three years from the day on which the Clinical Trials Regulation becomes applicable the Clinical Trials Regulation will at that time begin to apply to the clinical trial.

The new Clinical Trials Regulation aims to simplify and streamline the approval of clinical trials in the European Union. The main characteristics of the regulation include: a streamlined application procedure via a single entry point, the "EU Portal and Database"; a single set of documents to be prepared and submitted for the application as well as simplified reporting procedures for clinical trial sponsors; and a harmonized procedure for the assessment of applications for clinical trials, which is divided in two parts. Part I is assessed by the appointed reporting Member State, whose assessment report is submitted for review by the sponsor and all other competent authorities of all EU Member States in which an application for authorization of a clinical trial has been submitted (Concerned Member States). Part II is assessed separately by each Concerned Member State. Strict deadlines have been established for the assessment of clinical trial applications. The role of the relevant ethics committees in the assessment procedure will continue to be governed by the national law of the Concerned Member State. However, overall related timelines will be defined by the Clinical Trials Regulation.

PRIME Designation in the European Union

In March 2016, the European Medicines Agency, or EMA, launched an initiative to facilitate development of product candidates in indications, often rare, for which few or no therapies currently exist. The PRIority MEdicines, or PRIME, scheme is intended to encourage drug development in areas of unmet medical need and provides accelerated assessment of products representing substantial innovation reviewed under the centralized procedure. Products from small- and medium-sized enterprises may qualify for earlier entry into the PRIME scheme than larger companies. Many benefits accrue to sponsors of product candidates with PRIME designation, including but not limited to, early and proactive regulatory dialogue with the EMA, frequent discussions on clinical trial designs and other development program elements, and accelerated marketing authorization application assessment once a dossier has been submitted.

Importantly, a dedicated agency contact and rapporteur from the Committee for Human Medicinal Products, or CHMP, or Committee for Advanced Therapies are appointed early in PRIME scheme facilitating increased understanding of the product at EMA's Committee level. A kick-off meeting initiates these relationships and includes a team of multidisciplinary experts at the EMA to provide guidance on the overall development and regulatory strategies.

Marketing Authorization

To obtain a marketing authorization for a product under European Union regulatory systems, an applicant must submit an MAA either under a centralized procedure administered by the EMA, or one of the procedures administered by competent authorities in the EU Member States (decentralized procedure, national procedure or mutual recognition procedure). A marketing authorization may be granted only to an applicant established in the European Union. Regulation (EC) No 1901/2006 provides that prior to obtaining a marketing authorization in the European Union, applicants have to demonstrate compliance with all measures included in an EMA-approved Paediatric Investigation Plan, or PIP, covering all subsets of the pediatric population, unless the EMA has granted (1) a product-specific waiver, (2) a class waiver, or (3) a deferral for one or more of the measures included in the PIP.

The centralized procedure provides for the grant of a single marketing authorization by the European Commission that is valid across the European Economic Area (i.e. the European Union as well as Iceland, Liechtenstein and Norway). Pursuant to Regulation (EC) No 726/2004, the centralized procedure is compulsory for specific products, including for medicines produced by certain biotechnological processes, products designated as orphan medicinal products, advanced therapy medicinal products, and products with a new active substance indicated for the treatment of certain diseases. For products with a new active substance indicated for the treatment of other diseases and products that are highly innovative or for which a centralized process is in the interest of patients, the centralized procedure may be optional. The centralized procedure may at the request of the applicant also be used in certain other cases.

Under the centralized procedure, the CHMP is responsible for conducting the initial assessment of a product and for several post-authorization and maintenance activities, such as the assessment of modifications or extensions to an existing marketing authorization. Under the centralized procedure in the European Union, the maximum timeframe for the evaluation of an MAA is 210 days, excluding clock stops, when additional information or written or oral explanation is to be provided by the applicant in response to questions of the CHMP. Accelerated evaluation might be granted by the CHMP in exceptional cases, when a medicinal product is of major interest from the point of view of public health and in particular from the viewpoint of therapeutic innovation. If the CHMP accepts such request, the time limit of 210 days will be reduced to 150 days but it is possible that the CHMP can revert to the standard time limit for the centralized procedure if it considers that it is no longer appropriate to conduct an accelerated assessment. At the end of this period, the CHMP provides a scientific opinion on whether or not a marketing authorization should be granted in relation to a medicinal product. Within 15 calendar days of receipt of a final opinion from the CHMP, the European Commission must prepare a draft decision concerning an application for marketing authorization. This draft

decision must take the opinion and any relevant provisions of European Union law into account. Before arriving at a final decision on an application for centralized authorization of a medicinal product the European Commission must consult the Standing Committee on Medicinal Products for Human Use, or the Standing Committee. The Standing Committee is composed of representatives of the EU Member States and chaired by a non-voting European Commission representative. The European Parliament also has a related "droit de regard". The European Parliament's role is to ensure that the European Commission has not exceeded its powers in deciding to grant or refuse to grant a marketing authorization.

The European Commission may grant a so-called "marketing authorization under exceptional circumstances". Such authorization is intended for products for which the applicant can demonstrate that it is unable to provide comprehensive data on the efficacy and safety under normal conditions of use, because the indications for which the product in question is intended are encountered so rarely that the applicant cannot reasonably be expected to provide comprehensive evidence, or in the present state of scientific knowledge, comprehensive information cannot be provided, or it would be contrary to generally accepted principles of medical ethics to collect such information. Consequently, marketing authorization under exceptional circumstances may be granted subject to certain specific obligations, which may include the following:

- the applicant must complete an identified program of studies within a time period specified by the competent authority, the results of which form the basis of a reassessment of the benefit/risk profile;
- the medicinal product in question may be supplied on medical prescription only and may in certain cases be administered only under strict medical supervision, possibly in a hospital and in the case of a radiopharmaceutical, by an authorized person; and
- the package leaflet and any medical information must draw the attention of the medical practitioner to the fact that the particulars available concerning the medicinal product in question are as yet inadequate in certain specified respects.

A marketing authorization under exceptional circumstances is subject to annual review to reassess the risk- benefit balance in an annual reassessment procedure. Continuation of the authorization is linked to the annual reassessment and a negative assessment could potentially result in the marketing authorization being suspended or revoked. The renewal of a marketing authorization of a medicinal product under exceptional circumstances, however, follows the same rules as a "normal" marketing authorization. Thus, a marketing authorization under exceptional circumstances is granted for an initial five years, after which the authorization will become valid indefinitely, unless the EMA decides that safety grounds merit one additional five-year renewal.

The European Commission may also grant a so-called "conditional marketing authorization" prior to obtaining the comprehensive clinical data required for an application for a full marketing authorization. Such conditional marketing authorizations may be granted for product candidates (including medicines designated as orphan medicinal products), if (i) the risk-benefit balance of the product candidate is positive, (ii) it is likely that the applicant will be in a

position to provide the required comprehensive clinical trial data, (iii) the product fulfills an unmet medical need, and (iv) the benefit to public health of the immediate availability on the market of the medicinal product concerned outweighs the risk inherent in the fact that additional data are still required. A conditional marketing authorization may contain specific obligations to be fulfilled by the marketing authorization holder, including obligations with respect to the completion of ongoing or new studies, and with respect to the collection of pharmacovigilance data. Conditional marketing authorizations are valid for one year, and may be renewed annually, if the risk-benefit balance remains positive, and after an assessment of the need for additional or modified conditions and/or specific obligations. The timelines for the centralized procedure described above also apply with respect to the review by the CHMP of applications for a conditional marketing authorization.

The European Union medicines rules expressly permit the EU Member States to adopt national legislation prohibiting or restricting the sale, supply or use of any medicinal product containing, consisting of or derived from a specific type of human or animal cell, such as embryonic stem cells. While the products we have in development do not make use of embryonic stem cells, it is possible that the national laws in certain EU Member States may prohibit or restrict us from commercializing our products, even if they have been granted a European Union marketing authorization.

Unlike the centralized authorization procedure, the decentralized marketing authorization procedure requires a separate application to, and leads to separate approval by, the competent authorities of each EU Member State in which the product is to be marketed. This application is identical to the application that would be submitted to the EMA for authorization through the centralized procedure. The reference EU Member State prepares a draft assessment and drafts of the related materials within 120 days after receipt of a valid application. The resulting assessment report is submitted to the concerned EU Member States who, within 90 days of receipt, must decide whether to approve the assessment report and related materials. If a concerned EU Member State cannot approve the assessment report and related materials due to concerns relating to a potential serious risk to public health, disputed elements may be referred to the European Commission, whose decision is binding on all EU Member States.

The mutual recognition procedure similarly is based on the acceptance by the competent authorities of the EU Member States of the marketing authorization of a medicinal product by the competent authorities of other EU Member States. The holder of a national marketing authorization may submit an application to the competent authority of an EU Member State requesting that this authority recognize the marketing authorization delivered by the competent authority of another EU Member State.

Regulatory Data Protection in the European Union

In the European Union, innovative medicinal products approved on the basis of a complete independent data package qualify for eight years of data exclusivity upon marketing authorization and an additional two years of market exclusivity pursuant to Directive 2001/83/EC. Regulation (EC) No 726/2004 repeats this entitlement for medicinal products authorized in accordance the centralized authorization procedure. Data exclusivity prevents

applicants for authorization of generics of these innovative products from referencing the innovator's data to assess a generic (abridged) application for a period of eight years. During an additional two-year period of market exclusivity, a generic marketing authorization application can be submitted and authorized, and the innovator's data may be referenced, but no generic medicinal product can be placed on the European Union market until the expiration of the market exclusivity. The overall ten-year period will be extended to a maximum of 11 years if, during the first eight years of those ten years, the marketing authorization holder obtains an authorization for one or more new therapeutic indications which, during the scientific evaluation prior to their authorization, are held to bring a significant clinical benefit in comparison with existing therapies. Even if a compound is considered to be a new chemical entity so that the innovator gains the prescribed period of data exclusivity, another company nevertheless could also market another version of the product if such company obtained marketing authorization based on an MAA with a complete independent data package of pharmaceutical tests, preclinical tests, and clinical trials.

Periods of Authorization and Renewals

A marketing authorization has an initial validity for five years in principle. The marketing authorization may be renewed after five years on the basis of a re-evaluation of the risk-benefit balance by the EMA or by the competent authority of the EU Member State. To this end, the marketing authorization holder must provide the EMA or the competent authority with a consolidated version of the file in respect of quality, safety, and efficacy, including all variations introduced since the marketing authorization was granted, at least six months before the marketing authorization ceases to be valid. The European Commission or the competent authorities of the EU Member States may decide, on justified grounds relating to pharmacovigilance, to proceed with one further five- year period of marketing authorization. Once subsequently definitively renewed, the marketing authorization shall be valid for an unlimited period. Any authorization which is not followed by the actual placing of the medicinal product on the European Union market (in case of centralized procedure) or on the market of the authorizing EU Member State within three years after authorization ceases to be valid (the so-called sunset clause).

Brexit and the Regulatory Framework in the United Kingdom

On June 23, 2016, the electorate in the United Kingdom voted in favor of leaving the European Union, commonly referred to as Brexit. Following protracted negotiations, the United Kingdom withdrew from the European Union on January 31, 2020. Pursuant to the formal withdrawal arrangements agreed between the United Kingdom and the European Union, the United Kingdom will be subject to a transition period until December 31, 2020, or the Transition Period, during which European Union rules will continue to apply. Negotiations between the United Kingdom and the European Union are expected to continue in relation to the customs and trading relationship between the United Kingdom and the European Union following the expiry of the Transition Period. To date, only an outline of a trade agreement has been reached. If no trade agreement has been reached before the end of the Transition Period, there may be significant market and economic disruption. The Prime Minister has also indicated that the United Kingdom will not accept high regulatory alignment with the European Union.

Pricing Decisions for Approved Products

In the European Union, pricing and reimbursement schemes vary widely from country to country. Some countries provide that products may be marketed only after a reimbursement price has been agreed. Some countries may require the completion of additional studies that compare the cost-effectiveness of a particular product candidate to currently available therapies or so-called health technology assessments, in order to obtain reimbursement or pricing approval. For example, EU Member States have the option to restrict the range of products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. EU Member States may approve a specific price for a product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the product on the market. Other EU Member States allow companies to fix their own prices for products, but monitor and control prescription volumes and issue guidance to physicians to limit prescriptions. Recently, many countries in the European Union have increased the amount of discounts required on pharmaceuticals and these efforts could continue as countries attempt to manage health care expenditures, especially in light of the severe fiscal and debt crises experienced by many countries in the European Union. The downward pressure on health care costs in general, particularly prescription products, has become intense. As a result, increasingly high barriers are being erected to the entry of new products. Political, economic, and regulatory developments may further complicate pricing negotiations, and pricing negotiations may continue after reimbursement has been obtained. Reference pricing used by various EU Member States, and parallel trade, i.e., arbitrage between low-priced and high-priced EU Member States, can further reduce prices. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any products, if approved in those countries.

Employees

As of December 31, 2019, we had 392 full-time employees and 394 total employees, including a total of 200 employees with Ph.D. degrees. None of our employees are represented by labor unions or covered by collective bargaining agreements. We consider our relationship with our employees to be good.

Our Corporate Information

We were incorporated under the laws of the state of California in August 1990 under the name Schrödinger, Inc. We reorganized under the laws of the state of Delaware in May 1995. Our principal executive offices are located at 120 West 45th Street, 17th Floor, New York, New York 10036, and our telephone number is (212) 295-5800. Our website address is http://www.schrodinger.com. The information contained on, or that can be accessed through, our website is not incorporated by reference into this Annual Report or in any other report or document we file with the SEC, and any reference to our website address is intended to be an inactive textual reference only.

We own or have rights to trademarks, service marks, and trade names that we use in connection with the operation of our business, including our corporate name, logos and website names. Other trademarks, service marks, and trade names appearing in this Annual Report are the property of their respective owners. Solely for convenience, some of the trademarks, service marks, and trade names referred to in this Annual Report are listed without the ® and ™ symbols.

Available Information

We make available free of charge through our website our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to those reports filed or furnished pursuant to Sections 13(a) and 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act. We make these reports available through our website as soon as reasonably practicable after we electronically file such reports with, or furnish such reports to, the SEC. We also make available, free of charge on our website, the reports filed with the SEC by our executive officers, directors and 10% stockholders pursuant to Section 16 under the Exchange Act as soon as reasonably practicable after copies of those filings are provided to us by those persons. The information contained on, or that can be access through, our website is not a part of or incorporated by reference in this Annual Report.

Item 1A. Risk Factors.

You should carefully consider the risks and uncertainties described below together with all of the other information contained in this Annual Report and our other public filings with the Securities and Exchange Commission. The risks described below are not the only risks facing our company. The occurrence of any of the following risks, or of additional risks and uncertainties not presently known to us or that we currently believe to be immaterial, could cause our business, prospects, operating results, and financial condition to suffer materially.

Risks Related to Our Financial Position and Need for Additional Capital

We have a history of significant operating losses, and we expect to incur losses over the next several years.

We have a history of significant operating losses. Our net loss was $28.4 million for the year ended December 31, 2018 and $25.7 million for the year ended December 31, 2019. As of December 31, 2019, we had an accumulated deficit of $105.1 million. We anticipate that our operating expenses will increase substantially in the foreseeable future as we continue to invest in our internal drug discovery programs, sales and marketing infrastructure, and our computational platform. We are still in the early stages of development of our own drug discovery program, and we have not yet identified our first clinical candidate. We have no drug products licensed for commercial sale and have not generated any revenue from our own drug product sales to date. We expect to continue to incur significant expenses and operating losses over the next several years. Our operating expenses and net losses may fluctuate significantly from quarter to quarter and year to year. We anticipate that our expenses will increase substantially as we:

- continue to invest in and develop our computational platform and software solutions;
- continue our research and development efforts for our internal drug discovery programs;
- conduct preclinical studies and clinical trials for any of our future product candidates;
- maintain, expand, enforce, defend, and protect our intellectual property;
- hire additional software engineers, programmers, sales and marketing, and other personnel to support our software business;
- hire additional clinical, quality control, and other scientific personnel; and
- add operational, financial, and management information systems and personnel to support our operations as a public company.

If we are unable to increase sales of our software, or if we and our current and future collaborators are unable to successfully develop and commercialize drug products, our revenues may be insufficient for us to achieve or maintain profitability.

To achieve and maintain profitability, we must succeed in significantly increasing our software sales, or we and our current or future collaborators must succeed in developing, and eventually commercializing, a drug product or drug products that generate significant revenue. We currently generate revenues primarily from the sales of our software solutions and expect to continue to derive most of our revenue from sales of our software until such time as our or our collaborators' drug development and commercialization efforts are successful, if ever. As such, increasing sales of our software to existing customers and successfully marketing our software to new customers are critical to our success. Demand for our software solutions may be affected by a number of factors, including continued market acceptance by the biopharmaceutical industry, market adoption of our software solutions beyond the biopharmaceutical industry including for material science applications, the ability of our platform to identify more promising molecules and accelerate and lower the costs of discovery as compared to traditional methods, timing of development and release of new offerings by our competitors, technological change, and the rate of growth in our target markets. If we are unable to continue to meet the demands of our customers, our business operations, financial results, and growth prospects will be adversely affected.

Achieving success in drug development will require us or our current or future collaborators to be effective in a range of challenging activities, including completing preclinical testing and clinical trials of product candidates, obtaining regulatory approval for these product candidates and manufacturing, marketing, and selling any products for which we or they may obtain regulatory approval. We and most of our current drug discovery collaborators are only in the preliminary stages of most of these activities. We and they may never succeed in these activities and, even if we do, we may never generate revenues that are significant enough to achieve profitability, or even if our collaborators do, we may not receive option fees, milestone payments, or royalties from them that are significant enough for us to achieve profitability. Because of the intense competition in the market for our software solutions and the numerous risks and uncertainties associated with biopharmaceutical product development, we are unable to accurately predict when, or if, we will be able to achieve or sustain profitability.

Even if we achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis. Our failure to become and remain profitable would depress the value of our company and could impair our ability to raise capital, expand our business, maintain our research and development efforts, increase sales of our software, develop a pipeline of product candidates, enter into collaborations, or even continue our operations. A decline in the value of our company could also cause our stockholders to lose all or part of their investment.

In addition, although we have experienced revenue growth in recent periods, we may not be able to sustain revenue growth consistent with our recent history or at all. Our total revenues increased by 28% from $66.6 million in the fiscal year ended December 31, 2018 to $85.5 million in the fiscal year ended December 31, 2019. You should not consider our revenue growth in recent periods as indicative of our future performance. As we grow our business, our revenue growth rates may slow in future periods.

Our quarterly and annual results may fluctuate significantly, which could adversely impact the value of our common stock.

Our results of operations, including our revenues, gross margin, profitability, and cash flows, have historically varied from period to period, and we expect that they will continue to do so. As a result, period-to-period comparisons of our operating results may not be meaningful, and our quarterly and annual results should not be relied upon as an indication of future performance. Our quarterly and annual financial results may fluctuate as a result of a variety of factors, many of which are outside of our control. Factors that may cause fluctuations in our quarterly and annual financial results include, without limitation, those listed elsewhere in this “Risk Factors” section and those listed below:

- customer renewal rates and the timing and terms of customer renewals, including the seasonality of customer renewals of our on-premise software arrangements, for which revenue historically has been recognized at a single point in time in the first quarter of each fiscal year;
- our ability to attract new customers for our software;
- the addition or loss of large customers, including through acquisitions or consolidations of such customers;
- the amount and timing of operating expenses related to the maintenance and expansion of our business, operations, and infrastructure;
- network outages or security breaches;
- general economic, industry, and market conditions, including within the life sciences industry;
- our ability to collect receivables from our customers;
- the amount of software purchased by our customers, including the mix of on-premise and hosted software sold during a period;

- variations in the timing of the sales of our software, which may be difficult to predict;
- changes in the pricing of our solutions and in our pricing policies or those of our competitors;
- the timing and success of the introduction of new software solutions by us or our competitors or any other change in the competitive dynamics of our industry, including consolidation among competitors, customers, or strategic collaborators;
- changes in the fair value of or receipt of distributions or proceeds on account of the equity interests we hold in our drug discovery collaborators, such as Morphic;
- the success of our drug discovery collaborators in developing and commercializing drug products for which we are entitled to receive milestone payments or royalties and the timing of receipt of such payments, if any; and
- the timing of expenses related to our drug discovery programs, the development or acquisition of technologies or businesses and potential future charges for impairment of goodwill from acquired companies.

In addition, because we recognize revenues from our hosted software solutions ratably over the life of the contract, a significant upturn or downturn in sales of our hosted software solutions may not be reflected immediately in our operating results. We expect our hosted software revenue to trend higher over time as our customers continue to migrate from purchasing on-premise software licenses to utilizing our hosted software solutions, which will increase the difficulty of evaluating our future financial performance. As a result of these factors, we believe that period-to-period comparisons of our operating results are not a good indication of our future performance and that our interim financial results are not necessarily indicative of results for a full year or for any subsequent interim period.

We may require additional capital to fund our operations. If we are unable to raise additional capital on terms acceptable to us or at all or generate cash flows necessary to maintain or expand our operations, we may not be able to compete successfully, which would harm our business, operations, and financial condition.

We expect to devote substantial financial resources to our ongoing and planned activities, including the development of drug discovery programs and continued investment in our computational platform. We expect our expenses to increase substantially in connection with our ongoing and planned activities, particularly as we advance our internal drug discovery programs, initiate preclinical and investigational new drug enabling studies and invest in the further development of our platform. In addition, if we determine to advance any of our drug discovery programs into clinical development and seek regulatory approval on our own, we expect to incur significant additional expenses. Furthermore, we expect to incur additional costs associated with operating as a public company.

Our current drug discovery collaborators, from whom we are entitled to receive milestone payments upon achievement of various development, regulatory, and commercial milestones as well as royalties on commercial sales, if any, under the collaboration agreements that we have entered into with them, face numerous risks in the development of drugs, including the conduct of preclinical and clinical testing, obtaining regulatory approval, and achieving product sales. In addition, the amounts we are entitled to receive upon the achievement of such milestones tend to be smaller for near-term development milestones and increase if and as a collaborative product candidate advances through regulatory development to commercialization and will vary depending on the level of commercial success achieved, if any. We do not anticipate receiving significant milestone payments from many of our drug discovery collaborators for several years, if at all, and our drug discovery collaborators may never achieve milestones that result in significant cash payments to us. Accordingly, we may need to obtain substantial additional capital to fund our continuing operations.

As of December 31, 2019, we had cash, cash equivalents, restricted cash, and marketable securities of $86.3 million. In February 2020, we closed our initial public offering, in which we issued and sold 13,664,704 shares of common stock at a public offering price of $17.00 per share for net proceeds to us of $209.9 million after deducting underwriting discounts and commissions and estimated offering expenses. We believe that our existing cash, cash equivalents, and marketable securities, together with the proceeds from our initial public offering, will be sufficient to fund our operations and capital expenditure requirements for at least the next 12 months. However, we have based this estimate on assumptions that may prove to be wrong, and our operating plans may change as a result of many factors currently unknown to us. As a result, we could deplete our capital resources sooner than we currently expect.

Our future capital requirements will depend on many factors, including:

- the growth of our software revenue;
- the timing and extent of spending to support research and development efforts;
- the continued expansion of software sales and marketing activities;
- the timing and receipt of payments from our collaborations as well as spending to support, advance, and broaden our internal drug discovery programs; and
- the timing and receipt of any distributions or proceeds we may receive from our equity stakes in our co-founded companies.

In the event that we require additional financing, we may not be able to raise such financing on terms acceptable to us or at all. In addition, we may seek additional capital due to favorable market conditions or strategic considerations, even if we believe we have sufficient funds for our current or future operating plans. If we are unable to raise additional capital on terms acceptable to us or at all or generate cash flows necessary to maintain or expand our operations and invest in our computational platform, we may not be able to compete successfully, which would harm our business, operations, and financial condition.

Raising additional capital may cause dilution to our stockholders, restrict our operations, or require us to relinquish rights to our technologies or drug programs.

To the extent that we raise additional capital through the sale of equity or convertible debt securities, our stockholders' ownership interests will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect our stockholders' rights as common stockholders. Debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, selling or licensing our assets, making product acquisitions, making capital expenditures, or declaring dividends.

If we raise additional funds through collaborations, strategic alliances or marketing, distribution, or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs, or product candidates or grant licenses on terms that may not be favorable to us or agree to exploit a drug development target exclusively for one of our collaborators when we may prefer to pursue the drug development target for ourselves.

Our ability to use our NOLs and research and development tax credit carryforwards to offset future taxable income may be subject to certain limitations.

As of December 31, 2019, we had federal net operating losses, or NOLs, of approximately $104.3 million and state NOLs of approximately $64.8 million, which, if not utilized, generally begin to expire in 2019. As of December 31, 2019, we also had federal research and development tax credit carryforwards of approximately $8.0 million and state research and development tax credit carryforwards of approximately $0.4 million, which, if not utilized, generally begin to expire in 2020. These NOLs and research and development tax credit carryforwards could expire unused and be unavailable to offset future income tax liabilities. Federal NOLs generated after December 31, 2017 are not subject to expiration, but the deductibility of such NOLs is limited to 80% of our taxable income in any future taxable year.

In addition, in general, under Section 382 of the Internal Revenue Code of 1986, as amended, or the Code, and corresponding provisions of state law, a corporation that undergoes an "ownership change," generally defined as a greater than 50 percentage point change (by value) in its equity ownership by certain stockholders over a three year period, is subject to limitations on its ability to utilize its pre-change NOLs and research and development tax credit carryforwards to offset future taxable income. We have performed an analysis through December 31, 2019 and determined that such an ownership change has not occurred. However, we may experience such ownership changes in the future as a result of our initial public offering or of subsequent changes in our stock ownership (which may be outside our control). As a result, if, and to the extent that, we earn net taxable income, our ability to use our pre-change NOLs and research and development tax credit carryforwards to offset such taxable income may be subject to limitations.

If our estimates or judgments relating to our critical accounting policies prove to be incorrect or financial reporting standards or interpretations change, our results of operations could be adversely affected.

The preparation of financial statements in conformity with generally accepted accounting principles in the United States, or U.S. GAAP, requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. We base our estimates on historical experience, known trends and events, and various other factors that we believe to be reasonable under the circumstances, as provided in "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies and Significant Judgments and Estimates." The results of these estimates form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Significant assumptions and estimates used in preparing our consolidated financial statements include the estimated variable consideration included in the transaction price in our contracts with customers, stock-based compensation, and valuation of our equity investments in early-stage biotechnology companies. Our results of operations may be adversely affected if our assumptions change or if actual circumstances differ from those in our assumptions, which could cause our results of operations to fall below the expectations of securities analysts and investors, resulting in a decline in the trading price of our common stock.

Additionally, we regularly monitor our compliance with applicable financial reporting standards and review new pronouncements and drafts thereof that are relevant to us. As a result of new standards, changes to existing standards and changes in their interpretation, we might be required to change our accounting policies, alter our operational policies, and implement new or enhance existing systems so that they reflect new or amended financial reporting standards, or we may be required to restate our published financial statements. Such changes to existing standards or changes in their interpretation may have an adverse effect on our reputation, business, financial position, and profit.

Risks Related to Our Software

If our existing customers do not renew their licenses, do not buy additional solutions from us, or renew at lower prices, our business and operating results will suffer.

We expect to continue to derive a significant portion of our software revenues from renewal of existing license agreements. As a result, maintaining the renewal rate of our existing customers and selling additional software solutions to them is critical to our future operating results. Factors that may affect the renewal rate for our customers and our ability to sell additional solutions to them include:

- the price, performance, and functionality of our software solutions;
- the availability, price, performance, and functionality of competing software solutions;
- the effectiveness of our professional services;
- our ability to develop complementary software solutions, applications, and services;

- the success of competitive products or technologies;
- the stability, performance, and security of our technological infrastructure; and
- the business environment of our customers.

We deliver our software through either (i) a product license that permits our customers to install the software solution directly on their own in-house hardware and use it for a specified term, or (ii) a subscription that allows our customers to access the cloud-based software solution for a specified term. Our customers have no obligation to renew their product licenses or subscriptions for our software solutions after the license term expires, which is typically after one year, and many of our contracts may be terminated or reduced in scope either immediately or upon notice. In addition, our customers may negotiate terms less advantageous to us upon renewal, which may reduce our revenues from these customers. Factors that are not within our control may contribute to a reduction in our software revenues. For instance, our customers may reduce the number of their employees who are engaged in research and who would have use of our software, which would result in a corresponding reduction in the number of user licenses needed for some of our solutions and thus a lower aggregate renewal fee. The loss, reduction in scope, or delay of a large contract, or the loss or delay of multiple contracts, could materially adversely affect our business.

Our future operating results also depend, in part, on our ability to sell new software solutions and licenses to our existing customers. For example, the willingness of existing customers to license our software will depend on our ability to scale and adapt our existing software solutions to meet the performance and other requirements of our customers, which we may not do successfully. If our customers fail to renew their agreements, renew their agreements upon less favorable terms or at lower fee levels, or fail to purchase new software solutions and licenses from us, our revenues may decline and our future revenues may be constrained.

Our software sales cycle can vary and be long and unpredictable.

The timing of sales of our software solutions is difficult to forecast because of the length and unpredictability of our sales cycle. We sell our solutions primarily to biopharmaceutical companies, and our sales cycles can be as long as nine to twelve months or longer. Further, the length of time that potential customers devote to their testing and evaluation, contract negotiation, and budgeting processes varies significantly, depending on the size of the organization and the nature of their needs. In addition, we might devote substantial time and effort to a particular unsuccessful sales effort, and as a result, we could lose other sales opportunities or incur expenses that are not offset by an increase in revenue, which could harm our business.

A significant portion of our revenues are generated by sales to life sciences industry customers, and factors that adversely affect this industry could also adversely affect our software sales.

A significant portion of our current software sales are to customers in the life sciences industry, in particular the biopharmaceutical industry. Demand for our software solutions could be affected by factors that adversely affect the life sciences industry. The life sciences industry is highly regulated and competitive and has experienced periods of considerable consolidation. Consolidation among our customers could cause us to lose customers, decrease the available market for our solutions, and adversely affect our business. In addition, changes in regulations that make investment in the life sciences industry less attractive or drug development more expensive could adversely impact the demand for our software solutions. For these reasons and others, selling software to life sciences companies can be competitive, expensive, and time consuming, often requiring significant upfront time and expense without any assurance that we will successfully complete a software sale. Accordingly, our operating results and our ability to efficiently provide our solutions to life sciences companies and to grow or maintain our customer base could be adversely affected as a result of factors that affect the life sciences industry generally.

We also intend to continue leveraging our solutions for broad application to industrial challenges in molecule design, including in the fields of aerospace, energy, semiconductors, and electronic displays. However, we believe the materials science industry is in the very early stages of recognizing the potential of computational methods for molecular discovery, and there can be no assurance that the industry will adopt computational methods such as our platform. Any factor adversely affecting our ability to market our software solutions to customers outside of the life sciences industry, including in these new fields, could increase our dependence on the life sciences industry and adversely affect the growth rate of our revenues, operating results, and business.

The markets in which we participate are competitive, and if we do not compete effectively, our business and operating results could be adversely affected.

The overall market for molecular discovery and design software is global, rapidly evolving, competitive, and subject to changing technology and shifting customer focus. Our software solutions face competition from commercial competitors in the business of selling simulation and modeling software to biopharmaceutical companies. These competitors include BIOVIA, a brand of Dassault Systèmes SE, or BIOVIA; Chemical Computing Group (US) Inc.; Cresset Biomolecular Discovery Limited; OpenEye Scientific Software, Inc.; Optibrium Limited; and Simulations Plus, Inc. We also have competitors in materials science, such as BIOVIA and Materials Design, Inc., and in enterprise software for the life sciences, such as BIOVIA; Certara USA, Inc.; and Dotmatics, Inc. In some cases, these competitors are well-established providers of these solutions and have long-standing relationships with many of our current and potential customers, including large biopharmaceutical companies. In addition, there are academic consortia that develop physics-based simulation programs for life sciences and materials applications. In life sciences, the most prominent academic simulation packages include AMBER, CHARMm, GROMACS, GROMOS, OpenMM, and OpenFF. These packages are primarily maintained and developed by graduate students and post-doctoral researchers, often

without the intent for commercialization. We also face competition from solutions that biopharmaceutical companies develop internally and from smaller companies that offer products and services directed at more specific markets than we target, enabling these smaller competitors to focus a greater proportion of their efforts and resources on these markets, as well as a large number of companies that have been founded with the goal of applying machine learning technologies to drug discovery.

Many of our competitors are able to devote greater resources to the development, promotion, and sale of their software solutions and services. It is possible that our new focus on internal drug discovery will result in loss of management focus and resources relating to our software business, thereby resulting in decreasing revenues from our software business. Furthermore, third parties with greater available resources and the ability to initiate or withstand substantial price competition could acquire our current or potential competitors. Our competitors may also establish cooperative relationships among themselves or with third parties that may further enhance their product offerings or resources. If our competitors' products, services, or technologies become more accepted than our solutions, if our competitors are successful in bringing their products or services to market earlier than ours, if our competitors are able to respond more quickly and effectively to new or changing opportunities, technologies, or customer requirements, or if their products or services are more technologically capable than ours, then our software revenues could be adversely affected.

We may be required to decrease our prices or modify our pricing practices in order to attract new customers or retain existing customers due to increased competition. Pricing pressures and increased competition could result in reduced sales, reduced margins, losses, or a failure to maintain or improve our competitive market position, any of which could adversely affect our business.

We have invested and expect to continue to invest in research and development efforts that further enhance our computational platform. Such investments may affect our operating results, and, if the return on these investments is lower or develops more slowly than we expect, our revenue and operating results may suffer.

We have invested and expect to continue to invest in research and development efforts that further enhance our computational platform, often in response to our customers' requirements. These investments may involve significant time, risks, and uncertainties, including the risk that the expenses associated with these investments may affect our margins and operating results and that such investments may not generate sufficient revenues to offset liabilities assumed and expenses associated with these new investments. The software industry changes rapidly as a result of technological and product developments, which may render our solutions less desirable. We believe that we must continue to invest a significant amount of time and resources in our platform and software solutions to maintain and improve our competitive position. If we do not achieve the benefits anticipated from these investments, if the achievement of these benefits is delayed, or if a slowdown in general computing power impacts the rate at which we expect our physics-based simulations to increase in power and domain applicability, our revenue and operating results may be adversely affected.

If we are unable to collect receivables from our customers, our operating results may be adversely affected.

While the majority of our current customers are well-established, large companies and universities, we also provide software solutions to smaller companies. Our financial success depends upon the creditworthiness and ultimate collection of amounts due from our customers, including our smaller customers with fewer financial resources. If we are not able to collect amounts due from our customers, we may be required to write-off significant accounts receivable and recognize bad debt expenses, which could materially and adversely affect our operating results.

Defects or disruptions in our solutions could result in diminishing demand for our solutions, a reduction in our revenues, and subject us to substantial liability.

Our software business and the level of customer acceptance of our software depend upon the continuous, effective, and reliable operation of our software and related tools and functions. Our software solutions are inherently complex and may contain defects or errors. Errors may result from our own technology or from the interface of our software solutions with legacy systems and data, which we did not develop. The risk of errors is particularly significant when a new software solution is first introduced or when new versions or enhancements of existing software solutions are released. We have from time to time found defects in our software, and new errors in our existing software may be detected in the future. Any errors, defects, disruptions, or other performance problems with our software could hurt our reputation and may damage our customers' businesses. If that occurs, our customers may delay or withhold payment to us, cancel their agreements with us, elect not to renew, make service credit claims, warranty claims, or other claims against us, and we could lose future sales. The occurrence of any of these events could result in diminishing demand for our software, a reduction of our revenues, an increase in collection cycles for accounts receivable, require us to increase our warranty provisions, or incur the expense of litigation or substantial liability.

We rely upon third-party providers of cloud-based infrastructure to host our software solutions. Any disruption in the operations of these third-party providers, limitations on capacity, or interference with our use could adversely affect our business, financial condition, and results of operations.

We outsource substantially all of the infrastructure relating to our hosted software solutions to third-party hosting services. Customers of our hosted software solutions need to be able to access our computational platform at any time, without interruption or degradation of performance, and we provide them with service-level commitments with respect to uptime. Our hosted software solutions depend on protecting the virtual cloud infrastructure hosted by third-party hosting services by maintaining its configuration, architecture, features, and interconnection specifications, as well as the information stored in these virtual data centers, which is transmitted by third-party internet service providers. Any limitation on the capacity of our third-party hosting services could impede our ability to onboard new customers or expand the usage of our existing customers, which could adversely affect our business, financial condition, and results of operations. In addition, any incident affecting our third-party hosting

services' infrastructure that may be caused by cyber-attacks, natural disasters, fire, flood, severe storm, earthquake, power loss, telecommunications failures, terrorist or other attacks, and other similar events beyond our control could negatively affect our cloud-based solutions. A prolonged service disruption affecting our cloud-based solutions for any of the foregoing reasons would negatively impact our ability to serve our customers and could damage our reputation with current and potential customers, expose us to liability, cause us to lose customers, or otherwise harm our business. We may also incur significant costs for using alternative equipment or taking other actions in preparation for, or in reaction to, events that damage the third-party hosting services we use.

In the event that our service agreements with our third-party hosting services are terminated, or there is a lapse of service, elimination of services or features that we utilize, interruption of internet service provider connectivity, or damage to such facilities, we could experience interruptions in access to our platform as well as significant delays and additional expense in arranging or creating new facilities and services and/or re-architecting our hosted software solutions for deployment on a different cloud infrastructure service provider, which could adversely affect our business, financial condition, and results of operations.

If our security measures are breached or unauthorized access to customer data is otherwise obtained, our solutions may be perceived as not being secure, customers may reduce the use of or stop using our solutions, and we may incur significant liabilities.

Our solutions involve the collection, analysis, and storage of our customers' proprietary information and sensitive proprietary data related to the discovery efforts of our customers. As a result, unauthorized access or security breaches, as a result of third-party action, employee error, malfeasance, or otherwise could result in the loss of information, litigation, indemnity obligations, damage to our reputation, and other liability. Because the techniques used to obtain unauthorized access or sabotage systems change frequently and generally are not identified until they are launched against a target, we may be unable to anticipate these techniques or to implement adequate preventative measures. In addition, if our employees fail to adhere to practices we have established to maintain a firewall between our internal drug discovery team and our teams that work with software customers, or if the technical solutions we have adopted to maintain the firewall malfunction, our customers and collaborators may lose confidence in our ability to maintain the confidentiality of their intellectual property, we may have trouble attracting new customers and collaborators, we may be subject to breach of contract claims by our customers and collaborators, and we may suffer reputational and other harm as a result. Any or all of these issues could adversely affect our ability to attract new customers, cause existing customers to elect to not renew their licenses, result in reputational damage or subject us to third-party lawsuits or other action or liability, which could adversely affect our operating results. Our insurance may not be adequate to cover losses associated with such events, and in any case, such insurance may not cover all of the types of costs, expenses, and losses we could incur to respond to and remediate a security breach.

Any failure to offer high-quality technical support services could adversely affect our relationships with our customers and our operating results.

Our customers depend on our support organization to resolve technical issues relating to our solutions, as our software requires expert usage to fully exploit its capabilities. Certain of our customers also rely on us to troubleshoot problems with the performance of the software, introduce new features requested for specific customer projects, inform them about the best way to set up and analyze various types of simulations and illustrate our techniques for drug discovery using examples from publicly available data sets. We may be unable to respond quickly enough to accommodate short-term increases in customer demand for these support services. Increased customer demand for our services, without corresponding revenues, could increase costs and adversely affect our operating results. In addition, our sales process is highly dependent on the reputation of our solutions and business and on positive recommendations from our existing customers. Any failure to offer high-quality technical support, or a market perception that we do not offer high-quality support, could adversely affect our reputation, our ability to sell our solutions to existing and prospective customers and our business and operating results.

Our solutions utilize third party open source software, and any failure to comply with the terms of one or more of these open source software licenses could adversely affect our business or our ability to sell our software solutions, subject us to litigation, or create potential liability.

Our solutions include software licensed by third parties under any one or more open source licenses, including the GNU General Public License, or GPL, the GNU Lesser General Public License, or LGPL, the Affero General Public License, or AGPL, the BSD License, the MIT License, the Apache License, and others, and we expect to continue to incorporate open source software in our solutions in the future. Moreover, we cannot ensure that we have effectively monitored our use of open source software or that we are in compliance with the terms of the applicable open source licenses or our current policies and procedures. There have been claims against companies that use open source software in their products and services asserting that the use of such open source software infringes the claimants' intellectual property rights. As a result, we and our customers could be subject to suits by third parties claiming that what we believe to be licensed open source software infringes such third parties' intellectual property rights, and we may be required to indemnify our customers against such claims. Additionally, if an author or other third party that distributes such open source software were to allege that we had not complied with the conditions of one or more of these licenses, we or our customers could be required to incur significant legal expenses defending against such allegations and could be subject to significant damages, enjoined from the sale of our solutions that contain the open source software and required to comply with onerous conditions or restrictions on these solutions, which could disrupt the distribution and sale of these solutions. Litigation could be costly for us to defend, have a negative effect on our business, financial condition, and results of operations, or require us to devote additional research and development resources to change our solutions.

Use of open source software may entail greater risks than use of third party commercial software, as open source licensors generally do not provide warranties or other contractual protections regarding infringement claims or the quality of the code, including with respect to security vulnerabilities. In addition, certain open source licenses require that source code for software programs that interact with such open source software be made available to the public at no cost and that any modifications or derivative works to such open source software continue to be licensed under the same terms as the open source software license. The terms of various open source licenses have not been interpreted by courts in the relevant jurisdictions, and there is a risk that such licenses could be construed in a manner that imposes unanticipated conditions or restrictions on our ability to market our solutions. By the terms of certain open source licenses, we could be required to release the source code of our proprietary software, and to make our proprietary software available under open source licenses, if we combine our proprietary software with open source software in a certain manner. In the event that portions of our proprietary software are determined to be subject to an open source license, we could be required to publicly release the affected portions of our source code, re-engineer all or a portion of our solutions, or otherwise be limited in the licensing of our solutions, each of which could reduce or eliminate the value of our solutions. Disclosing our proprietary source code could allow our competitors to create similar products with lower development effort and time and ultimately could result in a loss of sales. Any of these events could create liability for us and damage our reputation, which could have a material adverse effect on our revenue, business, results of operations, and financial condition and the market price of our shares.

Risks Related to Drug Discovery

We may never realize return on our investment of resources and cash in our drug discovery collaborations.

We use our computational platform to provide drug discovery services to collaborators who are engaged in drug discovery and development. These collaborators include start-up companies we co-found, pre-commercial biotechnology companies, and large-scale pharmaceutical companies. When we engage in drug discovery with these collaborators, we typically provide access to our platform and platform experts who assist the drug discovery collaborator in identifying molecules that have activity against one or more specified protein targets. We historically have not received significant initial cash consideration for these services. However, we have received equity consideration in the collaborator and/or the right to receive option fees, cash milestone payments upon the achievement of specified development, regulatory, and commercial sales milestones for the drug discovery targets, and potential royalties. From time to time, we have also made additional equity investments in our drug discovery collaborators.

We may never realize return on our investment of resources and cash in our drug discovery collaborations. Clinical drug development involves a lengthy and expensive process, with an uncertain outcome. Our drug discovery collaborators may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of any product candidates. In addition, our ability to realize return from our drug discovery collaborations is subject to the following risks:

- drug discovery collaborators have significant discretion in determining the amount and timing of efforts and resources that they will apply to our collaborations and may not perform their obligations as expected;
- drug discovery collaborators may not pursue development or commercialization of any product candidates for which we are entitled to option fees, milestone payments, or royalties or may elect not to continue or renew development or commercialization programs based on results of clinical trials or other studies, changes in the collaborator's strategic focus or available funding, or external factors, such as an acquisition, that divert resources or create competing priorities;
- drug discovery collaborators may delay clinical trials for which we are entitled to milestone payments;
- we may not have access to, or may be restricted from disclosing, certain information regarding our collaborators' product candidates being developed or commercialized and, consequently, may have limited ability to inform our stockholders about the status of, and likelihood of achieving, milestone payments or royalties under such collaborations;
- drug discovery collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with any product candidates and products for which we are entitled to milestone payments or royalties if the collaborator believes that the competitive products are more likely to be successfully developed or can be commercialized under terms that are more economically attractive;
- product candidates discovered in drug discovery collaborations with us may be viewed by our collaborators as competitive with their own product candidates or products, which may cause our collaborators to cease to devote resources to the commercialization of any such product candidates;
- existing drug discovery collaborators and potential future drug discovery collaborators may begin to perceive us to be a competitor more generally, particularly as we advance our internal drug discovery programs, and therefore may be unwilling to continue existing collaborations with us or to enter into new collaborations with us;
- a drug discovery collaborator may fail to comply with applicable regulatory requirements regarding the development, manufacture, distribution, or marketing of a product candidate or product, which may impact our ability to receive milestone payments;

- disagreements with drug discovery collaborators, including disagreements over intellectual property or proprietary rights, contract interpretation, or the preferred course of development, might cause delays or terminations of the research, development, or commercialization of product candidates for which we are eligible to receive milestone payments, or might result in litigation or arbitration;
- drug discovery collaborators may not properly obtain, maintain, enforce, defend or protect our intellectual property or proprietary rights or may use our proprietary information in such a way as to potentially lead to disputes or legal proceedings that could jeopardize or invalidate our or their intellectual property or proprietary information or expose us and them to potential litigation;
- drug discovery collaborators may infringe, misappropriate, or otherwise violate the intellectual property or proprietary rights of third parties, which may expose us to litigation and potential liability; and
- drug discovery collaborations may be terminated prior to our receipt of any significant value from the collaboration.

Our drug discovery collaborations may not lead to development or commercialization of product candidates that results in our receipt of option fees, milestone payments, or royalties in a timely manner, or at all. If any drug discovery collaborations that we enter into do not result in the successful development and commercialization of drug products that result in option fees, milestone payments, or royalties to us, we may not receive return on the resources we have invested in the drug discovery collaboration. Moreover, even if a drug discovery collaboration initially leads to the achievement of milestones that result in payments to us, it may not continue to do so.

We may never realize return on our equity investments in our drug discovery collaborators.

We may never realize a return on our equity investments in our drug discovery collaborators. None of the drug discovery collaborators in which we hold equity generate revenue from commercial sales of drug products. They are therefore dependent on the availability of capital on favorable terms to continue their operations. In addition, if the drug discovery collaborators in which we hold equity raise additional capital, our ownership interest in and degree of control over these drug discovery collaborators will be diluted, unless we have sufficient resources and choose to invest in them further or successfully negotiate contractual anti-dilution protections for our equity investment. The financial success of our equity investment in any collaborator will likely be dependent on a liquidity event, such as a public offering, acquisition, or other favorable market event reflecting appreciation in the value of the equity we hold. The capital markets for public offerings and acquisitions are dynamic, and the likelihood of liquidity events for the companies in which we hold equity interests could significantly worsen. Further, valuations of privately held companies are inherently complex due to the lack of readily available market data. If we determine that any of our investments in such companies have experienced a decline in value, we may be required to record an impairment, which could negatively impact our financial results. The fair value of our equity interests in public companies, such as Morphic, may fluctuate significantly in future periods since we

determine the fair value of such equity interests based on the market value of such companies' common stock as of a given reporting date. All of the equity we hold in our drug discovery collaborators is subject to a risk of partial or total loss of our investment.

Our drug discovery collaborators have significant discretion in determining when to make announcements, if any, about the status of our collaborations, including about clinical developments and timelines for advancing collaborative programs, and the price of our common stock may decline as a result of announcements of unexpected results or developments.

Our drug discovery collaborators have significant discretion in determining when to make announcements about the status of our collaborations, including about preclinical and clinical developments and timelines for advancing the collaborative programs. While as a general matter we intend to periodically report on the status of our collaborations, our drug discovery collaborators, and in particular, our privately-held collaborators, may wish to report such information more or less frequently than we intend to or may not wish to report such information at all. The price of our common stock may decline as a result of the public announcement of unexpected results or developments in our collaborations, or as a result of our collaborators withholding such information.

Although we believe that our computational platform has the potential to identify more promising molecules than traditional methods and to accelerate drug discovery, our focus on using our platform technology to discover and design molecules with therapeutic potential may not result in the discovery and development of commercially viable products for us or our collaborators.

Our scientific approach focuses on using our platform technology to conduct "computational assays" that leverage our deep understanding of physics-based modeling and theoretical chemistry to design molecules and predict their key properties without conducting time-consuming and expensive physical experiments. Our computational platform underpins our software solutions, our drug discovery collaborations and our own internal drug discovery programs.

While the results of certain of our drug discovery collaborators suggest that our platform is capable of accelerating drug discovery and identifying high quality product candidates, these results do not assure future success for our drug discovery collaborators or for us with our internal drug discovery programs.

Even if we or our drug discovery collaborators are able to develop product candidates that demonstrate potential in preclinical studies, we or they may not succeed in demonstrating safety and efficacy of product candidates in human clinical trials. For example, in collaboration with us, Nimbus Therapeutics, LLC, or Nimbus, was able to identify a unique series of acetyl-CoA carboxylase, or ACC, allosteric protein-protein interaction inhibitors with favorable pharmaceutical properties that inhibit the activity of the ACC enzyme. Nimbus achieved proof of concept in a Phase 1b clinical trial of its ACC inhibitor, firsocostat, and later sold the program to Gilead Sciences, Inc., or Gilead Sciences, in a transaction valued at approximately $1.2 billion,

comprised of an upfront payment and earn outs. Of this amount, $601.3 million has been paid to Nimbus to date, and we received a total of $46.0 million in cash distributions in 2016 and 2017. In December 2019, Gilead Sciences announced topline results from its Phase 2 clinical trial which included firsocostat, both as a monotherapy and in combination with other investigational therapies for advanced fibrosis due to nonalcoholic steatohepatitis, in which the primary endpoint was not met. Moreover, preclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that have believed their product candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval of their product candidates.

We may not be successful in our efforts to identify or discover product candidates and may fail to capitalize on programs, collaborations, or product candidates that may present a greater commercial opportunity or for which there is a greater likelihood of success.

Research programs to identify new product candidates require substantial technical, financial, and human resources. As an organization, we have not yet developed any product candidates, and we may fail to identify potential product candidates for clinical development. Similarly, a key element of our business plan is to expand the use of our computational platform through an increase in software sales and drug discovery collaborations. A failure to demonstrate the utility of our platform by successfully using it ourselves to discover internal product candidates could harm our business prospects.

Because we have limited resources, we focus our research programs on protein targets where we believe our computational assays are a good substitute for experimental assays, where we believe it is theoretically possible to discover a molecule with properties that are required for the molecule to become a drug and where we believe there is a meaningful commercial opportunity, among other factors. Currently, the focus of our internal drug discovery programs is in the area of oncology. We may forego or delay pursuit of opportunities with certain programs, collaborations, or product candidates or for indications that later prove to have greater commercial potential. However, the development of any product candidate we pursue may ultimately prove to be unsuccessful or less successful than another potential product candidate that we might have chosen to pursue on a more aggressive basis with our capital resources. If we do not accurately evaluate the commercial potential for a particular product candidate, we may relinquish valuable rights to that product candidate through strategic collaboration, partnership, licensing, or other arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate. Alternatively, we may allocate internal resources to a product candidate in a therapeutic area in which it would have been more advantageous to enter into a collaboration.

We rely on contract research organizations to synthesize any molecules with therapeutic potential that we discover. If such organizations do not meet our supply requirements, development of any product candidate we may develop may be delayed.

We expect to rely on third parties to synthesize any molecules with therapeutic potential that we discover. Reliance on third parties may expose us to different risks than if we were to synthesize molecules ourselves. If these third parties do not successfully carry out their contractual duties, meet expected deadlines, or synthesize molecules in accordance with regulatory requirements, if there are disagreements between us and such parties or if such parties are unable to expand capacities, we may not be able to fulfill, or may be delayed in producing sufficient product candidates to meet, our supply requirements. These facilities may also be affected by natural disasters, such as floods or fire, or geopolitical developments, or such facilities could face production issues, such as contamination or regulatory concerns following a regulatory inspection of such facility. In such instances, we may need to locate an appropriate replacement third-party facility and establish a contractual relationship, which may not be readily available or on acceptable terms, which would cause additional delay and increased expense, and may have a material adverse effect on our business.

We or any third party may also encounter shortages in the raw materials or active pharmaceutical ingredient, or API, necessary to synthesize any molecule we may discover in the quantities needed for preclinical studies or clinical trials, as a result of capacity constraints or delays or disruptions in the market for the raw materials or API. Even if raw materials or API are available, we may be unable to obtain sufficient quantities at an acceptable cost or quality. The failure by us or the third parties to obtain the raw materials or API necessary to synthesize sufficient quantities of any molecule we may discover could delay, prevent, or impair our development efforts and may have a material adverse effect on our business.

If we are not able to establish or maintain collaborations to develop and commercialize any of the product candidates we discover internally, we may have to alter our development and commercialization plans for those product candidates and our business could be adversely affected.

We have not yet identified any product candidates or advanced any of our drug discovery programs past the discovery stage and into preclinical studies or human clinical trials. We expect to rely on future collaborators for the development and potential commercialization of product candidates we discover internally when we believe it will help maximize the commercial value of the product candidate. We face significant competition in seeking appropriate collaborators for these activities, and a number of more established companies may also be pursuing such collaborations. These established companies may have a competitive advantage over us due to their size, financial resources, and greater clinical development and commercialization expertise. Whether we reach a definitive agreement for such collaborations will depend, among other things, upon our assessment of the collaborator’s resources and expertise, the terms and conditions of the proposed collaboration, and the proposed collaborator’s evaluation of a number of factors. Those factors may include the design or results of preclinical studies and clinical trials, the likelihood of approval by the U.S. Food and Drug Administration, or FDA, or similar regulatory authorities outside the United States, the potential market for the subject product

candidate, the costs and complexities of manufacturing and delivering such product candidate to patients, the potential of competing products, the existence of uncertainty with respect to our ownership of technology, which can exist if there is a challenge to such ownership without regard to the merits of the challenge, and industry and market conditions generally. The collaborator may also consider alternative product candidates or technologies for similar indications that may be available to collaborate on and whether such a collaboration could be more attractive than the one with us for our product candidate. Collaborations are complex and time-consuming to negotiate and document. In addition, there have been a significant number of recent business combinations among large biopharmaceutical companies that have resulted in a reduced number of potential future collaborators.

If we are unable to reach agreements with suitable collaborators on a timely basis, on acceptable terms or at all, we may have to curtail the development of a product candidate, reduce or delay its development program or one or more of our other development programs, or increase our expenditures and undertake development or commercialization activities at our own expense. If we elect to fund and undertake development or commercialization activities on our own, we may need to obtain additional expertise and additional capital, which may not be available to us on acceptable terms or at all. If we fail to enter into collaborations and do not have sufficient funds or expertise to undertake the necessary development and commercialization activities, we may not be able to further develop any product candidates or bring them to market.

As a company, we do not have any experience in clinical development and have not advanced any product candidates into clinical development.

We only began conducting our own internal drug discovery efforts in mid-2018. As a company, we do not have any experience in clinical development and have not advanced any product candidates into clinical development. Our lack of experience in conducting clinical development activities may adversely impact the likelihood that we will be successful in advancing our programs. Further, any predictions you make about the future success or viability of our internal drug discovery programs may not be as accurate as they could be if we had a history of conducting clinical trials and developing our own product candidates.

In addition, as our internal drug discovery business grows, we may encounter unforeseen expenses, difficulties, complications, delays, and other known and unknown factors. Our internal drug discovery business may need to transition to a business capable of supporting clinical development activities. We may not be successful in such a transition.

If we and any future collaborators are unable to successfully complete clinical development, obtain regulatory approval for, or commercialize any product candidates, or experience delays in doing so, our business may be materially harmed.

The success of our and any future collaborators' development and commercialization programs will depend on several factors, including the following:

- successful completion of necessary preclinical studies to enable the initiation of clinical trials;

- successful enrollment of patients in, and the completion of, the clinical trials;
- acceptance by the FDA or other regulatory agencies of regulatory filings for any product candidates we and our future collaborators may develop;
- expanding and maintaining a workforce of experienced scientists and others to continue to develop any product candidates;
- obtaining and maintaining intellectual property protection and regulatory exclusivity for any product candidates we and our future collaborators may develop;
- making arrangements with third-party manufacturers for, or establishing, clinical and commercial manufacturing capabilities;
- establishing sales, marketing, and distribution capabilities for drug products and successfully launching commercial sales, if and when approved;
- acceptance of any product candidates we and our future collaborators may develop, if and when approved, by patients, the medical community, and third-party payors;
- effectively competing with other therapies;
- obtaining and maintaining coverage, adequate pricing, and adequate reimbursement from third-party payors, including government payors;
- patients' willingness to pay out-of-pocket in the absence of coverage and/or adequate reimbursement from third-party payors; and
- maintaining a continued acceptable safety profile following receipt of any regulatory approvals.

Many of these factors are beyond our control, including clinical outcomes, the regulatory review process, potential threats to our intellectual property rights, and the manufacturing, marketing, and sales efforts of any future collaborator. Clinical drug development involves a lengthy and expensive process, with an uncertain outcome. If we or our future collaborators are unable to develop, receive marketing approval for, and successfully commercialize any product candidates, or if we or they experience delays as a result of any of these factors or otherwise, we may need to spend significant additional time and resources, which would adversely affect our business, prospects, financial condition, and results of operations.

Risks Related to Our Operations

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

In our fiscal year ended December 31, 2019, sales to customers outside of the United States accounted for approximately 44% of our total revenues. Operating in international markets requires significant resources and management attention and subjects us to regulatory, economic, and political risks that are different from those in the United States. We have limited operating experience in some international markets, and we cannot assure you that our expansion efforts into other international markets will be successful. Our experience in the United States and other international markets in which we already have a presence may not be relevant to our ability to expand in other markets. Our international expansion efforts may not be successful in creating

further demand for our solutions outside of the United States or in effectively selling our solutions in the international markets we enter. In addition, we face risks in doing business internationally that could adversely affect our business, including:

- the need to localize and adapt our solutions for specific countries, including translation into foreign languages;
- data privacy laws which require that customer data be stored and processed in a designated territory or handled in a manner that differs significantly from how we typically handle customer data;
- difficulties in staffing and managing foreign operations, including employee laws and regulations;
- different pricing environments, longer sales cycles, and longer accounts receivable payment cycles and collections issues;
- new and different sources of competition;
- weaker protection for intellectual property and other legal rights than in the United States and practical difficulties in enforcing intellectual property and other rights outside of the United States;
- laws and business practices favoring local competitors;
- compliance challenges related to the complexity of multiple, conflicting, and changing governmental laws and regulations, including employment, tax, reimbursement and pricing, privacy and data protection, and anti-bribery laws and regulations;
- increased financial accounting and reporting burdens and complexities;
- restrictions on the transfer of funds;
- changes in diplomatic and trade relationships, including new tariffs, trade protection measures, import or export licensing requirements, trade embargoes, and other trade barriers;
- 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;
- adverse tax consequences, including the potential for required withholding taxes; and
- unstable regional and economic political conditions.

Our international agreements may provide for payment denominated in local currencies and our local operating costs are denominated in local currencies. Therefore, fluctuations in the value of the U.S. dollar and foreign currencies may impact our operating results when translated into U.S. dollars. We do not currently engage in currency hedging activities to limit the risk of exchange rate fluctuations.

Additionally, we could face heightened risks as a result of the recent withdrawal of the United Kingdom from the European Union on January 31, 2020, commonly referred to as Brexit. Pursuant to the formal withdrawal arrangements agreed between the United Kingdom and the European Union, the United Kingdom will be subject to a transition period until December 31, 2020, or the Transition Period, during which European Union rules will continue to apply. Negotiations between the United Kingdom and the European Union are expected to continue in relation to the customs and trading relationship between the United Kingdom and the European Union following the expiry of the Transition Period. To date, only an outline of a trade agreement has been reached. If no trade agreement has been reached before the end of the Transition Period, there may be significant market and economic disruption. The Prime Minister has also indicated that the United Kingdom will not accept high regulatory alignment with the European Union.

If we fail to manage our technical operations infrastructure, our existing customers, and our internal drug discovery team, may experience service outages, and our new customers may experience delays in the deployment of our solutions.

We have experienced significant growth in the number of users and data that our operations infrastructure supports. We seek to maintain sufficient excess capacity in our operations infrastructure to meet the needs of all of our customers and to support our internal drug discovery programs. We also seek to maintain excess capacity to facilitate the rapid provision of new customer deployments and the expansion of existing customer deployments. In addition, we need to properly manage our technological operations infrastructure in order to support version control, changes in hardware and software parameters and the evolution of our solutions. However, the provision of new hosting infrastructure requires adequate lead-time. We have experienced, and may in the future experience, website disruptions, outages, and other performance problems. These types of problems may be caused by a variety of factors, including infrastructure changes, human or software errors, viruses, security attacks, fraud, spikes in usage, and denial of service issues. In some instances, we may not be able to identify the cause or causes of these performance problems within an acceptable period of time. If we do not accurately predict our infrastructure requirements, our existing customers may experience service outages that may subject us to financial penalties, financial liabilities, and customer losses. If our operations infrastructure fails to keep pace with increased sales and usage, customers and our internal drug discovery team may experience delays in the deployment of our solutions as we seek to obtain additional capacity, which could adversely affect our reputation and adversely affect our revenues.

Our international operations subject us to potentially adverse tax consequences.

We report our taxable income in various jurisdictions worldwide based upon our business operations in those jurisdictions. These jurisdictions include Germany, Japan, and India. The international nature and organization of our business activities are subject to complex transfer pricing regulations administered by taxing authorities in various jurisdictions. The relevant taxing authorities may disagree with our determinations as to the income and expenses attributable to specific jurisdictions. If such a disagreement were to occur, and our position were not sustained, we could be required to pay additional taxes, interest, and penalties, which could result in one-time tax charges, higher effective tax rates, reduced cash flows, and lower overall profitability of our operations.

Taxing authorities may successfully assert that we should have collected or in the future should collect sales and use, value added, or similar taxes, and we could be subject to tax liabilities with respect to past or future sales, which could adversely affect our results of operations.

We do not collect sales and use, value added, and similar taxes in all jurisdictions in which we have sales, based on our belief that such taxes are not applicable or that we are not required to collect such taxes with respect to the jurisdiction. Sales and use, value added, and similar tax laws and rates vary greatly by jurisdiction. Certain jurisdictions in which we do not collect such taxes may assert that such taxes are applicable, which could result in tax assessments, penalties, and interest, and we may be required to collect such taxes in the future. Such tax assessments, penalties, and interest or future requirements may adversely affect our results of operations.

Unanticipated changes in our effective tax rate could harm our future results.

We are subject to income taxes in the United States and various foreign jurisdictions, and our domestic and international tax liabilities are subject to the allocation of expenses in differing jurisdictions. Forecasting our estimated annual effective tax rate is complex and subject to uncertainty, and there may be material differences between our forecasted and actual tax rates. Our effective tax rate could be adversely affected by changes in the mix of earnings and losses in countries with differing statutory tax rates, certain non-deductible expenses as a result of acquisitions, the valuation of deferred tax assets and liabilities, and changes in federal, state, or international tax laws and accounting principles. Increases in our effective tax rate would reduce our profitability or in some cases increase our losses.

In addition, we may be subject to income tax audits by many tax jurisdictions throughout the world. Although we believe our income tax liabilities are reasonably estimated and accounted for in accordance with applicable laws and principles, an adverse resolution of one or more uncertain tax positions in any period could have a material impact on the results of operations for that period.

We may acquire other companies or technologies, which could divert our management's attention, result in additional dilution to our stockholders, and otherwise disrupt our operations and adversely affect our operating results.

We may in the future seek to acquire or invest in businesses, solutions, or technologies that we believe could complement or expand our solutions, enhance our technical capabilities, or otherwise offer growth opportunities. The pursuit of potential acquisitions may divert the attention of management and cause us to incur various expenses in identifying, investigating, and pursuing suitable acquisitions, whether or not they are consummated.

In addition, we have limited experience in acquiring other businesses. If we acquire additional businesses, we may not be able to integrate the acquired personnel, operations, and technologies successfully, effectively manage the combined business following the acquisition or preserve the operational synergies between our business units that we believe currently exist. We cannot assure you that following any acquisition we would achieve the expected synergies to justify the transaction, due to a number of factors, including:

- inability to integrate or benefit from acquired technologies or services in a profitable manner;
- unanticipated costs or liabilities associated with the acquisition;
- incurrence of acquisition-related costs;
- difficulty integrating the accounting systems, operations, and personnel of the acquired business;
- difficulties and additional expenses associated with supporting legacy products and hosting infrastructure of the acquired business;
- difficulty converting the customers of the acquired business onto our solutions and contract terms, including disparities in the revenues, licensing, support, or professional services model of the acquired company;
- diversion of management's attention from other business concerns;
- adverse effects to our existing business relationships with business partners and customers as a result of the acquisition;
- the potential loss of key employees;
- use of resources that are needed in other parts of our business; and
- use of substantial portions of our available cash to consummate the acquisition.

In addition, a significant portion of the purchase price of companies we acquire may be allocated to acquired goodwill and other intangible assets, which must be assessed for impairment at least annually. In the future, if our acquisitions do not yield expected returns, we may be required to take charges to our operating results based on this impairment assessment process, which could adversely affect our results of operations.

Acquisitions could also result in dilutive issuances of equity securities or the incurrence of debt, which could adversely affect our operating results. In addition, if an acquired business fails to meet our expectations, our operating results, business, and financial position may suffer.

A widespread outbreak of an illness or other health issue, such as the Coronavirus outbreak, could negatively affect various aspects of our business and make it more difficult and expensive to meet our obligations to our customers, and could result in reduced demand from our customers.

Our operations are susceptible to a widespread outbreak of an illness or other health issue, such as the recent outbreak of the coronavirus disease 2019 (COVID-19), or Coronavirus, resulting in thousands of confirmed cases in China and many additional cases identified in other countries, including in the United States. As a result of illness outbreaks, including Coronavirus, businesses can be shut down, supply chains can be interrupted, slowed, or rendered inoperable, and individuals can become ill, quarantined, or otherwise unable to work and/or travel due to health reasons or governmental restrictions. With respect our software business, we have important distribution channels in China and South Korea that could be disrupted by the Coronavirus, however, we cannot reasonably estimate its impact at this time. The extent to which the Coronavirus impacts our business or our results will depend on future developments, which are highly uncertain and cannot be predicted, including new information which may emerge concerning the severity of the Coronavirus and the actions to contain the Coronavirus or treat its impact, among others.

Our operations may be interrupted by the occurrence of a natural disaster or other catastrophic event at our primary facilities.

Our operations are primarily conducted at our facilities in New York, New York and Portland, Oregon and our internal hosting facility located in Clifton, New Jersey. The occurrence of natural disasters or other catastrophic events could disrupt our operations. Any natural disaster or catastrophic event in our facilities or the areas in which they are located could have a significant negative impact on our operations.

Risks Related to Our Intellectual Property

If we fail to comply with our obligations under our existing license agreements with Columbia University, under any of our other intellectual property licenses, or under any future intellectual property licenses, or otherwise experience disruptions to our business relationships with our current or any future licensors, we could lose intellectual property rights that are important to our business.

We are party to a number of license agreements pursuant to which we have been granted exclusive and non-exclusive worldwide licenses to certain patents, software code, and software programs to, among other things, reproduce, use, execute, copy, operate, sublicense, and distribute the licensed technology in connection with the marketing and sale of our software solutions and to develop improvements thereto. In particular, the technology that we license from Columbia University pursuant to our license agreements with them are used in and incorporated into a number of our software solutions which we market and license to our customers. For further information regarding our license agreements with Columbia University, see “Item 1. Business—License Agreements with Columbia University.” Our license agreements with Columbia University and other licensors impose, and we expect that future licenses will impose, specified royalty and other obligations on us.

In spite of our best efforts, our current or any future licensors might conclude that we have materially breached our license agreements with them and might therefore terminate the license agreements, thereby delaying our ability to market and sell our existing software solutions and develop and commercialize new software solutions that utilize technology covered by these license agreements. If these in-licenses are terminated, or if the underlying intellectual property fails to provide the intended exclusivity, competitors could market, products and technologies similar to ours. This could have a material adverse effect on our competitive position, business, financial condition, results of operations, and prospects.

Disputes may arise regarding intellectual property subject to a licensing agreement, including:

- the scope of rights granted under the license agreement and other interpretation related issues;
- the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- the sublicensing of patent and other rights under any collaborative development relationships;
- the inventorship and ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our current or future licensors and us and our collaborators; and
- the priority of invention of patented technology.

In addition, license agreements are complex, and certain provisions in such agreements may be susceptible to multiple interpretations. The resolution of any contract interpretation disagreement that may arise could narrow what we believe to be the scope of our rights to the relevant intellectual property or technology, or increase what we believe to be our financial or other obligations under the relevant agreement. For example, our counterparties have in the past and may in the future dispute the amounts owed to them pursuant to payment obligations. If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on commercially acceptable terms, we may experience delays in the development and commercialization of new software solutions and in our ability to market and sell existing software solutions, which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

Our obligations under our existing or future drug discovery collaboration agreements may limit our intellectual property rights that are important to our business. Further, if we fail to comply with our obligations under our existing or future collaboration agreements, or otherwise experience disruptions to our business relationships with our prior, current, or future collaborators, we could lose intellectual property rights that are important to our business.

We are party to collaboration agreements with biopharmaceutical companies, pursuant to which we provide drug discovery services but have no ownership rights, or only co-ownership rights, to certain intellectual property generated through the collaborations. We may enter into additional collaboration agreements in the future, pursuant to which we may have no ownership rights, or only co-ownership rights, to certain intellectual property generated through the future collaborations. If we are unable to obtain ownership or license of such intellectual property generated through our prior, current, or future collaborations and overlapping with, or related to, our own proprietary technology or product candidates, then our business, financial condition, results of operations, and prospects could be materially harmed.

Our existing collaboration agreements contain certain exclusivity obligations that require us to design compounds exclusively for our collaborators with respect to certain specific targets over a specified time period. Our future collaboration agreements may grant similar exclusivity rights to future collaborators with respect to target(s) that are the subject of such collaborations. These existing or future collaboration agreements may impose diligence obligations on us. For example, existing or future collaboration agreements may impose the restrictions on us from pursuing the drug development targets for ourselves or for our other current or future collaborators, thereby removing our ability to develop and commercialize, or to jointly develop and commercialize with other current or future collaborators, product candidates, and technology related to the drug development targets. In spite of our best efforts, our prior, current, or future collaborators might conclude that we have materially breached our collaboration agreements. If these collaboration agreements are terminated, or if the underlying intellectual property, to the extent we have ownership or license of, fails to provide the intended exclusivity, competitors would have the freedom to seek regulatory approval of, and to market, products and technology identical to ours. This could have a material adverse effect on our competitive position, business, financial condition, results of operations, and prospects.

Disputes may arise regarding intellectual property subject to a collaboration agreement, including:

- the scope of ownership or license granted under the collaboration agreement and other interpretation related issues;
- the extent to which our technology and product candidates infringe on intellectual property that generated through the collaboration to of which we do not have ownership or license under the collaboration agreement;
- the assignment or sublicense of intellectual property rights and other rights under the collaboration agreement;

- our diligence obligations under the collaboration agreement and what activities satisfy those diligence obligations; and
- the inventorship and ownership of inventions and know-how resulting from the joint creation or use of intellectual property by us and our current or future collaborators.

In addition, collaboration agreements are complex, and certain provisions in such agreements may be susceptible to multiple interpretations. The resolution of any contract interpretation disagreement that may arise could narrow what we believe to be the scope of our rights to the relevant intellectual property, or increase what we believe to be our obligations under the relevant agreements, either of which could have a material adverse effect on our business, financial condition, results of operations, and prospects. Moreover, if disputes over intellectual property that we have owned, co-owned, or in-licensed under the collaboration agreements prevent or impair our ability to maintain our current collaboration arrangements on commercially acceptable terms, we may be unable to successfully develop and commercialize the affected technology or product candidates, which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

If we are unable to obtain, maintain, enforce, and protect patent protection for our technology and product candidates or if the scope of the patent protection obtained is not sufficiently broad, our competitors could develop and commercialize technology and products similar or identical to ours, and our ability to successfully develop and commercialize our technology and product candidates may be adversely affected.

Our success depends in large part on our ability to obtain and maintain protection of the intellectual property we may own solely and jointly with others or may license from others, particularly patents, in the United States and other countries with respect to any proprietary technology and product candidates we develop. We seek to protect our proprietary position by filing patent applications in the United States and abroad related to our technology and any product candidates we may develop that are important to our business and by in-licensing intellectual property related to our technology and product candidates. If we are unable to obtain or maintain patent protection with respect to any proprietary technology or product candidate, our business, financial condition, results of operations, and prospects could be materially harmed.

The patent prosecution process is expensive, time-consuming, and complex, and we may not be able to file, prosecute, maintain, defend, or license all necessary or desirable patent applications at a reasonable cost or in a timely manner. It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. Moreover, in some circumstances, we may not have the right to control the preparation, filing, and prosecution of patent applications, or to maintain, enforce, and defend the patents, covering technology that we co-own with third parties or license from third parties. Therefore, these co-owned and in-licensed patents and applications may not be prepared, filed, prosecuted, maintained, defended, and enforced in a manner consistent with the best interests of our business.

The patent position of software and biopharmaceutical companies generally is highly uncertain, involves complex legal and factual questions, and has in recent years been the subject of much litigation. In addition, the scope of patent protection outside of the United States is uncertain and laws of non-U.S. countries may not protect our rights to the same extent as the laws of the United States or vice versa. With respect to both owned and in-licensed patent rights, we cannot predict whether the patent applications we and our licensor are currently pursuing will issue as patents in any particular jurisdiction or whether the claims of any issued patents will provide sufficient protection from competitors. Further, we may not be aware of all third-party intellectual property rights or prior art potentially relating to our computational platform, technology, and any product candidates we may develop. In addition, publications of discoveries in the scientific literature often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until 18 months after filing of the priority application, or in some cases not published at all. Therefore, neither we nor our collaborators, or our licensor can know with certainty whether either we, our collaborators, or our licensor were the first to make the inventions claimed in the patents and patent applications we own or in-license now or in the future, or that either we, our collaborators, or our licensor were the first to file for patent protection of such inventions. As a result, the issuance, scope, validity, enforceability, and commercial value of our owned, co-owned, and in-licensed patent rights are highly uncertain. Moreover, our owned, co-owned, and in-licensed pending and future patent applications may not result in patents being issued that protect our technology and product candidates, in whole or in part, or that effectively prevent others from commercializing competitive technologies and products. Changes in either the patent laws or interpretation of the patent laws in the United States and other countries may diminish the value of our owned, co-owned, or in-licensed current or future patents and our ability to obtain, protect, maintain, defend, and enforce our patent rights, narrow the scope of our patent protection and, more generally, could affect the value of, or narrow the scope of, our patent rights. For example, recent Supreme Court decisions have served to curtail the scope of subject matter eligible for patent protection in the United States, and many software patents have since been invalidated on the basis that they are directed to abstract ideas.

In order to pursue protection based on our provisional patent applications, we will need to file Patent Cooperation Treaty applications, non-U.S. applications, and/or U.S. non-provisional patent applications prior to applicable deadlines. Even then, as highlighted above, patents may never issue from our patent applications, or the scope of any patent may not be sufficient to provide a competitive advantage.

Moreover, we, our collaborators, or our licensor may be subject to a third-party preissuance submission of prior art to the U.S. Patent and Trademark Office, or USPTO, or become involved in opposition, derivation, revocation, reexamination, *inter partes* review, post-grant review or interference proceedings challenging our patent rights or the patent rights of others. An adverse determination in any such submission, proceeding or litigation could reduce the scope of, or invalidate, our patent rights or allow third parties to commercialize our technology or product candidates and compete directly with us, without payment to us. If the breadth or strength of protection provided by our owned, co-owned, or in-licensed current or future patents and patent applications is threatened, regardless of the outcome, it could dissuade companies from collaborating with us to license, develop, or commercialize current or future technology or product candidates.

Additionally, the coverage claimed in a patent application can be significantly reduced before the patent is issued, and its scope can be reinterpreted after issuance. Even if our owned, co-owned, and in-licensed current and future patent applications issue as patents, they may not issue in a form that will provide us with any meaningful protection, prevent competitors from competing with us, or otherwise provide us with any competitive advantage. The issuance of a patent is not conclusive as to its inventorship, scope, validity, or enforceability, and our owned and in-licensed patents may be challenged in the courts or patent offices in the United States and abroad. Such challenges may result in loss of exclusivity or in patent claims being narrowed, invalidated, or held unenforceable, in whole or in part, which could limit our ability to stop others from using or commercializing similar or identical technology and products, or limit the duration of the patent protection of our technology and product candidates. Such proceedings also may result in substantial cost and require significant time from our management and employees, even if the eventual outcome is favorable to us. In particular, given the amount of time required for the development, testing, and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. Furthermore, our competitors may be able to circumvent our owned, co-owned, or in-licensed current or future patents by developing similar or alternative technologies or products in a non-infringing manner. As a result, our owned, co-owned, and in-licensed current or future patent portfolio may not provide us with sufficient rights to exclude others from commercializing technology and products similar or identical to any of our technology and product candidates.

Changes to patent laws in the United States and other jurisdictions could diminish the value of patents in general, thereby impairing our ability to protect our products.

Changes in either the patent laws or interpretation of patent laws in the United States, including patent reform legislation such as the Leahy-Smith America Invents Act, or the Leahy-Smith Act, could increase the uncertainties and costs surrounding the prosecution of our owned and in-licensed patent applications and the maintenance, enforcement or defense of our owned and in-licensed issued patents. The Leahy-Smith Act includes a number of significant changes to United States patent law. These changes include provisions that affect the way patent applications are prosecuted, redefine prior art, provide more efficient and cost-effective avenues for competitors to challenge the validity of patents, and enable third-party submission of prior art to the USPTO during patent prosecution and additional procedures to attack the validity of a patent at USPTO-administered post-grant proceedings, including post-grant review, *inter partes* review, and derivation proceedings. Assuming that other requirements for patentability are met, prior to March 2013, in the United States, the first to invent the claimed invention was entitled to the patent, while outside the United States, the first to file a patent application was entitled to the patent. After March 2013, under the Leahy-Smith Act, the United States transitioned to a first-to-file system in which, assuming that the other statutory requirements for patentability are met, the first inventor to file a patent application will be entitled to the patent on an invention regardless of whether a third party was the first to invent the claimed invention. As such, the Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business, financial condition, results of operations and prospects.

In addition, the patent positions of companies in the development and commercialization of software, biologics and pharmaceuticals are particularly uncertain. Recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. This combination of events has created uncertainty with respect to the validity and enforceability of patents once obtained. Depending on future actions by the U.S. Congress, the federal courts, and the USPTO, the laws and regulations governing patents could change in unpredictable ways that could have a material adverse effect on our patent rights and our ability to protect, defend and enforce our patent rights in the future.

A number of recent cases decided by the U.S. Supreme Court have involved questions of when claims reciting abstract ideas, laws of nature, natural phenomena and/or natural products are eligible for a patent, regardless of whether the claimed subject matter is otherwise novel and inventive. These cases include Association for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 12-398 (2013) or Myriad; Alice Corp. v. CLS Bank International, 573 U.S. 13-298 (2014); and Mayo Collaborative Services v. Prometheus Laboratories, Inc., or Prometheus, 566 U.S. 10-1150 (2012). In response to these cases, federal courts have held numerous patents invalid as claiming subject matter ineligible for patent protection. Moreover, the USPTO has issued guidance to the examining corps on how to apply these cases during examination. The full impact of these decisions is not yet known.

In addition to increasing uncertainty with regard to our ability to obtain future patents, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on these and other decisions by Congress, the federal courts and the USPTO, the laws and regulations governing patents could change or be interpreted in unpredictable ways that would weaken our ability to obtain new patents or to enforce any patents that may issue to us in the future. In addition, these events may adversely affect our ability to defend any patents that may issue in procedures in the USPTO or in courts.

We, our prior, existing, or future collaborators, and our existing or future licensors, may become involved in lawsuits to protect or enforce our patent or other intellectual property rights, which could be expensive, time-consuming and unsuccessful.

Competitors and other third parties may infringe, misappropriate, or otherwise violate our, our prior, current and future collaborators', or our current and future licensors' issued patents or other intellectual property. As a result, we, our prior, current, or future collaborators, or our current or future licensor may need to file infringement, misappropriation, or other intellectual property related claims, which can be expensive and time-consuming. Any claims we assert against perceived infringers could provoke such parties to assert counterclaims against us alleging that we infringe, misappropriate, or otherwise violate their intellectual property. In addition, in a patent infringement proceeding, such parties could assert that the patents we or our licensors have asserted are invalid or unenforceable. In patent litigation in the United States, defenses alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness, or non-enablement. Grounds for an unenforceability assertion

could be an allegation that someone connected with prosecution of the patent withheld relevant information from the USPTO, or made a misleading statement, during prosecution. Third parties may institute such claims before administrative bodies in the United States or abroad, even outside the context of litigation. Such mechanisms include re-examination, post-grant review, *inter partes* review, interference proceedings, derivation proceedings, and equivalent proceedings in non-U.S. jurisdictions (e.g., opposition proceedings). The outcome following legal assertions of invalidity and unenforceability is unpredictable.

An adverse result in any such proceeding could put one or more of our owned, co-owned, or in-licensed current or future patents at risk of being invalidated or interpreted narrowly and could put any of our owned, co-owned, or in-licensed current or future patent applications at risk of not yielding an issued patent. A court may also refuse to stop the third party from using the technology at issue in a proceeding on the grounds that our owned, co-owned, or in-licensed current or future patents do not cover such technology. Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information or trade secrets could be compromised by disclosure during this type of litigation. Any of the foregoing could allow such third parties to develop and commercialize competing technologies and products in a non-infringing manner and have a material adverse impact on our business, financial condition, results of operations, and prospects.

Interference or derivation proceedings provoked by third parties, or brought by us or by our licensor, or declared by the USPTO may be necessary to determine the priority of inventions with respect to our patents or patent applications. An unfavorable outcome could require us to cease using the related technology or to attempt to license rights to it from the prevailing party. Our business could be harmed if the prevailing party does not offer us a license on commercially reasonable terms or at all, or if a non-exclusive license is offered and our competitors gain access to the same technology. Our defense of litigation or interference or derivation proceedings may fail and, even if successful, may result in substantial costs and distract our management and other employees. In addition, the uncertainties associated with litigation could have a material adverse effect on our ability to raise the funds necessary to conduct clinical trials, continue our research programs, license necessary technology from third parties, or enter into development collaborations that would help us bring any product candidates to market.

Third parties may initiate legal proceedings alleging that we are infringing, misappropriating or otherwise violating their intellectual property rights, the outcome of which would be uncertain and could have a material adverse effect on the success of our business.

Our commercial success depends upon our ability and the ability of our collaborators to develop, manufacture, market and sell any product candidates we may develop and for our collaborators, customers and partners to use our proprietary technologies without infringing, misappropriating or otherwise violating the intellectual property and proprietary rights of third parties. There is considerable patent and other intellectual property litigation in the software, pharmaceutical, and biotechnology industries. We may become party to, or threatened with, adversarial proceedings or litigation regarding intellectual property rights with respect to our technology and product candidates, including interference proceedings, post grant review, *inter*

partes review, and derivation proceedings before the USPTO and similar proceedings in non-U.S. jurisdictions such as oppositions before the European Patent Office. Numerous U.S. and non-U.S. issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are pursuing development candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our technologies or product candidates that we may identify may be subject to claims of infringement of the patent rights of third parties.

The legal threshold for initiating litigation or contested proceedings is low, so that even lawsuits or proceedings with a low probability of success might be initiated and require significant resources to defend. Litigation and contested proceedings can also be expensive and time-consuming, and our adversaries in these proceedings may have the ability to dedicate substantially greater resources to prosecuting these legal actions than we can. The risks of being involved in such litigation and proceedings may increase if and as any product candidates near commercialization and as we gain the greater visibility associated with being a public company. Third parties may assert infringement claims against us based on existing patents or patents that may be granted in the future, regardless of merit. We may not be aware of all such intellectual property rights potentially relating to our technology and product candidates and their uses, or we may incorrectly conclude that third-party intellectual property is invalid or that our activities and product candidates do not infringe such intellectual property. Thus, we do not know with certainty that our technology and product candidates, or our development and commercialization thereof, do not and will not infringe, misappropriate or otherwise violate any third party's intellectual property.

Third parties may assert that we are employing their proprietary technology without authorization. There may be third-party patents or patent applications with claims to materials, formulations or methods, such as methods of manufacture or methods for treatment, related to the discovery, use or manufacture of the product candidates that we may identify or related to our technologies. Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in issued patents that the product candidates that we may identify may infringe. In addition, third parties may obtain patents in the future and claim that use of our technologies infringes upon these patents. Moreover, as noted above, there may be existing patents that we are not aware of or that we have incorrectly concluded are invalid or not infringed by our activities. If any third-party patents were held by a court of competent jurisdiction to cover, for example, the manufacturing process of the product candidates that we may identify, any molecules formed during the manufacturing process or any final product itself, the holders of any such patents may be able to block our ability to commercialize such product candidate unless we obtained a license under the applicable patents, or until such patents expire.

Parties making claims against us may obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize the product candidates that we may identify. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of employee resources from our business. In the event of a successful claim of infringement against us, we may have to pay

substantial damages, including treble damages and attorneys' fees for willful infringement, pay royalties, redesign our infringing products, be forced to indemnify our customers or collaborators or obtain one or more licenses from third parties, which may be impossible or require substantial time and monetary expenditure.

We may choose to take a license or, if we are found to infringe, misappropriate or otherwise violate a third party's intellectual property rights, we could also be required to obtain a license from such third party to continue developing, manufacturing and marketing our technology and product candidates. However, we may not be able to obtain any required license on commercially reasonable terms or at all. Even if we were able to obtain a license, it could be non-exclusive, thereby giving our competitors and other third parties access to the same technologies licensed to us and could require us to make substantial licensing and royalty payments. We could be forced, including by court order, to cease developing, manufacturing and commercializing the infringing technology or product. A finding of infringement could prevent us from commercializing any product candidates or force us to cease some of our business operations, which could materially harm our business. In addition, we may be forced to redesign any product candidates, seek new regulatory approvals and indemnify third parties pursuant to contractual agreements. Claims that we have misappropriated the confidential information or trade secrets of third parties could have a similar material adverse effect on our business, financial condition, results of operations and prospects.

We may be subject to claims by third parties asserting that our employees, consultants, or contractors have wrongfully used or disclosed confidential information of third parties, or we have wrongfully used or disclosed alleged trade secrets of their current or former employers or claims asserting we have misappropriated their intellectual property, or claiming ownership of what we regard as our own intellectual property.

Certain of our employees, consultants, and contractors were previously employed at universities or other software or biopharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees, consultants and contractors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that these individuals or we have used or disclosed intellectual property, including trade secrets or other proprietary information, of any such individual's current or former employer. Litigation may be necessary to defend against these claims.

In addition, while it is our policy to require that our employees, consultants and contractors who may be involved in the development of intellectual property to execute agreements assigning such intellectual property to us, we may be unsuccessful in executing such an agreement with each party who in fact develops intellectual property that we regard as our own. Our intellectual property assignment agreements with them may not be self-executing or may be breached, and we may be forced to bring claims against third parties, or defend claims they may bring against us, to determine the ownership of what we regard as our intellectual property. Such claims could have a material adverse effect on our business, financial condition, results of operations, and prospects.

If we fail in prosecuting or defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel, which could have a material adverse effect on our competitive business position and prospects. Such intellectual property rights could be awarded to a third party, and we could be required to obtain a license from such third party to commercialize our technology or products, which license may not be available on commercially reasonable terms, or at all, or such license may be non-exclusive. Even if we are successful in prosecuting or defending against such claims, litigation could result in substantial costs and be a distraction to our management and employees.

If we are unable to protect the confidentiality of our trade secrets, our business and competitive position may be harmed.

In addition to seeking patents for any product candidates and technology, we also rely on trade secrets and confidentiality agreements to protect our unpatented know-how, technology, and other proprietary information, to maintain our competitive position. We seek to protect our trade secrets and other proprietary technology, in part, by entering into non-disclosure and confidentiality agreements with parties who have access to them, such as our employees, corporate collaborators, outside scientific collaborators, contract research organizations, contract manufacturers, consultants, advisors, collaborators, and other third parties. We also enter into confidentiality and invention or patent assignment agreements with our employees and consultants, but we cannot guarantee that we have entered into such agreements with each party that may have or has had access to our trade secrets or proprietary technology. Despite these efforts, any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. Detecting the disclosure or misappropriation of a trade secret and enforcing a claim that a party illegally disclosed or misappropriated a trade secret is difficult, expensive, and time-consuming, and the outcome is unpredictable. In addition, some courts inside and outside of the United States are less willing or unwilling to protect trade secrets. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor or other third party, we would have no right to prevent them, or those to whom they communicate it, from using that technology or information to compete with us. If any of our trade secrets were to be disclosed to or independently developed by a competitor or other third party, our competitive position may be materially and adversely harmed.

Risks Related to Regulatory and Other Legal Compliance Matters

Compliance with global privacy and data security requirements could result in additional costs and liabilities to us or inhibit our ability to collect and process data globally, and the failure to comply with such requirements could subject us to significant fines and penalties, which may have a material adverse effect on our business, financial condition, or results of operations.

The regulatory framework for the collection, use, safeguarding, sharing, transfer, and other processing of information worldwide is rapidly evolving and is likely to remain uncertain for the foreseeable future. Globally, virtually every jurisdiction in which we operate has established its own data security and privacy frameworks with which we must comply. For example, the collection, use, disclosure, transfer, or other processing of personal data regarding individuals in the European Union, including personal health data and employee data, is subject to the

European Union General Data Protection Regulation, or the GDPR, which took effect across all member states of the European Economic Area, or EEA, in May 2018. The GDPR is wide-ranging in scope and imposes numerous requirements on companies that process personal data, including requirements relating to processing health and other sensitive data, obtaining consent of the individuals to whom the personal data relates, providing information to individuals regarding data processing activities, implementing safeguards to protect the security and confidentiality of personal data, providing notification of data breaches, and taking certain measures when engaging third-party processors. The GDPR would increase our obligations with respect to any clinical trials conducted in the EEA by expanding the definition of personal data to include coded data and requiring changes to informed consent practices and more detailed notices for clinical trial subjects and investigators. In addition, the GDPR also imposes strict rules on the transfer of personal data to countries outside the European Union, including the United States and, as a result, increases the scrutiny that such rules should apply to transfers of personal data from any clinical trial sites located in the EEA to the United States. The GDPR also permits data protection authorities to require destruction of improperly gathered or used personal information and/or impose substantial fines for violations of the GDPR, which can be up to four percent of global revenues or 20 million Euros, whichever is greater, and confers a private right of action on data subjects and consumer associations to lodge complaints with supervisory authorities, seek judicial remedies, and obtain compensation for damages resulting from violations of the GDPR. In addition, the GDPR provides that European Union member states may make their own further laws and regulations limiting the processing of personal data, including genetic, biometric, or health data.

Given the breadth and depth of changes in data protection obligations, preparing for and complying with the GDPR's requirements is rigorous and time intensive and requires significant resources and a review of our technologies, systems and practices, as well as those of any third-party collaborators, service providers, contractors, or consultants that process or transfer personal data collected in the European Union. The GDPR and other changes in laws or regulations associated with the enhanced protection of certain types of sensitive data, such as healthcare data or other personal information, could require us to change our business practices and put in place additional compliance mechanisms, may interrupt or delay our development, regulatory and commercialization activities and increase our cost of doing business, and could lead to government enforcement actions, private litigation, and significant fines and penalties against us, and could have a material adverse effect on our business, financial condition, or results of operations.

Similar privacy and data security requirements are either in place or underway in the United States. There are a broad variety of data protection laws that may be applicable to our activities, and a range of enforcement agencies at both the state and federal levels that can review companies for privacy and data security concerns. The Federal Trade Commission and state Attorneys General all are aggressive in reviewing privacy and data security protections for consumers. New laws also are being considered at both the state and federal levels. For example, the California Consumer Privacy Act, or CCPA, which went into effect on January 1, 2020, is creating similar risks and obligations as those created by GDPR. Because of this, we may need to engage in additional activities (e.g., data mapping) to identify the personal information we are collecting and the purposes for which such information is collected. In addition, we will need to

ensure that our policies recognize the rights granted to consumers (as that phrase is broadly defined in the CCPA and can include business contact information), including granting consumers the right to opt-out of the sale of their personal information. Many other states are considering similar legislation. A broad range of legislative measures also have been introduced at the federal level. Accordingly, failure to comply with current and any future federal and state laws regarding privacy and security of personal information could expose us to fines and penalties. We also face a threat of consumer class actions related to these laws and the overall protection of personal data. Even if we are not determined to have violated these laws, investigations into these issues typically require the expenditure of significant resources and generate negative publicity, which could harm our reputation and our business.

We, and the collaborators who use our computational platform, may be subject to applicable anti-kickback, fraud and abuse, false claims, transparency, health information privacy and security, and other healthcare laws and regulations. Failure to comply with such laws and regulations, may result in substantial penalties.

We, and the collaborators who use our computational platform, may be subject to broadly applicable healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we market, sell, and distribute our software solutions and any products for which we obtain marketing approval. Such healthcare laws and regulations include, but are not limited to, the federal health care Anti-Kickback Statute; federal civil and criminal false claims laws, such as the federal False Claims Act; the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA; the Federal Food, Drug, and Cosmetic Act, or FDCA; the federal Physician Payments Sunshine Act; and analogous state and foreign laws and regulations, such as state anti-kickback and false claims laws and transparency laws.

Efforts to ensure that our business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices may not comply with current or future statutes, regulations, or case law involving applicable fraud and abuse or other healthcare laws and regulations. Violations of applicable healthcare laws and regulations may result in significant civil, criminal, and administrative penalties, damages, disgorgement, fines, imprisonment, exclusion of products from government funded healthcare programs, such as Medicare and Medicaid, additional reporting requirements, and/or oversight if a corporate integrity agreement or similar agreement is executed to resolve allegations of non-compliance with these laws and the curtailment or restructuring of operations. In addition, violations may also result in reputational harm, diminished profits, and future earnings.

We are subject to anti-corruption laws, as well as export control laws, customs laws, sanctions laws, and other laws governing our operations. If we fail to comply with these laws, we could be subject to civil or criminal penalties, other remedial measures, and legal expenses, be precluded from developing, manufacturing, and selling certain products outside the United States or be required to develop and implement costly compliance programs, which could adversely affect our business, results of operations and financial condition.

Our operations are subject to anti-corruption laws, including the U.K. Bribery Act 2010, or Bribery Act, the U.S. Foreign Corrupt Practices Act, or FCPA, and other anti-corruption laws that apply in countries where we do business and may do business in the future. The Bribery Act, FCPA, and these other laws generally prohibit us, our officers, and our employees and intermediaries from bribing, being bribed, or making other prohibited payments to government officials or other persons to obtain or retain business or gain some other business advantage. Compliance with the FCPA, in particular, is expensive and difficult, particularly in countries in which corruption is a recognized problem. In addition, the FCPA presents particular challenges in the biopharmaceutical industry, because, in many countries, hospitals are operated by the government, and doctors and other hospital employees are considered foreign officials. Certain payments to hospitals in connection with clinical trials and other work have been deemed to be improper payments to government officials and have led to FCPA enforcement actions.

We may in the future operate in jurisdictions that pose a high risk of potential Bribery Act or FCPA violations, and we may participate in collaborations and relationships with third parties whose actions could potentially subject us to liability under the Bribery Act, FCPA, or local anti-corruption laws. In addition, we cannot predict the nature, scope or effect of future regulatory requirements to which our international operations might be subject or the manner in which existing laws might be administered or interpreted. If we further expand our operations outside of the United States, we will need to dedicate additional resources to comply with numerous laws and regulations in each jurisdiction in which we plan to operate.

We are also subject to other laws and regulations governing our international operations, including regulations administered by the governments of the United Kingdom and the United States, and authorities in the European Union, including applicable export control regulations, economic sanctions on countries and persons, customs requirements, and currency exchange regulations, collectively referred to as the Trade Control laws. In addition, various laws, regulations, and executive orders also restrict the use and dissemination outside of the United States, or the sharing with certain non-U.S. nationals, of information classified for national security purposes, as well as certain products and technical data relating to those products. If we expand our presence outside of the United States, it will require us to dedicate additional resources to comply with these laws, and these laws may preclude us from developing, manufacturing, or selling certain products and product candidates outside of the United States, which could limit our growth potential and increase our development costs.

There is no assurance that we will be completely effective in ensuring our compliance with all applicable anti-corruption laws, including the Bribery Act, the FCPA, or other legal requirements, including Trade Control laws. If we are not in compliance with the Bribery Act, the FCPA, and other anti-corruption laws or Trade Control laws, we may be subject to criminal and civil penalties, disgorgement and other sanctions and remedial measures, and legal expenses, which could have an adverse impact on our business, financial condition, results of operations, and liquidity. The U.S. Securities and Exchange Commission, or SEC, also may suspend or bar issuers from trading securities on U.S. exchanges for violations of the FCPA's accounting provisions. Any investigation of any potential violations of the Bribery Act, the FCPA, other anti-corruption laws or Trade Control laws by United Kingdom, U.S., or other authorities could also have an adverse impact on our reputation, our business, results of operations, and financial condition.

Our employees, independent contractors, consultants, and vendors may engage in misconduct or other improper activities, including non-compliance with regulatory standards and requirements and insider trading laws, which could cause significant liability for us and harm our reputation.

We are exposed to the risk of fraud or other misconduct by our employees, independent contractors, consultants, and vendors. Misconduct by these partners could include intentional failures to comply with FDA regulations or similar regulations of comparable foreign regulatory authorities, provide accurate information to the FDA or comparable foreign regulatory authorities, comply with manufacturing standards, comply with federal and state healthcare fraud and abuse laws and regulations and similar laws and regulations established and enforced by comparable foreign regulatory authorities, report financial information or data accurately, or disclose unauthorized activities to us. Employee misconduct could also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions and serious harm to our reputation. This could include violations of HIPAA, other U.S. federal and state law, and requirements of non-U.S. jurisdictions, including the European Union Data Protection Directive. We are also exposed to risks in connection with any insider trading violations by employees or others affiliated with us. It is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws, standards, regulations, guidance, or codes of conduct. Furthermore, our employees may, from time to time, bring lawsuits against us for employment issues, including injury, discrimination, wage and hour disputes, sexual harassment, hostile work environment, or other employment issues. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business and results of operations, including the imposition of significant fines or other sanctions.

Our internal information technology systems, or those of our third-party vendors, contractors, or consultants, may fail or suffer security breaches, loss or leakage of data, and other disruptions, which could result in a material disruption of our services, compromise sensitive information related to our business, or prevent us from accessing critical information, potentially exposing us to liability or otherwise adversely affecting our business.

We are increasingly dependent upon information technology systems, infrastructure, and data to operate our business. In the ordinary course of business, we collect, store, and transmit confidential information (including but not limited to intellectual property, proprietary business information, and personal information). It is critical that we do so in a secure manner to maintain the confidentiality and integrity of such confidential information. We also have outsourced elements of our operations to third parties, and as a result we manage a number of third-party vendors and other contractors and consultants who have access to our confidential information.

Despite the implementation of security measures, given the size and complexity of our internal information technology systems and those of our third-party vendors and other contractors and consultants, and the increasing amounts of confidential information that they maintain, our information technology systems are potentially vulnerable to breakdown or other damage or interruption from service interruptions, system malfunction, natural disasters, terrorism, war, and telecommunication and electrical failures, as well as security breaches from inadvertent or intentional actions by our employees, third-party vendors, contractors, consultants, business partners, and/or other third parties, or from cyber-attacks by malicious third parties (including the deployment of harmful malware, ransomware, denial-of-service attacks, social engineering, and other means to affect service reliability and threaten the confidentiality, integrity, and availability of information), which may compromise our system infrastructure, or that of our third-party vendors and other contractors and consultants or lead to data leakage. The risk of a security breach or disruption, particularly through cyber-attacks or cyber intrusion, including by computer hackers, foreign governments, and cyber terrorists, has generally increased as the number, intensity, and sophistication of attempted attacks and intrusions from around the world have increased. We may not be able to anticipate all types of security threats, and we may not be able to implement preventive measures effective against all such security threats. For example, third parties have in the past and may in the future illegally pirate our software and make that software publicly available on peer-to-peer file sharing networks or otherwise. The techniques used by cyber criminals change frequently, may not be recognized until launched, and can originate from a wide variety of sources, including outside groups such as external service providers, organized crime affiliates, terrorist organizations, or hostile foreign governments or agencies. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or applications, or those of our third-party vendors and other contractors and consultants, or inappropriate disclosure of confidential or proprietary information, we could incur liability and reputational damage and the further development and commercialization of our software could be delayed. The costs related to significant security breaches or disruptions could be material and exceed the limits of the cybersecurity insurance we maintain against such risks. If the information technology systems of our third-party vendors and other contractors and consultants become subject to disruptions or security breaches, we may have insufficient recourse against such third parties and we may have to expend significant resources to mitigate the impact of such an event, and to develop and implement protections to prevent future events of this nature from occurring.

While we have not experienced any such system failure, accident, or security breach to date, and believe that our data protection efforts and our investment in information technology reduce the likelihood of such incidents in the future, we cannot assure you that our data protection efforts and our investment in information technology will prevent significant breakdowns, data leakages, breaches in our systems, or those of our third-party vendors and other contractors and consultants, or other cyber incidents that could have a material adverse effect upon our reputation, business, operations, or financial condition. For example, if such an event were to occur and cause interruptions in our operations, or those of our third-party vendors and other contractors and consultants, it could result in a material disruption of our programs and the development of our services and technologies could be delayed. Furthermore, significant disruptions of our internal information technology systems or those of our third-party vendors and other contractors and consultants, or security breaches could result in the loss, misappropriation, and/or unauthorized access, use, or disclosure of, or the prevention of access to, confidential information (including trade secrets or other intellectual property, proprietary business information, and personal information), which could result in financial, legal, business, and reputational harm to us. For example, any such event that leads to unauthorized access, use, or disclosure of personal information, including personal information regarding our customers or employees, could harm our reputation directly, compel us to comply with federal and/or state breach notification laws and foreign law equivalents, subject us to mandatory corrective action, and otherwise subject us to liability under laws and regulations that protect the privacy and security of personal information, which could result in significant legal and financial exposure and reputational damages that could potentially have an adverse effect on our business. Further, sophisticated cyber attackers (including foreign adversaries engaged in industrial espionage) are skilled at adapting to existing security technology and developing new methods of gaining access to organizations' sensitive business data, which could result in the loss of sensitive information, including trade secrets. Additionally, actual, potential, or anticipated attacks may cause us to incur increasing costs, including costs to deploy additional personnel and protection technologies, train employees, and engage third-party experts and consultants.

Risks Related to Employee Matters and Managing Growth

Our future success depends on our ability to retain key executives and to attract, retain, and motivate qualified personnel.

We are highly dependent on the research and development, clinical, financial, operational, scientific, software engineering, and other business expertise of our executive officers, as well as the other principal members of our management, scientific, clinical, and software engineering teams. Although we have entered into employment agreements with our executive officers, each of them may terminate their employment with us at any time. We do not maintain "key person" insurance for any of our executives or other employees.

The loss of the services of our executive officers or other key employees could impede the achievement of our development and sales goals in our software business and the achievement of our research, development, and commercialization objectives in our drug discovery business. In either case, the loss of the services of our executive officers or other key employees could seriously harm our ability to successfully implement our business strategy. Furthermore,

replacing executive officers and key employees may be difficult and may take an extended period of time because of the limited number of individuals with the breadth of skills and experience required to successfully develop, gain regulatory approval of, and commercialize products in the life sciences industry.

Recruiting and retaining qualified scientific, clinical, manufacturing, accounting, legal, and sales and marketing personnel, as well as software engineers and computational chemists, will also be critical to our success. In the technology industry, there is substantial and continuous competition for engineers with high levels of expertise in designing, developing, and managing software and related services, as well as competition for sales executives, data scientists, and operations personnel. Competition to hire these individuals is intense, and we may be unable to hire, train, retain, or motivate these key personnel on acceptable terms given the competition among numerous biopharmaceutical and technology companies for similar personnel. We also experience competition for the hiring of scientific and clinical personnel from universities and research institutions. In addition, we rely on consultants and advisors to assist us in formulating our research and development and commercialization strategy and advancing our computational platform. Our consultants and advisors may be employed by employers other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us. If we are unable to continue to attract and retain high quality personnel, our ability to pursue our growth strategy will be limited and our business would be adversely affected.

We are pursuing multiple business strategies and expect to expand our development and regulatory capabilities, and as a result, we may encounter difficulties in managing our multiple business units and our growth, which could disrupt our operations.

Currently, we are pursuing multiple business strategies simultaneously, including activities in research and development, software sales, and collaborative and internal drug discovery. We believe pursuing these multiple business strategies offers financial and operational synergies, but these diversified operations place increased demands on our limited resources. Furthermore, we expect to experience significant growth in the number of our employees and the scope of our operations, particularly in the areas of drug development, clinical and regulatory affairs. To manage our multiple business units and anticipated future growth, we must continue to implement and improve our managerial, operational and financial systems, expand our facilities, and continue to recruit and train additional qualified personnel. Due to our limited financial resources and our management team’s limited attention and limited experience in managing a company with such anticipated growth, we may not be able to effectively manage our multiple business units and the expansion of our operations or recruit and train additional qualified personnel. The expansion of our operations may lead to significant costs and may divert our management and business development resources. In addition, in order to meet our obligations as a public company and to support our anticipated long-term growth, we will need to increase our general and administrative capabilities. Our management, personnel, and systems may not be adequate to support this future growth. Any inability to manage our multiple business units and growth could delay the execution of our business plans or disrupt our operations and the synergies we believe currently exist between our business units. In addition, adverse developments in one of these business units may disrupt these synergies.

Risks Related to Ownership of Our Common Stock

An active trading market for our common stock may not develop or be sustained.

Our shares of common stock began trading on the Nasdaq Global Select Market on February 6, 2020. Prior to February 6, 2020, there was no public market for our common stock, and we cannot assure you that an active trading market for our shares will continue to develop or be sustained. As a result, it may be difficult for our stockholders to sell their shares without depressing the market price of our common stock, or at all.

Our executive officers, directors, and principal stockholders, if they choose to act together, have the ability to control all matters submitted to stockholders for approval.

As of March 12, 2020, our executive officers and directors and our stockholders who beneficially owned more than 5% of our outstanding common stock, in the aggregate, beneficially owned shares representing approximately 52.3% of our common stock and all of our limited common stock, or, if the holder of our limited common stock exercised its right to exchange each share of its limited common stock for one share of our common stock, approximately 62.3% of our common stock. As a result, if these stockholders were to choose to act together, they would be able to control all matters submitted to our stockholders for approval, as well as our management and affairs. For example, these persons, if they choose to act together, would control the election of directors and approval of any merger, consolidation, or sale of all or substantially all of our assets.

This concentration of ownership control may:

- delay, defer, or prevent a change in control;
- entrench our management and board of directors; or
- delay or prevent a merger, consolidation, takeover, or other business combination involving us that other stockholders may desire.

This concentration of ownership may also adversely affect the market price of our common stock.

The price of our common stock may be volatile and fluctuate substantially, which could result in substantial losses for our stockholders.

Our stock price is likely to be volatile. Since our initial public offering in February 2020, the intraday price of our common stock has fluctuated from a low of $25.50 to a high of $56.65. As a result of volatility, our stockholders may not be able to sell their common stock at or above the price paid for the shares. The market price for our common stock may be influenced by many factors, including:

- our investment in, and the success of, our software solutions;
- the success of our research and development efforts for our internal drug discovery programs;

- initiation and progress of preclinical studies and clinical trials for any product candidates that we may develop;
- results of or developments in preclinical studies and clinical trials of any product candidates we may develop or those of our competitors or potential collaborators;
- the success of our drug discovery collaborators and any milestone or other payments we receive from such collaborators;
- the success of competitive products or technologies;
- regulatory or legal developments in the United States and other countries;
- the recruitment or departure of key personnel;
- variations in our financial results or the financial results of companies that are perceived to be similar to us;
- sales of common stock by us, our executive officers, directors or principal stockholders, or others, or the anticipation of such sales;
- market conditions in the biopharmaceutical sector;
- general economic, industry, and market conditions; and
- the other factors described in this “Risk Factors” section.

In the past, following periods of volatility in the market price of a company’s securities, securities class-action litigation has often been instituted against that company. Any lawsuit to which we are a party, with or without merit, may result in an unfavorable judgment. We also may decide to settle lawsuits on unfavorable terms. Any such negative outcome could result in payments of substantial damages or fines, damage to our reputation, or adverse changes to our offerings or business practices. Such litigation may also cause us to incur other substantial costs to defend such claims and divert management’s attention and resources.

Our actual operating results may differ significantly from our guidance.

From time to time, we may release guidance in our quarterly earnings conference calls, quarterly earnings releases, or otherwise, regarding our future performance that represents our management’s estimates as of the date of release. This guidance, which would include forward-looking statements, would be based on projections prepared by our management. Neither our registered public accountants nor any other independent expert or outside party would compile or examine the projections. Accordingly, no such person would express any opinion or any other form of assurance with respect to the projections.

Projections are based upon a number of assumptions and estimates that, while presented with numerical specificity, are inherently subject to significant business, economic, and competitive uncertainties and contingencies, many of which are beyond our control and are based upon specific assumptions with respect to future business decisions, some of which will change. The principal reason that we would release guidance is to provide a basis for our management to discuss our business outlook with analysts and investors. We do not accept any responsibility for any projections or reports published by any such third parties.

Guidance is necessarily speculative in nature, and it can be expected that some or all of the assumptions underlying any guidance furnished by us will not materialize or will vary significantly from actual results. Accordingly, our guidance would be only an estimate of what management believes is realizable as of the date of release. Actual results may vary from our guidance and the variations may be material.

We and our collaborators may not achieve projected discovery and development milestones and other anticipated key events in the time frames that we or they announce, which could have an adverse impact on our business and could cause our stock price to decline.

From time to time, we expect that we will make public statements regarding the expected timing of certain milestones and key events, such as the commencement and completion of preclinical and IND-enabling studies in our internal drug discovery programs as well developments and milestones under our collaborations. Morphic has also made public statements regarding its expectations for the development of programs under collaboration with us and they and other collaborators may in the future make additional statements about their goals and expectations for collaborations with us. The actual timing of these events can vary dramatically due to a number of factors such as delays or failures in our or our current and future collaborators' drug discovery and development programs, the amount of time, effort, and resources committed by us and our current and future collaborators, and the numerous uncertainties inherent in the development of drugs. As a result, there can be no assurance that our or our current and future collaborators' programs will advance or be completed in the time frames we or they announce or expect. If we or any collaborators fail to achieve one or more of these milestones or other key events as planned, our business could be materially adversely affected and the price of our common stock could decline.

If securities analysts do not publish or cease publishing research or reports or publish misleading, inaccurate or unfavorable research about our business or if they publish negative evaluations of our stock, the price and trading volume of our stock could decline.

The market price and trading volume for our common stock relies, in part, on the research and reports that industry or financial analysts publish about us or our business. We do not have control over these analysts. There can be no assurance that existing analysts will continue to cover us or that new analysts will begin to cover us. There is also no assurance that any covering analyst will provide favorable coverage. Although we have obtained analyst coverage, if one or more of the analysts covering our business downgrade their evaluations of our stock or publish inaccurate or unfavorable research about our business, or provides more favorable relative recommendations about our competitors, the price of our stock could decline. If one or more of these analysts cease to cover our stock, we could lose visibility in the market for our stock, which in turn could cause our stock price and trading volume to decline.

We have broad discretion in the use of our cash, cash equivalents, and marketable securities and may not use them effectively.

Our management will have broad discretion in the application of our cash, cash equivalents, and marketable securities and could use such funds in ways that do not improve our results of operations or enhance the value of our common stock or in ways that our stockholders may not agree with. The failure by our management to apply these funds effectively could harm our business, financial condition, results of operations, and prospects and could cause the price of our common stock to decline.

Because we do not anticipate paying any cash dividends on our common stock in the foreseeable future, capital appreciation, if any, will be the sole source of gain for our stockholders.

We have never declared or paid cash dividends on our common stock. We currently intend to retain all of our future earnings to fund the development and expansion of our business. Any determination to pay dividends in the future will be at the discretion of our board of directors. As a result, capital appreciation of our common stock, if any, will be the sole source of gain for our stockholders for the foreseeable future.

A significant portion of our total outstanding shares are eligible to be sold into the market in the near future, which could cause the market price of our common stock to drop significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of our common stock, impair our ability to raise capital through the sale of additional equity securities, and make it more difficult for our stockholders to sell their common stock at a time and price that they deem appropriate. As of February 29, 2020, we had outstanding 50,091,685 shares of common stock and 13,164,193 shares of limited common stock. This includes the 13,664,704 shares of common stock that we sold in our initial public offering, which became freely tradeable in the public market without restriction immediately following the offering, unless purchased by our affiliates. The remaining shares of our common stock and shares of our limited common stock are currently restricted as a result of securities laws or lock-up agreements, but will be eligible to be sold in the near future. The representatives of the underwriters for our initial public offering may release some or all of the shares of common stock subject to lock-up agreements at any time in their sole discretion and without notice, which would allow for earlier sales of shares in the public market.

Moreover, beginning in August 2020, certain holders of our common stock and our limited common stock will have rights, subject to specified conditions, to require us to file registration statements covering their shares, or to include their shares in registration statements that we may file for ourselves or other stockholders. We also have filed a registration statement on Form S-8 to register shares of common stock that we may issue under our equity compensation plans. Shares registered under this registration statement on Form S-8 are available for sale in the public market upon issuance, subject to volume limitations applicable to affiliates, vesting arrangements and exercise of options, and the lock-up agreements entered into in connection with our initial public offering.

We are an "emerging growth company" and a "smaller reporting company," and the reduced disclosure requirements applicable to emerging growth companies and smaller reporting companies may make our common stock less attractive to investors.

We are an "emerging growth company," or EGC, as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. We may remain an EGC until December 31, 2025, although if we become a "large accelerated filer" or if we have annual gross revenues of $1.07 billion or more in any fiscal year, we would cease to be an EGC as of December 31 of the applicable year. We also would cease to be an EGC if we issue more than $1.0 billion of non-convertible debt over a three-year period. For so long as we remain an EGC, we are permitted and intend to rely on exemptions from certain disclosure requirements that are applicable to other public companies that are not EGCs. These exemptions include:

- not being required to comply with the auditor attestation requirements in the assessment of our internal control over financial reporting;
- not being required to comply with any requirement that may be adopted by the Public Company Accounting Oversight Board regarding mandatory audit firm rotation or a supplement to the auditor's report providing additional information about the audit and the financial statements;
- reduced disclosure obligations regarding executive compensation; and
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved.

We are also a "smaller reporting company," as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended, or the Exchange Act. We would cease to be a smaller reporting company if we have a public float in excess of $250 million or have annual revenues in excess of $100 million and a public float in excess of $700 million, determined on an annual basis. Similar to emerging growth companies, smaller reporting companies have reduced disclosure obligations, such as an exemption from providing selected financial data and an ability to provide simplified executive compensation information and only two years of audited financial statement in this Annual Report, with correspondingly reduced "Management's Discussion and Analysis of Financial Condition and Results of Operations" disclosure.

We have taken advantage of reduced reporting obligations in this Annual Report. In particular, in this Annual Report we have provided only two years of audited financial statements and have not included all of the executive compensation related information that would be required if we were not an EGC or a smaller reporting company.

We cannot predict whether investors will find our common stock less attractive if we rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile.

In addition, the JOBS Act permits an EGC to take advantage of an extended transition period to comply with new or revised accounting standards applicable to public companies until those standards would otherwise apply to private companies. We have elected to take advantage of such extended transition period, which means that when a standard is issued or revised and it has different application dates for public or private companies, we may adopt the new or revised standard at the time private companies adopt the new or revised standard and may do so until such time that we either irrevocably elect to "opt out" of such extended transition period or no longer qualify as an EGC.

We have incurred and will continue to incur increased costs as a result of operating as a public company, and our management has devoted and will continue to be required to devote substantial time to new compliance initiatives and corporate governance practices.

As a public company, we have incurred and will continue to incur significant legal, accounting, and other expenses that we did not incur as a private company, which we expect to further increase after we are no longer an EGC. The Exchange Act, Sarbanes-Oxley Act of 2002, the Dodd-Frank Wall Street Reform and Consumer Protection Act, the listing requirements of Nasdaq, and other applicable securities rules and regulations impose various requirements on public companies, including establishment and maintenance of effective disclosure and financial controls and corporate governance practices. Our management and other personnel devote and will need to continue to devote a substantial amount of time and resources to these compliance initiatives, potentially at the expense of other business concerns, which could harm our business, financial condition, results of operations, and prospects. Moreover, these rules and regulations will increase our legal and financial compliance costs, and will make some activities more time-consuming and costly compared to when we were a private company.

We are evaluating these rules and regulations, and cannot predict or estimate the amount of additional costs we may incur or the timing of such costs. These rules and regulations are often subject to varying interpretations, in many cases due to their lack of specificity, and, as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. This could result in continuing uncertainty regarding compliance matters and higher costs necessitated by ongoing revisions to disclosure and governance practices.

If we fail to establish and maintain effective internal controls, we may be unable to produce timely and accurate financial statements, and we may conclude that our internal control over financial reporting is not effective, which could adversely impact our investors' confidence and our stock price.

As a private company, we had limited accounting and financial reporting personnel and other resources with which to address our internal controls and related procedures. In connection with the audit of our consolidated financial statements for the years ended December 31, 2017 and 2018, we and our independent registered public accounting firm identified a material weakness in our internal control over financial reporting. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of our annual or interim financial statements will not be prevented or detected on a timely basis. The material weakness related to our controls

to review equity method investee financial information at a level of precision that would identify material misstatements in our financial statements, which was due to a deficiency in the design of entity-level controls. As a result of the material weakness, we failed to timely detect and correct a $3.4 million undervaluation of an equity method investment. The accompanying financial statements for 2018 were previously corrected to reflect the impact of this adjustment.

We have implemented measures designed to improve our internal control over financial reporting to remediate the material weakness. For example, we have increased communication with our equity investee companies to ensure timely receipt of relevant financial information; we have instructed our material investees to provide quarterly U.S. GAAP financial statements; and we have implemented completeness and accuracy controls surrounding the financial data received from investees.

We cannot assure you that the measures we have taken to date, together with any measures we may take in the future, will be sufficient to avoid potential future material weaknesses. In addition, neither our management nor an independent registered public accounting firm has ever performed an evaluation of our internal control over financial reporting in accordance with the provisions of the Sarbanes-Oxley Act because no such evaluation has been required. Had we or our independent registered public accounting firm performed an evaluation of our internal control over financial reporting in accordance with the provisions of the Sarbanes-Oxley Act, additional material weaknesses may have been identified. If we are unable to successfully remediate any future material weakness in our internal control over financial reporting, or if we identify any additional material weakness, the accuracy and timing of our financial reporting may be adversely affected, we may be unable to maintain compliance with securities law requirements regarding timely filing of periodic reports in addition to applicable stock exchange listing requirements, investors may lose confidence in our financial reporting, and our stock price may decline as a result. We also could become subject to investigations by Nasdaq, the SEC, or other regulatory authorities.

As a result of becoming a public company, we will be obligated to develop and maintain proper and effective internal controls over financial reporting. Any failure to maintain the adequacy of these internal controls may adversely affect investor confidence in our company and, as a result, the value of our common stock.

Pursuant to Section 404 of the Sarbanes-Oxley Act, we will be required to furnish a report by our management on our internal control over financial reporting beginning with our filing of an Annual Report on Form 10-K with the SEC for the year ended December 31, 2020. This assessment will need to include disclosure of any material weaknesses identified by our management in our internal control over financial reporting. However, our independent registered public accounting firm will not be required to attest to the effectiveness of our internal control over financial reporting until our first annual report required to be filed with the SEC following the date we are no longer an EGC. At such time as we are required to obtain auditor attestation, if we then have a material weakness, we would receive an adverse opinion regarding our internal control over financial reporting from our independent registered accounting firm.

To achieve compliance with Section 404 within the prescribed period, we will be engaged in a process to document and evaluate our internal control over financial reporting, which is both costly and challenging. In this regard, we will need to continue to dedicate internal resources, including through hiring additional financial and accounting personnel, potentially engage outside consultants and adopt a detailed work plan to assess and document the adequacy of internal control over financial reporting, continue steps to improve control processes as appropriate, validate through testing that controls are functioning as documented, and implement a continuous reporting and improvement process for internal control over financial reporting. During our evaluation of our internal control, if we identify one or more material weaknesses in our internal control over financial reporting, we will be unable to assert that our internal control over financial reporting is effective. We cannot assure you that there will not be material weaknesses or significant deficiencies in our internal control over financial reporting in the future. Any failure to maintain internal control over financial reporting could severely inhibit our ability to accurately report our financial condition, or results of operations. If we are unable to conclude that our internal control over financial reporting is effective, or if our independent registered public accounting firm determines we have a material weakness or significant deficiency in our internal control over financial reporting, we could lose investor confidence in the accuracy and completeness of our financial reports, the market price of shares of our common stock could decline, and we could be subject to sanctions or investigations by Nasdaq, the SEC, or other regulatory authorities. Failure to remedy any material weakness in our internal control over financial reporting, or to implement or maintain other effective control systems required of public companies, could also restrict our future access to the capital markets.

Our disclosure controls and procedures may not prevent or detect all errors or acts of fraud.

As a public company, we are subject to certain reporting requirements of the Exchange Act. Our disclosure controls and procedures are designed to reasonably assure that information required to be disclosed by us in reports we file or submit under the Exchange Act is accumulated and communicated to management, recorded, processed, summarized, and reported within the time periods specified in the rules and forms of the SEC. We believe that any disclosure controls and procedures or internal controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by an unauthorized override of the controls. Accordingly, because of the inherent limitations in our control system, misstatements or insufficient disclosures due to error or fraud may occur and not be detected.

Provisions in our corporate charter documents and under Delaware law could make an acquisition of our company, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current directors and members of management.

Provisions in our certificate of incorporation and our bylaws may discourage, delay, or prevent a merger, acquisition, or other change in control of our company that stockholders may consider favorable, including transactions in which stockholders might otherwise receive a premium for their shares. These provisions could also limit the price that investors might be willing to pay in the future for shares of our common stock, thereby depressing the market price of our common stock. In addition, because our board of directors is responsible for appointing the members of our management team, 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. Among other things, these provisions:

- establish a classified board of directors such that only one of three classes of directors is elected each year;
- allow the authorized number of our directors to be changed only by resolution of our board of directors;
- limit the manner in which stockholders can remove directors from our board of directors;
- establish advance notice requirements for stockholder proposals that can be acted on at stockholder meetings and nominations to our board of directors;
- require that stockholder actions must be effected at a duly called stockholder meeting and prohibit actions by our stockholders by written consent, except in limited circumstances;
- limit who may call stockholder meetings to the board of directors or to the secretary at the request of the holders of at least 25% of the outstanding shares of our common stock and limited common stock; and
- authorize our board of directors to issue preferred stock without stockholder approval, which could be used to institute a “poison pill” that would work to dilute the stock ownership of a potential hostile acquirer, effectively preventing acquisitions that have not been approved by our board of directors.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, or the DGCL, which prohibits a person who owns in excess of 15% of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner.

Our certificate of incorporation designates the state courts in the State of Delaware as the sole and exclusive forum for certain types of actions and proceedings that may be initiated by our stockholders, which could discourage lawsuits against the company and our directors, officers, and employees.

Our certificate of incorporation provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware (or, if the Court of Chancery of the State of Delaware does not have jurisdiction, the federal district court for the District of Delaware) will be the sole and exclusive forum for: (1) any derivative action or proceeding brought on our behalf, (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers, employees or stockholders to our company or our stockholders, (3) any action asserting a claim arising pursuant to any provision of the DGCL or as to which the DGCL confers jurisdiction on the Court of Chancery of the State of Delaware or (4) any action asserting a claim arising pursuant to any provision of our certificate of incorporation or bylaws (in each case, as they may be amended from time to time) or governed by the internal affairs doctrine. These choice of forum provisions will not apply to suits brought to enforce a duty or liability created by the Securities Act of 1933, as amended, the Exchange Act or any other claim for which federal courts have exclusive jurisdiction.

This exclusive forum provision may limit the ability of our stockholders to bring a claim in a judicial forum that such stockholders find favorable for disputes with us or our directors, officers, or employees, which may discourage such lawsuits against us and our directors, officers, and employees. Alternatively, if a court were to find the choice of forum provision contained in our certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could materially adversely affect our business, financial condition, and operating results.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Our principal facilities consist of office space. We occupy approximately 63,000 square feet of office space in New York, New York under a lease that currently expires in August 2021. We also occupy approximately 26,000 square feet of office space in Portland, Oregon under a lease that currently expires in August 2026, and we lease additional office space at our other office locations around the world. We believe our facilities are adequate and suitable for our current needs and that should it be needed, suitable additional or alternative space will be available to accommodate our operations.

Item 3. Legal Proceedings.

From time to time, we may become involved in legal proceedings arising in the ordinary course of our business. We are not currently subject to any material legal proceedings.

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

Market Information

Our common stock has been publicly traded on the Nasdaq Global Select Market under the symbol "SDGR" since February 6, 2020. Prior to that date, there was no public market for our common stock. Our limited common stock is not listed or traded on any stock exchange.

Holders of Record

As of March 12, 2020, there were approximately 307 holders of record of our common stock and one holder of record of our limited common stock. The actual number of stockholders is greater than this number of holders of record and includes stockholders who are beneficial owners but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

Dividends

We have never declared or paid cash dividends on our common stock or our limited common stock. We currently intend to retain all available funds and any future earnings to fund the development and expansion of our business and we do not anticipate paying any cash dividends in the foreseeable future. Any future determination to declare and pay dividends will be made at the discretion of our board of directors and will depend on then-existing conditions, including our results of operations, financial condition, contractual restrictions, capital requirements, business prospects, and other factors our board of directors may deem relevant.

Securities Authorized for Issuance Under Equity Compensation Plans

The information required by this item is set forth in "Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters" and is incorporated herein by reference.

Use of Proceeds

On February 5, 2020, our registration statement on Form S-1, as amended (File No. 333-235890) was declared effective by the SEC in connection with our initial public offering of common stock, pursuant to which we issued and sold on February 10, 2020, 13,664,704 shares of our common stock at a public offering price of $17.00 per share, including 1,782,352 additional shares of common stock issued upon the full exercise by the underwriters of their option to purchase additional shares, for total gross proceeds of $232.3 million.

On February 10, 2020, we received net proceeds of $209.9 million, after deducting $16.3 million in underwriting discounts and commissions and $6.1 million in estimated offering expenses borne by us. None of the underwriting discounts and commissions or offering expenses incurred by us were direct or indirect payments to any of (i) our officers or directors or their associates, (ii) persons owning 10% or more of our common stock or our limited common stock, or (iii) our affiliates.

The joint book-running managers of our initial public offering were Morgan Stanley & Co. LLC, BofA Securities, Inc., Jefferies LLC, and BMO Capital Markets Corp. The offering commenced on February 5, 2020 and did not terminate until the sale of all of the shares offered.

There has been no material change in the planned use of proceeds from our initial public offering from that described in the final prospectus related to the offering, dated February 5, 2020, as filed with the SEC on February 6, 2020.

Recent Sales of Unregistered Securities

Set forth below is information regarding shares of our preferred stock and stock options granted by us during the year ended December 31, 2019 that were not registered under the Securities Act of 1933, as amended, or the Securities Act, and that have not been otherwise described in a Quarterly Report on Form 10-Q or a Current Report on Form 8-K.

The following share numbers have been adjusted, as appropriate, to reflect the one-for-7.47534 reverse stock split of our common stock that became effective on January 24, 2020, which also resulted in a proportional adjustment to the ratios at which our outstanding shares of preferred stock converted into common stock. Our shares of preferred stock converted into shares of common stock upon the closing of our initial public offering on February 10, 2020, at the as-adjusted conversion ratios.

Issuances of Preferred Stock

On January 4, 2019, we issued and sold 3,354,353 shares of our Series E preferred stock to one investor at a price per share of $1.4906 in cash, for an aggregate purchase price of $4,999,998.59.

On April 8, 2019, we issued and sold 3,689,788 shares of our Series E preferred stock to two investors at a price per share of $1.4906 in cash, for an aggregate purchase price of $5,499,998.01.

On April 26, 2019, we issued and sold 8,268,481 shares of our Series E preferred stock to three investors at a price per share of $1.4906 in cash, for an aggregate purchase price of $12,324,997.79.

On May 6, 2019, we issued and sold 3,354,353 shares of our Series E preferred stock to one investor at a price per share of $1.4906 in cash, for an aggregate purchase price of $4,999,998.59.

On May 14, 2019, we issued and sold 1,459,143 shares of our Series E preferred stock to one investor at a price per share of $1.4906 in cash, for an aggregate purchase price of $2,174,998.56.

No underwriters were involved in the foregoing issuances of securities. The securities described in this section were issued to investors in reliance upon the exemption from the registration requirements of the Securities Act, as set forth in Section 4(a)(2) under the Securities Act and, in certain cases, Regulation D thereunder, relative to transactions by an issuer not involving any public offering, to the extent an exemption from such registration was required. All purchasers received written disclosures that the securities had not been registered under the Securities Act and that any resale must be made pursuant to a registration statement or an available exemption from such registration.

Stock Option Grants and Exercises

Between January 1, 2019 and December 31, 2019, we granted options to purchase an aggregate of 1,255,242 shares of common stock, with exercise prices ranging from $4.34 to $11.52 per share, to our employees, directors, advisors and consultants pursuant to our 2010 Stock Plan. Between January 1, 2019 and December 31, 2019, we issued 214,845 shares of our common stock to our employees, directors, advisors and consultants upon the exercise of stock options outstanding under our 2010 Stock Plan for aggregate consideration of $549,648.

The stock options and the shares of common stock issued upon the exercise of stock options described in this section were issued pursuant to written compensatory plans or arrangements with our employees, directors, advisors, and consultants, in reliance on the exemption provided by Rule 701 promulgated under the Securities Act, or pursuant to Section 4(a)(2) under the Securities Act, relative to transactions by an issuer not involving any public offering, to the extent an exemption from such registration was required. All recipients either received adequate information about our company or had access, through employment or other relationships, to such information.

Issuer Purchases of Equity Securities

Not applicable.

Item 6. Selected Financial Data.

You should read the following selected consolidated financial data together with our consolidated financial statements and the related notes, "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" and other financial information included in this Annual Report. We have derived the consolidated statement of operations data for the years ended December 31, 2018 and 2019 and the consolidated balance sheet data as of December 31, 2018 and 2019 from our audited consolidated financial statements, which are included elsewhere in this Annual Report. The consolidated statement of operations data for the year ended December 31, 2017 and the selected consolidated balance sheet data as of December 31, 2017 is derived from our audited consolidated financial statements not included in this Annual Report. Our historical results are not necessarily indicative of results that should be expected in any future period.

	Year Ended December 31,		
	2017	2018	2019
	(in thousands, except share and per share data)		
Consolidated Statements of Operations Data:			
Revenues:			
Software products and services	$ 50,841	$ 59,885	$ 66,735
Drug discovery	4,852	6,754	18,808
Total revenues	55,693	66,639	85,543
Cost of revenues:			
Software products and services	7,843	10,687	13,646
Drug discovery	8,050	13,015	22,804
Total cost of revenues	15,893	23,702	36,450
Gross profit	39,800	42,937	49,093
Operating expenses:			
Research and development	27,669	34,523	39,404
Sales and marketing	16,716	17,831	21,364
General and administrative	14,436	18,552	27,040
Total operating expenses	58,821	70,906	87,808
Loss from operations	(19,021)	(27,969)	(38,715)
Other income (expense):			
Gain on equity investment	3,243	—	943
Change in fair value	(1,641)	(812)	9,922
Interest income	359	433	1,878
Total other income (expense)	1,961	(379)	12,743
Loss before income taxes	(17,060)	(28,348)	(25,972)
Income tax expense (benefit)	332	77	(291)
Net loss	(17,392)	(28,425)	(25,681)
Net loss attributable to noncontrolling interest	—	—	(1,110)
Net loss attributable to Schrödinger stockholders	$ (17,392)	$ (28,425)	$ (24,571)
Net loss per share attributable to Schrödinger common stockholders, basic and diluted	$ (3.77)	$ (4.93)	$ (4.09)
Weighted average common shares used to compute net loss per share attributable to common stockholders, basic and diluted(1)	4,608,307	5,771,305	6,004,500

(1) Reflects the one-for-7.47534 reverse stock split of our common stock that became effective on January 24, 2020. Refer to Note 16 to the Consolidated Financial Statements of this Annual Report.

	December 31, 2017	December 31, 2018	December 31, 2019
		(in thousands)	
Consolidated Balance Sheet Data			
Cash, cash equivalents, marketable securities, and restricted cash	$ 36,343	$ 84,067	$ 86,330
Working capital(2)	30,236	77,685	73,516
Total assets	58,022	120,730	155,270
Deferred revenue, current and long-term	13,750	20,730	27,259
Convertible preferred stock	82,310	161,687	191,580
Total stockholders' deficit	(45,362)	(71,560)	(93,323)

(2) Working capital is current assets less current liabilities.

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 related notes appearing elsewhere in this Annual Report. Some of the information contained in this discussion and analysis or set forth elsewhere in this Annual Report, including information with respect to our plans and strategy for our business and related financing, includes forward-looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in "Item 1A. Risk Factors" of this Annual Report, our actual results could differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Overview

We are transforming the way therapeutics and materials are discovered. Our differentiated, physics-based software platform enables discovery of high-quality, novel molecules for drug development and materials applications more rapidly, at lower cost, and with, we believe, a higher likelihood of success compared to traditional methods. Our software is used by biopharmaceutical and industrial companies, academic institutions, and government laboratories around the world, and we are the leading provider of computational software solutions for drug discovery. We also apply our computational platform to a broad pipeline of drug discovery programs in collaboration with biopharmaceutical companies, some of which we co-founded. In addition, we are using our platform to advance a pipeline of internal, wholly-owned drug discovery programs.

Since our founding, we have been primarily focused on developing our computational platform, which is capable of predicting critical properties of molecules with a high degree of accuracy. We have devoted substantially all of our resources to introducing new capabilities and refining our software, conducting research and development activities, recruiting skilled personnel, and providing general and administrative support for these operations.

We are using our computational platform in both collaborative and wholly-owned drug discovery programs. Over the last decade, we have entered into a number of collaborations with biopharmaceutical companies that have provided us with significant income and have the potential to produce additional milestone payments, option fees, and future royalties. Furthermore, since mid-2018, we have launched five internal, wholly-owned programs.

We generate revenues from sales of our software solutions and from research funding and milestone payments from our drug discovery collaborations, which we have used to support our research and development and other operating expenses. In addition, since inception we have raised gross proceeds of $192.6 million from sales of our convertible preferred stock as well as amounts received from our equity investment in Nimbus Therapeutics, LLC, or Nimbus, which we co-founded in 2009. In late 2018 and early 2019, we issued and sold an aggregate of 73,795,777 shares of Series E convertible preferred stock at $1.4906 per share, for $110.0 million in gross proceeds. In 2016, Nimbus sold its Acetyl-CoA carboxylase, or ACC, inhibitor, firsocostat, to Gilead Sciences, Inc., or Gilead Sciences, in a transaction valued at approximately $1.2 billion, comprised of an upfront payment and earn outs that are tied to the

achievement of specified development and regulatory milestones. Of this amount, $601.3 million has been paid to Nimbus to date, and we received a total of $46.0 million in cash distributions in 2016 and 2017. We are eligible to receive up to $46 million in future cash distributions on the remaining approximately $600 million of earn outs, if and when such earn outs are achieved. However, the likelihood and timing of such payments, if any, are not possible for us to predict as the achievement of the development and regulatory milestones under the transaction agreement is uncertain and outside of our control. In December 2019, Gilead Sciences announced topline results from its Phase 2 clinical trial which included firsocostat, both as a monotherapy and in combination with other investigational therapies, in which the primary endpoint was not met. Gilead Sciences announced that it was continuing to analyze the data from the trial and determine next steps. We do not know how this development will affect Nimbus' right to receive future earnout payments from Gilead Sciences or our right to receive cash distributions from Nimbus. However, if Gilead Sciences determined not to continue to advance the development of firsocostat, then we would not expect to receive any additional distributions from Nimbus on account of this program. Additionally, even if Nimbus were to receive any further earnout payments from Gilead Sciences, any distribution to us as an investor in Nimbus would need to be approved by the board of directors of Nimbus.

On February 10, 2020, we closed our initial public offering of our common stock, in which we sold 13,664,704 shares of common stock at a public offering price of $17.00 per share, resulting in net proceeds to us of $209.9 million, after deducting underwriting discounts and commissions and offering expenses borne by us.

We currently conduct our operations through two reportable segments: software and drug discovery. The software segment is focused on selling our software to transform drug discovery across the life sciences industry, as well as to customers in materials science industries. The drug discovery segment is focused on generating revenue from a diverse portfolio of preclinical and clinical programs, internally and through collaborations, that have advanced to various stages of discovery and development.

Our software segment generates revenue from software product licenses, hosted software subscriptions, software maintenance, and professional services. The revenue we generate through our software solutions from each of our customers varies largely depending on the number of software licenses our customers purchase from us. The licenses that our customers purchase from us provide them the ability to perform a certain number of calculations used in the design of molecules for drug discovery or materials science. We deliver our software through either (i) a product license that permits our customers to install the software solution directly on their own in-house hardware and use it for a specified term, or (ii) a subscription that allows our customers to access the cloud-based software solution for a specified term.

We currently generate drug discovery revenue from our collaborations, including research funding payments and discovery and development milestones. In the future, we may also derive drug discovery revenue from our collaborations from option fees, the achievement of commercial milestones, and royalties on commercial drug sales. In addition to revenue from our collaborations, in the future we may also derive drug discovery revenue from out-licensing our internal drug discovery programs when we believe it will help maximize the commercial potential of the program.

We generated revenue of $66.6 million and $85.5 million in 2018 and 2019, respectively, representing year-over-year growth of 28%. Our net loss was $28.4 million and $24.6 million for the years ended December 31, 2018 and 2019, respectively.

Key Factors Affecting Our Performance

Ability to drive additional revenue from our software solutions from existing customers

Our large existing base of customers represents a significant opportunity for us to expand our revenue through increased utilization of our software. The revenue that we generate through our software solutions from each of our customers varies depending on the number of licenses for each software solution that each customer purchases from us. Accordingly, we work with our customers to improve their experience and increase the utility of our platform in order to expand the scale at which they deploy our platform in their business. Biopharmaceutical companies are increasingly adopting our software at a larger scale, and we anticipate that this scaling-up will drive future revenue growth. Our ability to expand within our customer base is best demonstrated by the increasing number of our customers with an annual contract value, or ACV, of over $100,000. We had 103, 122, and 131 of these customers for the years ended December 31, 2017, 2018, and 2019, respectively. This subset of customers represented approximately 75%, 77%, and 78% of our total ACV for the years ended December 31, 2017, 2018, and 2019, respectively. In addition, we had nine, 11, and 10 customers with an ACV of over $1.0 million for the years ended December 31, 2017, 2018, and 2019, respectively.

With respect to contracts that have a duration of one year or less, or contracts of more than one year in duration that are billed annually, we define ACV as the contract value billed during the applicable period. For contracts with a duration of more than one year that are billed upfront, ACV in each period represents the total billed contract value divided by the term. ACV should be viewed independently of revenue and does not represent revenue calculated in accordance with generally accepted accounting principles in the United States, or U.S. GAAP, on an annualized basis, as it is an operating metric that can be impacted by contract execution start and end dates and renewal rates. ACV is not intended to be a replacement for, or forecast of, revenue.

Furthermore, another important driver of our ability to expand our customer relationships is the retention of our customers with an ACV over $100,000. For the year ended December 31, 2019 and for each of the previous six fiscal years, our year-over-year customer retention for such customers was 96% or higher. We calculate year-over-year customer retention for our customers with an ACV over $100,000 by starting with the number of such customers we had in the previous fiscal year. We then calculate how many of these customers were active customers in the current fiscal year. We then divide this number by the number of customers with an ACV over $100,000 we had in the previous fiscal year to arrive at the year-over-year customer retention rate for such customers. We intend to leverage our existing relationships with our customers to drive larger-scale adoption of our software solutions. If we are unable to continue to increase revenue from existing customers, our financial performance will be adversely impacted.

Ability to increase our customer base for our software solutions

We believe that we have significant opportunity to continue to increase the number of customers who use our solutions. We had 1,042, 1,150, and 1,266 active customers for the years ended December 31, 2017, 2018, and 2019, respectively. We define the number of active customers as the number of customers who had an ACV of at least $1,000 in the fiscal year. We use $1,000 as a threshold for defining our active customers as this amount will generally exclude customers who only license our PyMOL software, which is our open-source molecular visualization system broadly available at low cost.

While we have significantly penetrated the pharmaceutical industry, with all of the top 20 pharmaceutical companies, measured by 2018 revenue, licensing our software in 2019, our strategy is to grow our customer base. We believe there remains a large opportunity for growth as there are thousands of biopharmaceutical companies that could benefit from our solutions. Additionally, since the physics underlying the properties of drug molecules and materials is the same, we have been able to extend our computational platform to materials science applications in fields such as aerospace, energy, semiconductors, and electronic displays. We sell our software solutions to a growing number of materials science customers, and we believe the materials science industry is only beginning to recognize the potential of computational methods. We continue to promote the education and recognition of our computational platform across industries. As part of our strategy, we have driven the adoption of our software by researchers, and we had more than 1,350 academic institutions across the world using our software in 2019. We believe that by introducing the benefits of our computational software at the academic stage, we will drive brand awareness and expand the use of our platform to industries that have historically relied on traditional methods for discovery of molecules. Our ability to continue to grow our customer base is dependent upon our ability to educate the market and support the business through investment in our sales and marketing efforts and the ongoing enhancement of our software solutions.

Advancement of our collaborations

We have entered into a number of collaborations with various biopharmaceutical companies, some of which we have co-founded, to advance drug discovery. We will seek to enter into additional collaboration agreements, driven by the synergies we expect to achieve between our platform and the capabilities and expertise of our potential collaborators. We believe that our collaborations will be a significant driver of value for us in the form of equity stakes, research fees, pre-clinical, clinical, and commercial milestone payments, and option fees, as well as royalties on any potential future sales of products, if approved. We continue to work with our current collaborators to advance existing programs through discovery research stages and initiate additional programs. However, we do not generally exercise control over the development programs of our collaborators and often rely on decisions of the management of such companies with respect to clinical development and commercialization. Our ability to continue to derive value from our collaborations will be driven by both our capability to make progress in these programs as well as whether our collaborators successfully advance such programs beyond the discovery stage.

Ability to develop and expand our internal proprietary drug discovery pipeline

We are advancing our pipeline of internal drug discovery programs through extensive application of our software platform. Since launching our first program in mid-2018, we have built a pipeline of five programs. We intend to progress our wholly-owned programs through the development candidate stage and potentially into investigational new drug-enabling studies and clinical development. As we progress these programs, we will strategically evaluate on a program-by-program basis entering into clinical development ourselves or out-licensing programs to maximize commercial opportunities. However, we will need to devote substantial resources to develop and expand our internal pipeline. Our ability to advance and build value in our internal drug discovery programs will impact our financial performance, especially as we increasingly shift our focus to these programs.

Components of Results of Operations

Software Products and Services Revenue

Our software business generates revenue from four sources: (i) on-premise software license fees, (ii) hosted software subscription fees, (iii) software maintenance fees, and (iv) professional services fees.

On-premise software. Our on-premise software license arrangements grant customers the right to use our software on their own in-house servers for a specified term, typically for one year. We recognize revenue for on-premise software license fees upfront, either upon delivery of the license or the effective date of the agreement, whichever is later

Hosted software. Hosted software revenue consists primarily of fees to provide our customers with access to our hosted software platform and is recognized ratably over the term of the arrangement, which is typically one year. When a customer enters into a hosted arrangement for which revenue is recognized over time, the amount paid upfront that is not recognized in the current period is included in deferred revenue in our statement of financial position until the period in which it is recognized.

Software maintenance. Software maintenance includes technical support, updates, and upgrades related to our on-premise software licenses. Software maintenance revenue is recognized ratably over the term of the arrangement. Software maintenance activities are performed in connection with the use of our on-premise software, and may fluctuate from period to period.

Professional services. Professional services, such as technical setup or installation or modeling services, where we use our software to perform tasks such as virtual screening and homology modeling on behalf of our customers, generally are not related to the functionality of our software and are recognized as revenue when resources are consumed. Since each professional services agreement represents a unique, ad hoc engagement, professional services revenue may fluctuate from period to period.

Drug Discovery Revenue

We currently generate drug discovery revenue from discovery collaboration arrangements, including research funding payments and discovery and development milestones. We expect our drug discovery revenue to trend higher over time as these collaboration arrangements advance and we receive additional revenue from research funding payments, the achievement of discovery, development, and commercial milestones, option fees, and royalties on commercial drug sales. The majority of our current collaborations are in the discovery stage. Milestone payments typically increase in magnitude as a program advances. In addition to revenue from our collaborations, in the future we may also derive drug discovery revenue from out-licensing our internal drug discovery programs when we believe it will help maximize the commercial potential of the program. However, we expect that our revenue will fluctuate from period to period due to the inherently uncertain nature of the timing of milestone achievement and our dependence on the program decisions of our collaborators.

Cost of Revenues

Software products and services. Cost of revenues for software includes personnel-related expenses (comprised of salaries, benefits, and stock-based compensation) for employees directly involved in the delivery of software solutions, maintenance and professional services, royalties paid for products sold and services performed using third-party licensed software functionality, and allocated overhead (facilities and information technology support) costs. Pursuant to various third party arrangements, we license technology that is used in our software. These arrangements require us to pay royalties based on sales volume, and such royalty payments represented 7.6% and 6.4% of software revenues in the years ended December 31, 2018 and 2019, respectively.

Drug discovery. Costs of revenue for drug discovery includes personnel-related expenses and costs of third-party contract research organizations, or CROs, that support discovery activities in our collaborations, royalties paid for services performed using third-party licensed software functionality, and allocated compute capacity and overhead costs. Currently, we have only one collaboration that involves payment of CRO costs. While we have incurred costs associated with discovery efforts for this collaboration since late 2017, we have recognized and expect to continue to recognize revenues in the future if and when milestones are achieved. Generally, drug discovery costs of revenue for collaborations are incurred in advance of the revenue milestone achievement.

Royalty payments to third parties represented 5.1% and 6.7% of drug discovery revenues in the years ended December 31, 2018 and 2019, respectively. We expect our drug discovery costs of revenue to trend higher over time as our discovery collaborations advance. Personnel-related expenses for our internal discovery programs are classified within research and development expense.

Gross Profit and Gross Margin

Gross profit represents revenue less cost of revenues. Gross margin is gross profit expressed as a percentage of revenue. Our software products and services gross margin may fluctuate from period to period as our revenue fluctuates, and as a result of changes in sales mix between on-premise and hosted software solutions. For example, the cost of royalties due for sales of our hosted software arrangements are recognized upfront, whereas the associated revenue is recognized over the term of the underlying agreement. Currently, gross margin is not meaningful for measuring the operating results of our drug discovery business.

Research and Development Expense

Research and development expense accounts for a significant portion of our operating expenses. We recognize research and development expenses as incurred. Research and development expenses consist of internal drug discovery program costs and costs incurred for continuous development of the technology and science that supports our computational platform, primarily:

- personnel-related expenses, including salaries, benefits, bonuses, and stock-based compensation for employees engaged in research and development functions;
- expenses incurred under agreements with third-party CROs and consultants involved in our internal discovery programs; and
- allocated compute capacity and overhead (facilities and information technology support) costs.

We expect our research and development expense to increase substantially in absolute dollars for the foreseeable future as we continue to invest in activities related to discovery and development of our internal target candidates, in advancing our platform, and as we incur expenses associated with hiring additional personnel directly involved in such efforts. At this time, we do not know, nor can we reasonably estimate, the nature, timing, or costs of the efforts that will be necessary to complete the development of any of our internal drug discovery programs. Since our internal drug discovery efforts are at a very early stage, currently we do not track research and development expense on a program-by-program basis.

Sales and Marketing Expense

Sales and marketing expense consists primarily of personnel-related costs for our sales and marketing staff and application scientists supporting our sales efforts, including salaries, benefits, bonuses, and stock-based compensation. Other sales and marketing costs include promotional events that promote and expand knowledge of our company and platform, including industry conferences and events and our annual user group meetings in the United States and Europe, advertising, and allocated overhead costs. Most operating costs of our sales offices in Europe and Japan are included in sales and marketing expense. Due to the inherent scientific complexity of our software solutions, a high level of scientific expertise is needed to support our sales and marketing efforts. We plan to increase our investment in sales and marketing over the foreseeable future to foster the growth of our business as we aim to expand software sales to existing customers and increase our customer base.

General and Administrative Expense

General and administrative expense consists of personnel-related expenses associated with our executive, legal, finance, human resources, information technology, and other administrative functions, including salaries, benefits, bonuses, and stock-based compensation. General and administrative expense also includes professional fees for external legal, accounting and other consulting services, allocated overhead costs, and other general operating expenses.

We expect to increase the size of our general and administrative staff to support the anticipated growth of our business. We expect to incur additional expenses as a result of operating as a public company, including costs to comply with the rules and regulations applicable to companies listed on a U.S. securities exchange and costs related to compliance and reporting obligations pursuant to the rules and regulations of the Securities and Exchange Commission, or SEC. In addition, as a public company, we expect to incur increased expenses such as insurance and professional services. As a result, we expect the dollar amount of our general and administrative expense to increase for the foreseeable future.

Gain on Equity Investments

Gain on equity investments consists of realized gains in the form of cash distributions received from our equity investments.

Change in Fair Value

Fair value gains and losses consist of adjustments to the fair values of our equity investments, including Nimbus and Morphic Holding, Inc., or Morphic. In June 2019, Morphic became a publicly traded company and, as such, fair value is determined as the current market value of Morphic common stock as of the reporting date. We remeasure our holding in Morphic at each period end. Prior to Morphic's initial public offering, fair value changes for our Morphic investment were determined under the hypothetical liquidation book value, or HLBV, method. For further information regarding the HLBV method, see "—Critical Accounting Policies and Significant Judgments and Estimates—Valuation of Equity Investments." We expect that fair value gains and losses may fluctuate significantly in future periods.

Interest Income

Interest income consists of interest earned on our cash equivalents and marketable securities.

Income Tax Expense (Benefit)

Income tax expense (benefit) consists of U.S. federal and state income taxes and income taxes in certain foreign jurisdictions in which we conduct business. We maintain a full valuation allowance on our federal and state deferred tax assets as we have concluded that it is not more likely than not that the deferred tax assets will be realized.

Results of Operations

Comparison of the years ended December 31, 2018 and 2019

The following table summarizes our unaudited results of operations data for the years ended December 31, 2018 and 2019:

	Year Ended December 31,		Change	
	2018	2019	$	%
	(in thousands)			
Revenues:				
Software products and services	$ 59,885	$ 66,735	$ 6,850	11%
Drug discovery	6,754	18,808	12,054	178%
Total revenues	66,639	85,543	18,904	28%
Cost of revenues:				
Software products and services	10,687	13,646	2,959	28%
Drug discovery	13,015	22,804	9,789	75%
Total cost of revenues	23,702	36,450	12,748	54%
Gross profit	42,937	49,093	6,156	14%
Operating expenses:				
Research and development	34,523	39,404	4,881	14%
Sales and marketing	17,831	21,364	3,533	20%
General and administrative	18,552	27,040	8,488	46%
Total operating expenses	70,906	87,808	16,902	24%
Loss from operations	(27,969)	(38,715)	(10,746)	38%
Other (expense) income:				
Gain on equity investment	—	943	943	
Change in fair value	(812)	9,922	10,734	
Interest income	433	1,878	1,445	
Total other (expense) income	(379)	12,743	13,122	
Loss before income taxes	(28,348)	(25,972)	2,376	
Income tax expense (benefit)	77	(291)	(368)	
Net loss	(28,425)	(25,681)	2,744	
Net loss attributable to noncontrolling interest	—	(1,110)	(1,110)	
Net loss attributable to Schrödinger stockholders	$ (28,425)	$ (24,571)	$ 3,854	

Revenues

	Year Ended December 31,		Change	
	2018	2019	$	%
	(in thousands)			
Revenues:				
On-premise software	$ 40,146	$ 42,647	$ 2,501	6%
Hosted software	2,932	7,418	4,486	153%
Software maintenance	9,837	11,643	1,806	18%
Professional services	6,970	5,027	(1,943)	(28)%
Total software products and services	59,885	66,735	6,850	11%
Drug discovery	6,754	18,808	12,054	178%
Total revenues	$ 66,639	$ 85,543	$ 18,904	28%

On-premise software. The increase in revenues for on-premise software was primarily attributable to new customer and existing customer growth during 2019 as compared to 2018. This was partially offset by a shift in sales mix from customers purchasing our software product licenses for use on their own in-house servers, which is recognized upfront at a single point in time, to accessing our software as a hosted solution, which is classified within hosted software revenue and recognized ratably over the term of the arrangement.

Hosted software. The increase in revenues for hosted software was primarily due to existing customers shifting from on-premise software product licenses to hosted software subscriptions, for which revenue is recognized ratably over time.

Software maintenance. The increase in revenues for software maintenance was primarily due to growing product sales in previous years. Maintenance revenue is recognized over time.

Professional services. The decrease in revenues from professional services was primarily due to lower modeling services fees and non-renewing technology service projects.

Drug discovery. The increase in revenues for drug discovery was primarily due to an increase in the number of collaboration milestones achieved during 2019 as compared to 2018.

Cost of Revenues

	Year Ended December 31,		Change	
	2018	2019	$	%
	(in thousands)			
Cost of revenues:				
Software products and services	$ 10,687	$ 13,646	$ 2,959	28%
Gross margin	82%	80%		
Drug discovery	13,015	22,804	9,789	75%

Software products and services. The increase in cost of revenues for software products and services was attributable to increases of $2.3 million in personnel-related expenses, $0.5 million in compute capacity costs, and $0.2 million in other costs of revenue. The decrease in gross margin was primarily attributable to an increase in personnel-related expenses.

Drug discovery. The increase in cost of revenues for drug discovery was attributable to increases of $4.5 million in third-party CRO costs to support a collaboration, $1.9 million in compute capacity costs, $1.9 million in personnel-related expenses, $0.9 million in royalties paid to third parties for use of licensed software functionality, and $0.6 million in other costs of revenue.

Research and Development Expense

	Year Ended December 31,		Change	
	2018	2019	$	%
	(in thousands)			
Research and development	$ 34,523	$ 39,404	$ 4,881	14%

The increase in research and development expense was primarily due to additional CRO costs associated with the expansion and progression of internal drug discovery programs.

Sales and Marketing Expense

	Year Ended December 31,		Change	
	2018	2019	$	%
	(in thousands)			
Sales and marketing	$ 17,831	$ 21,364	$ 3,533	20%

The increase in sales and marketing expense was primarily attributable to an increase in personnel-related expenses due to additional employee headcount to support the expansion of our business.

General and Administrative Expense

	Year Ended December 31,		Change	
	2018	2019	$	%
	(in thousands)			
General and administrative	$ 18,552	$ 27,040	$ 8,488	46%

In the year ended December 31, 2019, we recognized a total of $3.3 million in non-comparable costs, which consisted of $1.8 million of costs related to a cash distribution we received from Nimbus and a $1.5 million unconditional gift to Columbia University intended to fund a research laboratory. The increase in general and administrative expense was also attributable to an increase of $3.8 million in personnel-related expenses due to additional employee headcount and a $1.4 million increase in other expenses.

Gain on Equity Investment

	Year Ended December 31,		
	2018	2019	Change
	(in thousands)		
Gain on equity investment	$ -	$ 943	$ 943

In the year ended December 31, 2019, we received a $0.9 million cash distribution from our Nimbus investment in 2019. There was no such distribution in 2018.

Change in Fair Value

	Year Ended December 31,		
	2018	2019	Change
	(in thousands)		
Change in fair value	$ (812)	$ 9,922	$ 10,734

The increase in fair value was due to a $14.1 million gain on our equity investment in Morphic, partially offset by a $4.2 million loss on our equity investment in Nimbus. Morphic became a publicly traded company in June 2019 and, as such, we revalued our investment as of December 31, 2019 to equal the current fair market value of Morphic's common stock. The Nimbus fair value loss was determined under the HLBV method.

Interest Income

	Year Ended December 31,		
	2018	2019	Change
	(in thousands)		
Interest income	$ 433	$ 1,878	$ 1,445

The increase in interest income was attributable to increased earnings on our investment portfolio balance, which increased significantly year-over-year due to the investment of proceeds from our Series E preferred stock issuance.

Income Tax Expense (Benefit)

	Year Ended December 31,		
	2018	2019	Change
	(in thousands)		
Income tax expense (benefit)	$ 77	$ (291)	$ (368)

Due to the full valuation allowance on our U.S. federal and state deferred tax assets, income tax expense (benefit) represents our income tax obligations in certain foreign jurisdictions in which we conduct business.

Quarterly Results of Operations

The following tables summarize our selected unaudited quarterly results of operations data for each of the eight quarters in the period ended December 31, 2019. The information for each of these quarters has been prepared on the same basis as our audited annual consolidated financial statements and reflect, in the opinion of management, all adjustments of a normal, recurring nature that are necessary for the fair statement of the results of operations for these periods. This data should be read in conjunction with our audited consolidated financial statements included elsewhere in this Annual Report. Historical results are not necessarily indicative of the results that may be expected for the full fiscal year or any other period.

	Three Months Ended							
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
	(in thousands)							
Revenues:								
Software products and services	$ 20,095	$ 13,938	$ 11,963	$ 13,889	$ 18,605	$ 14,482	$ 16,118	$ 17,530
Drug discovery	1,109	1,027	1,030	3,588	2,136	4,528	3,842	8,302
Total revenues	21,204	14,965	12,993	17,477	20,741	19,010	19,960	25,832
Cost of revenues:								
Software products and services(1)	2,412	2,379	2,588	3,308	3,133	3,671	3,097	3,745
Drug discovery(1)	2,312	3,486	3,360	3,857	4,604	5,488	6,152	6,560
Total cost of revenues	4,724	5,865	5,948	7,165	7,737	9,159	9,249	10,305
Gross profit	16,480	9,100	7,045	10,312	13,004	9,851	10,711	15,527
Operating expenses:								
Research and development(1)	8,220	8,609	8,820	8,874	8,438	9,531	10,353	11,082
Sales and marketing(1)	4,564	4,096	3,902	5,269	5,093	5,343	5,185	5,743
General and administrative(1)	3,760	5,493	4,456	4,843	5,086	8,940	6,465	6,549
Total operating expenses	16,544	18,198	17,178	18,986	18,617	23,814	22,003	23,374
Loss from operations	(64)	(9,098)	(10,133)	(8,674)	(5,613)	(13,963)	(11,292)	(7,847)
Other (expense) income:								
Gain on equity investment	—	—	—	—	—	—	—	943
Change in fair value	(879)	(743)	(1,052)	1,862	(627)	12,661	(1,427)	(685)
Interest income	124	56	35	218	438	524	501	415
Total other (expense) income	(755)	(687)	(1,017)	2,080	(189)	13,185	(926)	673
Loss before income taxes	(819)	(9,785)	(11,150)	(6,594)	(5,802)	(778)	(12,218)	(7,174)
Income tax expense (benefit)	54	100	143	(220)	46	(51)	(257)	(29)
Net loss	(873)	(9,885)	(11,293)	(6,374)	(5,848)	(727)	(11,961)	(7,145)

(1) Includes stock-based compensation as indicated in the table located further below.

Revenues:

	Three Months Ended							
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
	(in thousands)							
Revenues:								
On-premise software	$ 15,716	$ 9,683	$ 7,074	$ 7,674	$ 13,023	$ 8,601	$ 10,300	$ 10,723
Hosted software	211	372	864	1,484	1,711	1,911	1,862	1,934
Software maintenance	2,290	2,508	2,332	2,707	2,589	2,848	3,025	3,181
Professional services	1,878	1,375	1,693	2,024	1,282	1,122	931	1,692
Total software products and services	20,095	13,938	11,963	13,889	18,605	14,482	16,118	17,530
Drug discovery	1,109	1,027	1,030	3,588	2,136	4,528	3,842	8,302
Total revenues	$ 21,204	$ 14,965	$ 12,993	$ 17,477	$ 20,741	$ 19,010	$ 19,960	$ 25,832

Deferred Revenue:

	As of							
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
	(in thousands)							
Deferred revenue	$ 15,351	$ 15,846	$ 14,455	$ 20,730	$ 17,970	$ 22,417	$ 19,129	$ 27,259

Gross Margin:

	Three Months Ended							
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
Software products and services gross margin	88%	83%	78%	76%	83%	75%	81%	79%

Stock-Based Compensation:

	Three Months Ended							
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
	(in thousands)							
Stock-based compensation:								
Cost of revenues:								
Software products and services	$ 22	$ 41	$ 19	$ 18	$ 36	$ 33	$ 41	$ 42
Drug discovery	44	88	32	36	53	48	60	62
Research and development	144	108	103	126	111	113	114	122
Sales and marketing	57	39	38	49	71	75	79	86
General and administrative	58	93	89	109	249	262	267	269
Total stock-based compensation expense	$ 325	$ 369	$ 281	$ 338	$ 520	$ 531	$ 561	$ 581

Depreciation:

	Three Months Ended							
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
	(in thousands)							
Depreciation:								
Cost of revenues:								
Software products and services	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —
Drug discovery	—	—	246	216	219	227	234	229
Research and development	—	—	164	144	147	155	159	157
Sales and marketing	26	26	29	26	30	37	44	43
General and administrative	440	714	374	489	481	497	502	479
Total depreciation expense	$ 466	$ 740	$ 813	$ 875	$ 877	$ 916	$ 939	$ 908

Quarterly Revenue Trends

On-premise software revenue is subject to seasonality that favors the first quarter of each year, primarily due to the calendar year timing of customer renewals for on-premise software arrangements, for which revenue is recognized at a single point in time. Hosted software revenue grew steadily in the periods presented, as existing customers migrated from on-premise licenses to hosted solutions, for which revenue is recognized over time. As a result, a substantial portion of the software products and services revenue we reported in each period was attributable to sales we made in prior periods. Software maintenance revenue is related to on-premise software sales and also is recognized ratably over the term of the underlying agreement. Therefore, increases or decreases in customer sales, customer expansion, or renewals in a period may not be immediately reflected in revenue for the period. Our professional services arrangements are typically project-based and, therefore, fluctuated based on individual customer needs and ongoing project support. Drug discovery revenue fluctuated from period to period based on the achievement of specific collaboration milestones, but has grown in recent periods as our collaborations have advanced. The majority of our current collaborations are in the discovery stage. Milestone payments typically increase in magnitude as a program advances.

Quarterly Deferred Revenue Trends

Deferred revenue consists of the unearned portion of customer billings, which is recognized as revenue in accordance with our revenue recognition policy, as well as the unearned portion of unbilled collaboration milestones that are deemed probable in advance of actual achievement. Deferred revenue balances have generally increased over the periods presented, but have fluctuated based on the timing of sales, the shift of product mix as customers transitioned from on-premise software to hosted software that is recognized over time, and the increase in the number of milestones that were deemed probable in advance of actual achievement.

Quarterly Gross Margin Trends

Our software products and services gross margin experienced declines over the periods presented due to increased headcount and the timing effect of a shift in software sales from on-premise to hosted solutions. The cost of royalties due on sales of our hosted software is recognized upfront, while the associated revenue is recognized over the term of the related agreement, which created fluctuation in gross margin from quarter-to-quarter. Currently, gross margin is not meaningful for measuring the operating results of our drug discovery business.

Quarterly Operating Expense Trends

Operating expenses generally increased during the periods presented due to increased headcount involved in research and development, sales and marketing, general and administrative activities, and CRO costs related to our internal drug discovery programs. These increases in headcount across our operations have supported the overall growth and management of our business. CRO cost increases were driven by the launch and expansion of our internal drug discovery programs. Included in general and administrative expense for the year ended December 31, 2019 was $3.3 million of non-comparable items.

Quarterly Other (Expense) Income Trends

Other (expense) income during the periods presented consisted primarily of fair value gains and losses related to our equity investments in Nimbus and Morphic and, to a lesser degree, interest income.

Segment Information

The following tables summarize segment information for the years ended December 31, 2018 and 2019. See Note 15 in our audited consolidated financial statements for additional information regarding our segments.

Segment gross profit is derived by deducting operational expenditures, with the exception of research and development, sales and marketing, and general and administrative activities, from U.S. GAAP revenue. Operational expenditures are expenditures made that are directly attributable to the reportable segment. In many cases, these expenditures are allocated to the segments based on headcount. The reportable segment expenditures include compensation, supplies, and services from contract research organizations.

Certain cost items are not allocated to our reportable segments. These cost items primarily consist of compensation and general operational expenses associated with our research and development, sales and marketing, and general and administrative activities. These costs are incurred by both segments and, due to the integrated nature of our software and drug discovery segments, any allocation methodology would be arbitrary and provide no meaningful analysis. Additionally, we report assets on a consolidated basis and do not allocate assets to our reportable segments for purposes of assessing segment performance or allocating resources.

	Year Ended December 31,	
	2018	2019
	(in thousands)	
Segment revenues:		
Software	$ 59,885	$ 66,735
Drug discovery	6,754	18,808
Total segment revenues	$ 66,639	$ 85,543
Segment gross profit:		
Software	$ 49,198	$ 53,089
Drug discovery	(6,261)	(3,996)
Total segment gross profit	42,937	49,093
Unallocated (expense) income:		
Research and development	(34,523)	(39,404)
Sales and marketing	(17,831)	(21,364)
General and administrative	(18,552)	(27,040)
Gain on equity investment	—	943
Change in fair value	(812)	9,922
Interest	433	1,878
Income taxes	(77)	291
Consolidated net loss	$ (28,425)	$ (25,681)

Liquidity and Capital Resources

Historically we have incurred substantial operating losses and expect to continue to incur significant operating losses for the foreseeable future and may never become profitable. As of December 31, 2019, we had an accumulated deficit of $105.1 million. Our operating cash flows are impacted by the magnitude and timing of our software sales and, to a lesser degree, by the magnitude and timing of our drug discovery milestone achievements and research funding fees. Our primary use of cash is to fund operating expenses, which consist of research and development, sales and marketing, and general and administrative expenditures. Cash used to fund operating expenses is impacted by the timing of when we pay operating expenses to vendors and collect amounts due from customers and collaborators, which is reflected in changes in our operating assets and liabilities, including accounts payable, accrued expenses, prepaid expenses, deferred revenue, and accounts receivable.

We generate revenues from sales of our software solutions and from research funding and milestone payments from our drug discovery collaborations, which we have used to support our research and development and other operating expenses. Since inception, we have also financed our operations from sales of our convertible preferred stock, as well as amounts received from our equity investment in Nimbus, which we co-founded in 2009, and the net proceeds of our initial public offering in February 2020. In late 2018 and early 2019, we issued and sold an aggregate of 73,795,777 shares of Series E convertible preferred stock at $1.4906 per share, for $110.0 million in gross proceeds. In 2016, Nimbus sold its ACC inhibitor to Gilead Sciences in a transaction valued at approximately $1.2 billion, comprised of an upfront payment and earn outs. Of this amount, $601.3 million has been paid to Nimbus to date, and we have received a total of $46.0 million in cash distributions to date. We are eligible to receive future cash distributions on the remaining approximately $600 million of earn outs, if and when such earn outs are achieved. However, the likelihood and timing of such payments, if any, are not possible for us to predict as the achievement of the development and regulatory milestones under the transaction agreement is uncertain and outside of our control. In December 2019, Gilead Sciences announced topline results from its Phase 2 clinical trial which included firsocostat, both as a monotherapy and in combination with other investigational therapies, in which the primary endpoint was not met. Gilead Sciences announced that it was continuing to analyze the data from the trial and determine next steps. We do not know how this development will affect Nimbus' right to receive future earnout payments from Gilead Sciences or our right to receive cash distributions from Nimbus. However, if Gilead Sciences determined not to continue to advance the development of firsocostat, then we would not expect to receive any additional distributions from Nimbus on account of this program. Additionally, even if Nimbus were to receive any further payments from Gilead Sciences, any distribution to us as an investor in Nimbus would need to be approved by the board of directors of Nimbus. As of December 31, 2019, we had cash, cash equivalents, restricted cash, and marketable securities of $86.3 million. In addition, on February 10, 2020, we closed our initial public offering of our common stock, in which we sold 13,664,704 shares of common stock at a public offering price of $17.00 per share, resulting in net proceeds of $209.9 million, after deducting underwriting discounts and commissions and offering expenses borne by us. Cash in excess of immediate requirements is invested in accordance with our investment policy, primarily with a view towards capital preservation and liquidity.

Cash Flows

The following table presents a summary of our cash flows for the periods shown:

	Year Ended December 31,	
	2018	2019
	(in thousands)	
Net cash used in operating activities	$ (23,711)	$ (26,059)
Net cash provided by (used in) investing activities	11,194	(53,855)
Net cash provided by financing activities	80,273	28,684
Net (decrease) increase in cash and cash equivalents	$ 67,756	$ (51,230)

Operating activities

During the year ended December 31, 2018, operating activities used approximately $23.7 million of cash, primarily resulting from net loss of $28.4 million, partially offset by $3.6 million of non-cash operating expenses included in net loss, including depreciation and stock-based compensation costs, and a $0.8 million non-cash loss from changes in fair value. Changes in our operating assets and liabilities provided cash of approximately $0.3 million.

During the year ended December 31, 2019, operating activities used approximately $26.1 million of cash, primarily resulting from net loss of $25.7 million, which included a $9.9 million non-cash gain from changes in fair value and a $0.9 million gain on equity investment that is classified as an investing activity, partially offset by $6.2 million of non-cash operating expenses included in net loss, including depreciation and stock-based compensation costs. Changes in our operating assets and liabilities provided cash of approximately $4.2 million.

Investing activities

During the year ended December 31, 2018, investing activities provided approximately $11.2 million of cash, primarily attributable to $20.1 million of proceeds upon the maturity of marketable securities, partially reduced by $5.3 million used for purchases of property and equipment, $3.3 million for the purchase of additional shares of Nimbus, and $0.3 million for the purchase of additional shares of Morphic.

During the year ended December 31, 2019, investing activities used approximately $53.9 million of cash, primarily for purchases of marketable securities.

Financing activities

During the year ended December 31, 2018, financing activities provided approximately $80.3 million of cash, primarily attributable to proceeds from issuances of our Series E preferred stock.

During the year ended December 31, 2019, financing activities provided approximately $28.7 million of cash, primarily attributable to proceeds from issuances of our Series E preferred stock.

Funding Requirements

We believe that our existing cash, cash equivalents, and marketable securities will be sufficient to fund our operations and capital expenditure requirements for at least the next 12 months. Our future capital requirements will depend on many factors, including the growth of our software revenue, the timing and extent of spending to support research and development efforts, the continued expansion of sales and marketing activities, the timing and receipt of milestone payments from our collaborations, as well as spending to support, advance, and broaden our internal programs. Furthermore, our capital requirements will also change depending on the timing and receipt of any distributions we may receive from our equity stakes in our co-founded companies. The potential for these distributions, and the amounts which we

may be entitled to receive, are difficult to predict due to the inherent uncertainty of the events which may trigger such distributions. In addition, with respect to our internal wholly-owned programs, as part of our strategy we may choose to pursue licensing arrangements when we believe it will help maximize the commercial value of any such program. If we are able to successfully enter into any licensing arrangements in the future, the potential amounts we may be entitled to and the likelihood and timing of such payments, including at what stage of discovery or development we may choose to pursue such arrangements, is uncertain.

We may be required to seek additional equity or debt financing. In the event that we require additional financing, we may not be able to raise such financing on terms acceptable to us or at all. If we are unable to raise additional capital or generate cash flows necessary to maintain or expand our operations and invest in our platform, we may not be able to compete successfully, which would harm our business, operations and financial condition.

Contractual Obligations and Commitments

The following table summarizes our contractual obligations as of December 31, 2019:

	Total	Less than 1 Year	1 to 3 Years	3 to 5 Years	More than 5 Years
			(in thousands)		
Operating lease obligations[1]	$ 17,230	$ 6,111	$ 6,181	$ 3,047	$ 1,891

(1) Operating lease obligations consist of our continuing rent obligations through January 2029, primarily for our principal offices located in New York, New York and Portland, Oregon, which expire in August 2021 and August 2026, respectively.

In November 2019, we entered into a three-year agreement with a third-party cloud provider for compute power. The agreement contains a minimum payment obligation which totals $18 million over the three years after the date we entered into the agreement. These amounts are not included in the table above because there is not an annual commitment.

We enter into agreements in the normal course of business with CRO vendors for research and preclinical studies, professional consultants for expert advice, and other vendors for various products and services. We have not included these payments in the table of contractual obligations above since the contracts do not contain any minimum purchase commitments and are cancelable at any time by us, generally upon 30 days prior written notice, and therefore we believe that our non-cancelable obligations under these agreements are not material. We have also agreed to pay volume-based royalties to third parties for use of software functionality under various licensing and related agreements.

Income Taxes

At December 31, 2019, we had federal and state net operating loss carryforwards of approximately $104.3 million and $64.8 million, respectively. These carryforwards will expire between 2020 and 2039, with the exception of 2018 and 2019 federal net operating losses, if not

used by us to reduce income taxes payable in future periods. Utilization of post 2017 federal net operating loss carryforwards is limited to 80% of taxable income generated in a given tax year and carry forward indefinitely. At December 31, 2019, we had federal and state research and development tax credit carryforwards of approximately $8.0 million and $0.4 million, respectively. These carryforwards will expire between 2020 and 2039 if not used by us to reduce income taxes payable in future periods.

As required by Accounting Standards Codification, or ASC, Topic 740, Income Taxes, our management has evaluated the positive and negative evidence bearing upon the realizability of our deferred tax assets, which are composed principally of NOL carryforwards and research and development credit carryforwards. Management has determined that it is more likely than not that we will not realize the benefits of our federal and state deferred tax assets and, as a result, a valuation allowance of $27.6 million and $35.3 million has been established at December 31, 2018 and 2019, respectively. The change in the valuation allowance was $7.8 million for the year ended December 31, 2018 and $7.7 million for the year ended December 31, 2019. We recorded income tax expense of $0.1 million for the year ended December 31, 2018 and income tax benefit of $0.3 million for the year ended December 31, 2019.

Seasonality

Historically, the first quarter of each year has been our largest quarter for software products and services revenue, primarily due to the timing of customer renewals of on-premise software arrangements, for which revenue is recognized at a single point in time. Seasonality has been a less significant factor for our hosted software arrangements, for which revenue is recognized ratably over time. Seasonality has not been a factor for our drug discovery revenues. Historical seasonality may not be indicative of future periods.

Off-Balance Sheet Arrangements

During the periods presented, we did not have, and currently we do not have, any off-balance sheet arrangements, as defined under the rules and regulations of the SEC.

Critical Accounting Policies and Significant Judgments and Estimates

Our management’s discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which have been prepared in accordance with U.S. GAAP. The preparation of these consolidated financial statements requires us to make judgments and estimates that affect the reported amounts of assets, liabilities, revenues, and expenses and the disclosure of contingent assets and liabilities in our consolidated financial statements. We base our estimates on historical experience, known trends and events, and various other factors that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. On an ongoing basis, we evaluate our judgments and estimates in light of changes in circumstances, facts, and experience. The effects of material

revisions in estimates, if any, are reflected in the consolidated financial statements prospectively from the date of change in estimates**.**

While our significant accounting policies are described in more detail in the notes to our consolidated financial statements appearing elsewhere in this Annual Report, we believe the following accounting policies used in the preparation of our consolidated financial statements require the most significant judgments and estimates.

Revenue

We recognize revenue in accordance with ASC 606, Revenue from Contracts with Customers, which we adopted as of January 1, 2017 on a full retrospective basis. In accordance with ASC 606, we recognize revenue when our customer obtains control of promised goods or services, in an amount that reflects the consideration which we expect to receive in exchange for those goods or services. To determine revenue recognition for arrangements that we determine are within the scope of ASC 606, we perform 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 we satisfy a performance obligation.

Our software revenue may include upfront payments for the performance of services in the future, which have both fixed and variable consideration. At contract inception, we assess the goods or services promised within each contract that falls under the scope of ASC 606 to identify distinct performance obligations. We then recognize as revenue the amount of the transaction price that is allocated to the respective performance obligation when or as the performance obligation is satisfied. For a collaborative arrangement that falls within the scope of ASC 808, Collaborative Arrangements, we apply the revenue recognition model under ASC 606 to part or all of the arrangement, when deemed appropriate. We have determined that we are the principal in arrangements where we act as a reseller, and therefore recognize revenue on a gross basis.

We include the unconstrained amount of estimated variable consideration in the transaction price. The amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur. At the end of each subsequent reporting period, we re- evaluate the estimated variable consideration included in the transaction price and any related constraint and, if necessary, adjust our estimate of the overall transaction price.

Research support payments: Payments by the licensees in exchange for research activities we performed on behalf of the licensee are recognized upon performance of such activities at rates consistent with prevailing market rates. If the expectation at contract inception is such that the period between payment by the licensee and the completion of related performance obligations will be one year or less, we assume that the contract does not have a significant financing component.

Milestone payments: Research and development or regulatory milestones in our collaboration agreements may include some, but not necessarily all, of the following types of events:

- completion of preclinical research and development work leading to selection of product candidates;
- initiation of Phase 1, Phase 2, and Phase 3 clinical trials;
- filing of regulatory applications for marketing approval in the United States, Europe or Japan;
- marketing approval in major markets, such as the United States, Europe, or Japan; and
- achievement of certain other technical, scientific, or development criteria.

At the inception of each arrangement that includes research, development, or regulatory milestone payments, we evaluate whether the milestones are considered probable of being reached and estimate the amount to be included in the transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within our control or that of the licensee, such as regulatory approvals, are not considered probable of being achieved until those approvals are received. The transaction price is then allocated to each performance obligation on a relative stand-alone selling price basis, for which we recognize revenue as or when the performance obligations under the contract are satisfied. At the end of each subsequent reporting period, we re-evaluate the probability of achievement of such development milestones and any related constraint, and if necessary, adjusts our estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which may affect license, collaboration, and other revenues and earnings in the period of adjustment. The process of successfully achieving the criteria for the milestone payments is highly uncertain. Consequently, there is a risk that we may not earn all of the milestone payments from each of our collaborators.

Royalties and commercial milestones: For arrangements that include sales-based royalties, including commercial milestone payments based on pre-specified level of sales, we recognize revenue at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty has been allocated has been satisfied (or partially satisfied). Achievement of these royalties and commercial milestones may solely depend upon performance of the licensee. The process of successfully achieving the criteria for the commercial milestone payments and sales-based royalties under our arrangements is highly uncertain. As a result, we cannot predict when we might achieve any commercial milestone or royalty payments or estimate the amount of such payments. Since inception to date, we have not recognized any royalty revenue or commercial milestone payments from any of our collaborations. We may never receive any such payments.

Stock-Based Compensation

We estimate the fair value of stock option awards granted using the Black-Scholes option-pricing model, which uses as inputs the fair value of our common stock and subjective assumptions we make as follows:

Fair Value of Common Stock. As our stock was not publicly traded prior to our initial public offering in February 2020, we historically estimated the fair value of common stock as discussed below.

Expected Term. The expected term of employee stock options represents the weighted average period that the stock options are expected to remain outstanding. The expected terms were calculated using an average of historical exercises.

Expected Volatility. As we did not have a trading history for our common stock prior to our initial public offering in February 2020, the selected volatility used is representative of expected future volatility. We based expected future volatility on the historical and implied volatility of comparable publicly traded companies over a similar expected term.

Expected Dividend Yield. We have never declared or paid any cash dividends and do not presently intend to pay cash dividends in the foreseeable future. As a result, we used an expected dividend yield of zero.

Risk-Free Interest Rates. We based the risk-free interest rate on the rate for a U.S. Treasury zero-coupon issue with a term that closely approximates the expected life of the option grant at the date nearest the option grant date.

If any assumptions used in the Black-Scholes option-pricing model change significantly, stock-based compensation for future awards may differ materially compared with the awards granted previously.

Prior to our initial public offering in February 2020, our board of directors, with input from management, estimated the price of our common stock based upon several factors, including third-party valuations and our operating results and financial performance. The valuations took into consideration several factors, including, but not limited to, prices for our preferred stock that was sold to outside investors in arms-length transactions, and the rights, preferences, and privileges of our preferred stock and common stock; the fact that the option grants involved illiquid securities in a private company; our stage of development and revenue growth; the state of the biopharmaceutical industry and the economy; the marketplace and major competitors; and the likelihood of achieving a liquidity event for shares of common stock underlying the options, such as an initial public offering or sale of our company, given prevailing market conditions. These valuations were performed in accordance with the *American Institute of Certified Public Accountants' Audit and Accounting Practice Aid, Valuation of Privately Held Company Equity Securities Issued as Compensation.*

The assumptions underlying these valuations represented management's best estimates, which involved inherent uncertainties and the application of management judgment. As a result, if factors or expected outcomes changed and we had used significantly different assumptions or estimates, our stock-based compensation expense could have been materially different.

Subsequent to the completion of our initial public offering in February 2020, our board of directors determines the fair value of our common stock based on the closing price of our common stock as reported on the Nasdaq Global Select Market.

Valuation of Equity Investments

We have investments in a number of early stage biotechnology companies. If we determine that, for accounting purposes, we have significant influence over the company, we value the investment using the HLBV method. The HLBV method is a balance sheet-oriented approach to equity method accounting. Under the HLBV method, we determine our share of earnings or losses by comparing our claim on the book value at the beginning and end of each reporting period. This claim is calculated as the amount that we would receive if the investee were to liquidate all of its assets at recorded amounts, determined as of the balance sheet date in accordance with generally accepted accounting principles, and distribute the resulting cash to creditors and investors in accordance with their respective priorities. Significant unobservable inputs used under the HLBV method include annual financial statements of investment companies and our respective liquidation priority.

The assumptions underlying these valuations represent management's best estimates, which involve inherent uncertainties and the application of management judgment. As a result, if factors or expected outcomes change and we use significantly different assumptions or estimates, our fair value gains and losses could be materially different. A 10% increase in the net assets of our HLBV equity investments and a 10% increase in the fair value of common stock of our other equity investment holdings would result in a $1.5 million increase in the valuation of our equity investments as of December 31, 2019. A 10% decrease in the net assets of our HLBV investments and a 10% decrease in the fair value of common stock of our other equity investment holdings would result in a $1.4 million decrease in the valuation of our equity investments as of December 31, 2019.

JOBS Act Election

We qualify as an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012, or JOBS Act. An emerging growth company may take advantage of reduced reporting requirements that are not otherwise applicable to public companies. These provisions include, but are not limited to:

- not being required to comply with the auditor attestation requirements on the effectiveness of our internal control over financial reporting;

- not being required to comply with any requirement that may be adopted by the PCAOB regarding mandatory audit firm rotation or a supplement to the auditor's report providing additional information about the audit and the financial statements (auditor discussion and analysis);
- reduced disclosure obligations regarding executive compensation arrangements; and
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved.

We may use these provisions until December 31, 2025. However, if certain events occur prior to such date, including if we become a "large accelerated filer," our annual gross revenues exceed $1.07 billion, or we issue more than $1.0 billion of non-convertible debt in any three-year period, we will cease to be an emerging growth company prior to the end of such five-year period.

We have elected to take advantage of certain of the reduced disclosure obligations in this Annual Report and may elect to take advantage of other reduced reporting requirements in future filings. As a result, the information that we provide to our stockholders may be different than the information you receive from other public companies in which you hold stock.

The JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards, until those standards apply to private companies. We have elected to take advantage of the benefits of this extended transition period and, therefore, we will not be subject to the same new or revised accounting standards as other public companies that are not emerging growth companies. Our financial statements may therefore not be comparable to those of companies that comply with such new or revised accounting standards. Until the date that we are no longer an emerging growth company or affirmatively and irrevocably opt out of the exemption provided by Section 7(a)(2)(B) of the Securities Act of 1933, as amended, upon issuance of a new or revised accounting standard that applies to our financial statements and that has a different effective date for public and private companies, we will disclose the date on which we will adopt the recently issued accounting standard.

Recent Accounting Pronouncements

See Note 2 to our consolidated financial statements appearing elsewhere in this Annual Report for a discussion of recent accounting pronouncements.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Our primary exposure to market risk is interest rate sensitivity, which is affected by changes in the general level of U.S. interest rates, particularly because our investments, including cash equivalents and marketable securities, are in the form of U.S. Treasury and corporate securities and a money market fund that is invested in U.S. Treasury and corporate securities. Due to the nature of these investments, an immediate 10% change in interest rates would not have a material effect on the fair market value of this investment portfolio.

We are also exposed to market risk related to changes in foreign currency exchange rates. We maintain a bank account denominated in Japanese Yen to accommodate deposits of amounts due from certain customers. We also contract with certain vendors that are located outside of the United States whose invoices are denominated in foreign currencies. We are subject to fluctuations in foreign currency rates in connection with these arrangements. We do not currently hedge our foreign currency exchange rate risk. Our cash balances and outstanding vendor invoices denominated in foreign currencies were not material as of December 31, 2018 or 2019, and our market risk associated with foreign currency exchange rates was deemed insignificant. An immediate 10% change in foreign exchange rates would not have a material effect on our consolidated financial statements.

Inflation generally affects us by increasing our cost of labor and target development costs. We do not believe that inflation had a material effect on our business, financial condition, or results of operations for the years ended December 31, 2018 or 2019.

Item 8. Financial Statements and Supplementary Data.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
Schrödinger, Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Schrödinger, Inc. and subsidiaries (the Company) as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive loss, convertible preferred stock and stockholders' deficit, and cash flows for the years then ended, and the related notes (collectively, 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, 2019 and 2018, and the results of its operations and its cash flows for the years then ended, in conformity with U.S. generally accepted accounting principles.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company has changed its method of accounting for leases as of January 1, 2019 due to the adoption of Accounting Standards Codification Topic 842, *Leases*.

Basis for Opinion

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

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated 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 consolidated 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 consolidated 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 consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ KPMG LLP

We have served as the Company's auditor since 2010.

Portland, Oregon
March 16, 2020

SCHRÖDINGER, INC. AND SUBSIDIARIES
Consolidated Balance Sheets
December 31, 2018 and 2019
(in thousands, except for share and per share amounts)

Assets	2018	2019
Current assets:		
Cash and cash equivalents	$ 77,716	$ 25,986
Restricted cash	—	500
Marketable securities	6,351	59,844
Accounts receivable, net of allowance for doubtful accounts of $50 and $50	13,638	18,676
Unbilled receivables and other receivables	4,383	7,062
Prepaid expenses	2,602	6,468
Total current assets	104,690	118,536
Property and equipment, net	7,967	6,268
Equity investments	5,444	15,366
Right of use assets	—	12,762
Other assets	2,629	2,338
Total assets	$ 120,730	$ 155,270
Liabilities, Convertible Preferred Stock, and Stockholders' Deficit		
Current liabilities:		
Accounts payable	$ 2,773	$ 3,524
Accrued payroll, taxes and benefits	4,086	7,034
Deferred revenue	17,617	25,054
Lease liabilities	—	5,584
Other accrued liabilities	2,529	3,824
Total current liabilities	27,005	45,020
Deferred revenue, long term	3,113	2,205
Deferred rent, long term	485	—
Lease liabilities, long term	—	8,888
Other liabilities, long term	—	900
Total liabilities	30,603	57,013
Commitments and contingencies (Note 6)		
Convertible preferred stock:		
Series E convertible preferred stock, $0.01 par value. Authorized, 67,087,074 shares; 73,795,777 shares issued and outstanding; liquidation preference of $110,000	79,377	109,270
Series D convertible preferred stock, $0.01 par value. Authorized, 39,540,611 shares; 39,540,611 shares issued and outstanding; liquidation preference of $22,000	22,000	22,000
Series C convertible preferred stock, $0.01 par value. Authorized, 47,242,235 shares; 47,242,235 shares issued and outstanding, liquidation preference of $20,000	19,844	19,844
Series B convertible preferred stock, $0.01 par value. Authorized, 29,468,101 shares; 29,468,101 shares issued and outstanding; liquidation preference of $10,000	9,840	9,840
Series A convertible preferred stock, $0.01 par value. Authorized, 134,704,785 shares; 134,704,785 shares issued and outstanding; liquidation preference of $18,185	30,626	30,626
Total convertible preferred stock	161,687	191,580
Stockholders' deficit:		
Common stock, $0.01 par value. Authorized 415,000,000 and 425,000,000 shares; 5,906,976 and 6,121,821 shares issued and outstanding at December 31, 2018 and 2019, respectively	59	61
Additional paid-in capital	8,915	11,655
Accumulated deficit	(80,525)	(105,096)
Accumulated other comprehensive income (loss)	(9)	16
Total stockholders' deficit of Schrödinger stockholders	(71,560)	(93,364)
Noncontrolling interest	—	41
Total stockholders' deficit	(71,560)	(93,323)
Total liabilities, convertible preferred stock, and stockholders' deficit	$ 120,730	$ 155,270

See accompanying notes to consolidated financial statements.

SCHRÖDINGER, INC. AND SUBSIDIARIES
Consolidated Statements of Operations
December 31, 2018 and 2019
(in thousands, except for share and per share amounts)

	2018	2019
Revenues:		
Software products and services	$ 59,885	$ 66,735
Drug discovery	6,754	18,808
Total revenues	66,639	85,543
Cost of revenues:		
Software products and services	10,687	13,646
Drug discovery	13,015	22,804
Total cost of revenues	23,702	36,450
Gross profit	42,937	49,093
Operating expenses:		
Research and development	34,523	39,404
Sales and marketing	17,831	21,364
General and administrative	18,552	27,040
Total operating expenses	70,906	87,808
Loss from operations	(27,969)	(38,715)
Other (expense) income:		
Gain on equity investment	—	943
Change in fair value	(812)	9,922
Interest income	433	1,878
Total other (expense) income	(379)	12,743
Loss before income taxes	(28,348)	(25,972)
Income tax expense (benefit)	77	(291)
Net loss	(28,425)	(25,681)
Net loss attributable to noncontrolling interest	—	(1,110)
Net loss attributable to Schrödinger stockholders	$ (28,425)	$ (24,571)
Net loss per share attributable to Schrödinger common stockholders, basic and diluted:	$ (4.93)	$ (4.09)
Weighted average common shares used to compute net loss per share attributable to common stockholders, basic and diluted:	5,771,305	6,004,500

See accompanying notes to consolidated financial statements.

SCHRÖDINGER, INC. AND SUBSIDIARIES
Consolidated Statements of Comprehensive Loss
December 31, 2018 and 2019
(in thousands)

	2018	2019
Net loss	$ (28,425)	$ (24,571)
Changes in market value of investments, net of tax:		
Unrealized gain on marketable securities	18	25
Comprehensive loss	$ (28,407)	$ (24,546)

See accompanying notes to consolidated financial statements.

SCHRÖDINGER, INC. AND SUBSIDIARIES
Consolidated Statements of Convertible Preferred Stock and Stockholders' Deficit
December 31, 2018 and 2019
(in thousands, except for share amounts)

	Series E preferred stock		Series D preferred stock		Series C preferred stock		Series B preferred stock		Series A preferred stock		Common stock		Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive Loss	Non Controlling Interest	Total stockholders' deficit
	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount					
Balance at December 31, 2017	—	$ —	39,540,611	$ 22,000	47,242,235	$ 19,844	29,468,101	$ 9,840	134,704,785	$ 30,626	5,460,393	$ 55	$ 6,710	$ (52,100)	$ (27)	$ —	$ (45,362)
Change in unrealized loss on marketable securities	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18	—	18
Issuances of Series E preferred stock, net of issuance costs of $623	53,669,659	79,377	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Issuances of common stock	—	—	—	—	—	—	—	—	—	—	446,583	4	892	—	—	—	896
Stock-based compensation	—	—	—	—	—	—	—	—	—	—	—	—	1,313	—	—	—	1,313
Net loss	—	—	—	—	—	—	—	—	—	—	—	—	—	(28,425)	—	—	(28,425)
Balance at December 31, 2018	53,669,659	79,377	39,540,611	22,000	47,242,235	19,844	29,468,101	9,840	134,704,785	30,626	5,906,976	59	8,915	(80,525)	(9)	—	(71,560)
Change in unrealized loss on marketable securities	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25	—	25
Issuances of Series E preferred stock, net of issuance costs of $127	20,126,118	29,893	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Issuances of common stock	—	—	—	—	—	—	—	—	—	—	214,845	2	547	—	—	—	549
Stock-based compensation	—	—	—	—	—	—	—	—	—	—	—	—	2,193	—	—	—	2,193
Contributions by noncontrolling interest	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,151	1,151
Net loss	—	—	—	—	—	—	—	—	—	—	—	—	—	(24,571)	—	(1,110)	(25,681)
Balance at December 31, 2019	73,795,777	$ 109,270	39,540,611	$ 22,000	47,242,235	$ 19,844	29,468,101	$ 9,840	134,704,785	$ 30,626	6,121,821	$ 61	$ 11,655	$ (105,096)	$ 16	$ 41	$ (93,323)

See accompanying notes to consolidated financial statements.

SCHRÖDINGER, INC. AND SUBSIDIARIES
Consolidated Statements of Cash Flows
December 31, 2018 and 2019
(in thousands)

	2018	2019
Cash flows from operating activities:		
Net loss	$ (28,425)	$ (25,681)
Adjustments to reconcile net loss to net cash used in operating activities:		
Gain on equity investments	—	(943)
Noncash revenue from equity investments	(464)	(186)
Fair value adjustments	812	(9,922)
Depreciation and amortization	2,894	3,640
Noncash rent expense	(149)	—
Stock-based compensation	1,313	2,193
Noncash research and development expenses	—	1,051
Noncash investment accretion	(50)	(506)
Loss on disposal of property and equipment	68	—
Decrease (increase) in assets:		
Accounts receivable, net	(4,264)	(5,038)
Other receivables	(3,998)	(1,556)
Reduction in the carrying amount of right of use asset	—	4,177
Prepaid expenses and other assets	(1,396)	410
Increase (decrease) in liabilities:		
Accounts payable	969	(294)
Accrued payroll, taxes, and benefits	1,261	2,948
Deferred revenue	7,444	6,715
Lease liabilities	—	(4,025)
Other accrued liabilities	274	958
Net cash used in operating activities	(23,711)	(26,059)
Cash flows from investing activities:		
Purchases of property and equipment	(5,259)	(1,836)
Purchases of equity investments	(3,647)	—
Distribution from equity investment	—	943
Purchases of marketable securities	—	(110,187)
Proceeds from maturity of marketable securities	20,100	57,225
Net cash provided by (used in) investing activities	11,194	(53,855)
Cash flows from financing activities:		
Issuances of Series E preferred stock, net	79,377	29,893
Contribution by noncontrolling interest	—	100
Deferred offering costs	—	(1,858)
Issuances of common stock	896	549
Net cash provided by financing activities	80,273	28,684
Net increase (decrease) in cash and cash equivalents and restricted cash	67,756	(51,230)
Cash and cash equivalents and restricted cash, beginning of year	9,960	77,716
Cash and cash equivalents and restricted cash, end of year	$ 77,716	$ 26,486
Supplemental disclosure of cash flow and noncash information		
Cash paid for income taxes	$ 13	$ 139
Noncash operating activities:		
Accrued deferred offering costs	—	2,142
Acquisition of right of use assets in exchange for lease obligations	—	464
Right of use assets recognized on adoption	—	16,475
Purchases of property and equipment	194	90

See accompanying notes to consolidated financial statements.

(1) Description of Business

Schrödinger, Inc. ("the Company") has developed a differentiated, physics-based software platform that enables discovery of high-quality, novel molecules for drug development and materials applications more rapidly, at lower cost, and with, the Company believes, a higher likelihood of success compared to traditional methods. The Company sells its software to biopharmaceutical and industrial companies, academic institutions, and government laboratories. The Company also applies its computational platform to a broad pipeline of drug discovery programs in collaboration with biopharmaceutical companies, some of which the Company co-founded. In addition, the Company uses its platform to advance a pipeline of internal, wholly-owned drug discovery programs.

(2) Significant Accounting Policies

(a) Recently Adopted Accounting Pronouncements

In February 2016, the Financial Accounting Standards Board ("FASB") issued Accounting Standard Update ("ASU") No. 2016-02, *"Leases (ASC 842),"* which supersedes, *"Leases (ASC 840)."* ASU No. 2016-02 increases the transparency and comparability of organizations by recognizing lease assets and lease liabilities on the balance sheet and disclosing key information about leasing arrangements. This guidance requires that operating lessees recognize a right-of-use asset and a lease liability measured at the present value of the lease payments in the statement of financial position, recognize a single lease cost allocated over the lease term on a straight-line basis, and classify all cash payments within operating activities in the statement of cash flows. The amendments in this update were effective for fiscal years beginning after December 31, 2018, and interim periods beginning in the first interim period within the year of adoption. In July 2018, the FASB issued ASU No. 2018-11, "*Leases (ASC 842) Targeted Improvements,"* to provide a transition election to not restate comparative periods for the effects of applying the new standard. This transition election permitted entities to change the date of initial application to the beginning of the year of adoption and to recognize the effects of applying the new standard as a cumulative-effect adjustment to the opening balance of retained earnings. In March 2019, the FASB issued ASU No. 2019-01, *"Leases (ASC 842) Codification Improvements,"* to increase transparency and comparability about disclosing essential information about leasing transactions. Collectively, ASU's 2016-02, 2018-11 and 2019-01 are defined as "ASC 842".

On January 1, 2019, the Company adopted ASU No. 2016-02, and its associated amendments using the modified retrospective transition method by applying the new standard to all leases existing at the date of initial application and not restating comparative periods. There were no material cumulative effect adjustments recorded to retained earnings upon adoption. Operating lease ROU assets and liabilities are recognized on the commencement date of the lease based on the present value of lease payments over the lease term. The new guidance also modified the classification criteria and requires additional disclosures to enable users of financial statements to understand the amount, timing, and uncertainty of cash flows arising from leases. Consistent with current guidance, a lessee's recognition, measurement, and presentation of

expenses and cash flows arising from a lease continues to depend primarily on its classification. At inception, the Company determines if an arrangement is a lease, if it includes options to extend or terminate the lease, and if it is reasonably certain that the Company will exercise the options. Lease cost, representing lease payments over the term of the lease and any capitalizable direct costs less any incentives received, is recognized on a straight-line basis over the lease term as lease expense.

The Company elected the package of practical expedients permitted under the transition guidance, which allowed the Company to carryforward its historical lease classification, its assessment on whether a contract was or contains a lease, and its initial direct costs for any leases that existed prior to January 1, 2019. In addition, the Company elected the short-term lease exception as a practical expedient and to combine lease and non-lease components.

On the date of adoption, the Company derecognized a deferred rent liability in the amount of $513, and recognized a ROU asset of $16,475 and a lease liability $18,033. As of December 31, 2019, lease liabilities in the amount of $5,584 and $8,888 are included in current lease liabilities and lease liabilities, long-term, respectively.

(b) Accounting Pronouncements Not Yet Adopted

In August 2017, the FASB issued ASU No. 2017-12, *Derivatives and Hedging (“Topic 815”), Targeted Improvements to Accounting for Hedging Activities*. The new guidance better aligns an entity’s risk management activities and financial reporting for hedging relationships through changes to both the designation and measurement guidance for qualifying hedging relationships and the presentation of hedge results. The new guidance also makes certain targeted improvements to simplify the application of hedge accounting guidance and ease the administrative burden of hedge documentation requirements and assessing hedge effectiveness. The standard is effective for fiscal years beginning after December 15, 2018, and early adoption is permitted. The Company does not expect this standard to have a material impact on its consolidated financial statements and related disclosures.

In August 2018, the FASB issued Accounting Standard Update No. 2018-13, *Changes to Disclosure Requirements for Fair Value Measurements* (“Topic 820”), which improved the effectiveness of disclosure requirements for recurring and nonrecurring fair value measurements. The standard removes, modifies, and adds certain disclosure requirements. The Company plans to adopt the new standard effective January 1, 2020 and does not expect the adoption of Topic 820 guidance to have a material impact on its consolidated financial statements.

In August 2018, the FASB issued ASU 2018-15, *Intangibles-Goodwill and Other-Internal-Use Software* (“Topic 350”)*: Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That is a Service Contract*. This standard aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. The standard is effective for annual periods beginning after December 15, 2020, and interim periods within annual periods beginning after December 15, 2021, with early adoption permitted. The Company has not yet adopted ASU 2018-15 and does not expect the adoption to have a significant impact on its consolidated financial statements.

In December 2019, the FASB issued Accounting Standard Update No. 2019-12, Income Taxes ("Topic 740"): *Simplifying the Accounting for Income Taxes* (ASU 2019-12), which simplifies the accounting for income taxes. This guidance will be effective for the Company in the first quarter of 2021 on a prospective basis, and early adoption is permitted. The Company is currently evaluating the impact of the new guidance on its consolidated financial statements.

(c) Basis of Presentation and Use of Estimates

The preparation of financial statements in conformity with U.S. generally accepted accounting principles ("U.S. GAAP") requires management to make estimates and assumptions that affect the amounts reported in our consolidated financial statements. Such estimates include the useful lives of long-lived assets, the recoverability of deferred tax assets, assumptions used in the allocation of revenue, and assumptions used in testing for impairment of long-lived assets. Actual results could differ from those estimates, and such differences may be material to the consolidated financial statements.

(d) Principles of Consolidation

The Company's consolidated financial statements include the accounts of Schrödinger, Inc. and its wholly owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation. The functional currency for foreign entities is the United States dollar. The Company accounts for investments over which it has significant influence, but not a controlling financial interest, using the equity method.

(e) Cash and Cash Equivalents and Marketable Securities and Restricted Cash

Included in cash and cash equivalents were cash equivalents of $73,211 and $20,208 as of December 31, 2018 and 2019, respectively, which consisted of money market funds and certificates of deposit, and are stated at cost, which approximates market value. The Company classifies all highly liquid investments with an original maturity of three months or less to be cash equivalents. The Company classifies all marketable securities, which consist of fixed income securities, as available for sale securities.

At times, cash balances held at financial institutions were in excess of the Federal Deposit Insurance Corporation's insured limits; however, the Company primarily places its temporary cash with high-credit quality financial institutions.

Restricted cash consists of a letter of credit held with the Company's financial institution related to facility leases, and is classified as current in the Company's balance sheets based on the maturity of the underlying letter of credit.

(f) Accounts Receivable

Accounts receivable are stated at original invoice amount less an allowance for doubtful accounts. Management estimates the allowance for doubtful accounts by evaluating individual customer receivables and considering a customer's financial condition, credit history, and current economic conditions. Account balances are considered delinquent if payment is not received by the due date. Accounts receivable are written off when deemed uncollectible. Recovery of accounts receivable previously written off is recorded when received. Changes in the balance of

accounts deemed uncollectible were deemed immaterial as of December 31, 2018 and 2019. Interest is not charged on accounts receivable.

(g) Fair Value of Financial Instruments

The carrying values of cash and cash equivalents, accounts receivable, accounts payable, and accrued liabilities approximate fair value due to their short maturities.

(h) Property and Equipment

Property and equipment are stated at cost. Maintenance and repairs are expensed as incurred.

Depreciation is calculated using the straight-line method over the estimated useful lives of the assets, which range from 3 to 7 years. Amortization of leasehold improvements is calculated using the straight-line method over the remaining life of the lease or the useful life of the asset, whichever is shorter.

Property and equipment are reviewed for impairment as discussed below under Accounting for the Impairment of Long-Lived Assets. The Company did not capitalize any interest during 2018 and 2019.

(i) Intangible Assets

Intangible assets include various intangible assets acquired through business acquisitions and asset purchases. Intangible assets are amortized using the straight-line method over their estimated useful lives, which range from 5 to 10 years, and are included in other assets in the consolidated balance sheets. Intangible assets are reviewed for impairment as discussed below under Accounting for the Impairment of Long-Lived Assets.

(j) Accounting for the Impairment of Long-Lived Assets

Long-lived assets, such as property and equipment and intangible assets subject to amortization, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. If circumstances require a long-lived asset or asset group be tested for potential impairment, the Company first compares undiscounted cash flows expected to be generated by that asset or asset group to its carrying value. If the carrying value of the long-lived asset or asset group is not recoverable on an undiscounted cash flow basis, an impairment is recognized to the extent that carrying value exceeds fair value. Fair value is determined using various valuation techniques, including discounted cash flow models, quoted market values, and third-party independent appraisals, depending on the nature of the asset. No impairment was identified for the years ended December 31, 2018 and 2019.

(k) Revenue Recognition

Revenue is recognized upon transfer of control of promised products or services to customers in an amount that reflects the consideration to which the Company expects to be entitled in exchange for promised goods or services. The Company’s performance obligations are satisfied either over time or at a point in time.

The following table illustrates the timing of the Company's revenue recognition:

	December 31,	
	2018	2019
Software products and services – point in time	60.5%	49.9%
Software products and services – over time	29.4	28.1
Drug Discovery – point in time	2.5	8.6
Drug Discovery – over time	7.6	13.4

Software Products and Services

The Company enters into contracts that can include various combinations of licenses, products and services, some of which are distinct and are accounted for as separate performance obligations. For contracts with multiple performance obligations, the Company allocates the transaction price of the contract to each performance obligation on a relative standalone selling price basis. Revenue is recognized net of any sale and value-added taxes collected from customers and subsequently remitted to governmental authorities.

The Company's software business derives revenue from four sources: (i) on-premise software license fees, (ii) hosted software subscription fees, (iii) software maintenance fees, and (iv) professional services fees.

On-premise software. The Company's on-premise software license arrangements grant customers the right to use its software on their own in-house servers for a specified term, typically for one year. The Company recognizes revenue for on-premise software license fees upfront, either upon delivery of the license or the effective date of the agreement, whichever is later. In instances where the timing of delivery differs from the timing of its invoicing, the Company considers whether a significant financing component exists. The Company has elected the practical expedient to not assess for significant financing where the term is less than one year. The Company's updates and upgrades are not integral to maintaining the utility of the software licenses. Payments typically are received upfront annually.

Hosted software. Hosted software revenue consists primarily of fees to provide the Company's customers with access to its hosted software platform and is recognized ratably over the term of the arrangement.

Software maintenance. Software maintenance includes technical support, updates, and upgrades. Software maintenance revenue is considered to be a separate performance obligation and is recognized ratably over the term of the arrangement.

Professional services. Professional services, such as technical support and installation or assisting customers with modeling, generally are not related to the functionality of the Company's software and may be recognized as resources are consumed or over the term of the arrangement, depending on the terms of the underlying agreement. The Company has historically estimated project status with relative accuracy. A number of internal and external factors can affect such estimates, including labor rates, utilization and efficiency variances. Payments for services are due in advance or upon consumption of resources.

The following table illustrates the revenue recognized from the four components of the software products and services revenue:

	As of December 31,	
	2018	2019
On premise software	$ 40,146	$ 42,647
Hosted software	2,932	7,418
Software maintenance	9,837	11,643
Professional services	6,970	5,027
Total software revenue	$ 59,885	$ 66,735

Drug Discovery

Revenue from drug discovery and collaboration services contracts is recognized either over time, typically by using costs incurred or hours expended to measure progress, or at a point in time based on the achievement of milestones. Payments for services are generally due upon achieving milestones stated in a contract, upfront at the start of a contract, or upon consumption of resources. Services may at times include variable consideration and milestone payments. The Company has estimated the amount of consideration that is variable using the most likely amount method. The Company evaluates milestones on a case by case basis, including whether there are factors outside the Company's control that could result in a significant reversal of revenue, and the likelihood and magnitude of a potential reversal. If achievement of a milestone is not considered probable, the Company constrains (reduces) variable consideration to exclude the milestone payment until it is probable to be achieved. As of December 31, 2018 and 2019, respectively, the Company determined that milestones totaling $3,650 and $1,500 were probable to occur, and $2,622 and $1,500 of those milestones were recognized as revenue during 2018 and 2019, respectively.

Significant Judgments

Significant judgments and estimates are required under Accounting Standard Codification ("ASC") Topic 606, Revenue from Contract with Customers ("Topic 606"). Due to the complexity of certain contracts, the actual revenue recognition treatment required under Topic 606 for the Company's arrangements may be dependent on contract-specific terms and may vary in some instances.

The Company's contracts with customers often include promises to transfer multiple software products and/or licenses and services, including professional services, technical support services, and rights to unspecified updates. Determining whether licenses and services are distinct performance obligations that should be accounted for separately, or are not distinct and therefore should be accounted for together, requires significant judgment. In some arrangements, such as most of the Company's term-based software license arrangements, the Company has concluded that the licenses and associated services are distinct from each other. In other arrangements, including collaboration services arrangements, the licenses and certain services may not be distinct from each other. The Company's time-based software arrangements may include multiple software licenses and a right to updates or upgrades to the licensed software products, and technical support. The Company has concluded that such promised goods and services are separate distinct performance obligations.

The Company is required to estimate the total consideration expected to be received from contracts with customers, including any variable consideration. Once the estimated transaction price is established, amounts are allocated to the performance obligations that have been identified. The transaction price is allocated to each separate performance obligation on a relative stand-alone selling price ("SSP") basis.

Judgment is required to determine the SSP for each distinct performance obligation. The Company rarely licenses or sells products on a standalone basis, so the Company is required to estimate the range of SSPs for each performance obligation. In instances where the SSP is not directly observable because the Company does not sell the license, product, or service separately, the Company determines the SSP using information that includes historical discounting practices, market conditions, cost-plus analysis, and other observable inputs. The Company typically has more than one SSP for individual performance obligations due to the stratification of those items by classes of customers and circumstances. In these instances, the Company may use information such as the size and geographic region of the customer in determining the SSP. Professional service revenue is recognized as costs and hours are incurred, and judgment is required in estimating project status and the costs incurred or hours expended.

If a group of agreements are so closely related to each other that they are, in effect, part of a single arrangement, such agreements are deemed to be one arrangement for revenue recognition purposes. The Company exercises significant judgment to evaluate the relevant facts and circumstances in determining whether the separate agreements should be accounted for separately or as, in substance, a single arrangement. The Company's judgments about whether a group of contracts comprises a single arrangement can affect the allocation of consideration to the distinct performance obligations, which could have an effect on results of operations for the periods involved.

Generally, the Company has not experienced significant returns or refunds to customers. The Company's estimates related to revenue recognition require significant judgment and the change in these estimates could have an effect on the Company's results of operations during the periods involved.

Contract Balances

The timing of revenue recognition may differ from the timing of invoicing to customers and these timing differences result in receivables, contract assets, or contract liabilities (deferred revenue) on the consolidated balance sheets. The Company records a contract asset when revenue is recognized prior to invoicing and records a deferred revenue liability when revenue is expected to be recognized subsequent to invoicing. For the Company's time-based software agreements, customers are generally invoiced at the beginning of the arrangement for the entire term, though when the term spans multiple years the customers may be invoiced on an annual basis. For certain drug discovery agreements that include payment plans, the Company records a receivable related to revenue recognized upon delivery because it has an unconditional right to invoice and receive payment in the future related to those deliveries.

Contract assets are presented as other receivables within the consolidated balance sheets and primarily relate to the Company's rights to consideration for work completed but not billed on service contracts. Contract assets are transferred to receivables when the Company invoices the customer.

Contract balances were as follows:

	As of December 31,	
	2018	2019
Contract assets	$ 4,357	$ 6,904
Deferred revenue	20,730	27,259

During 2018 and 2019, respectively, the Company recognized $11,297 and $17,720 of revenue that was included in deferred revenue at the end of the preceding year. All other deferred revenue activity is due to the timing of invoices in relation to the timing of revenue, as described above. The Company expects to recognize as revenue approximately 92% of its December 31, 2019 deferred revenue balance in 2020 and the remainder thereafter. Additionally, contracted but unsatisfied performance obligations that had not yet been billed to the customer or included in deferred revenue were $15,308 as of December 31, 2019.

Payment terms and conditions vary by contract type, although terms typically require payment within 30 to 60 days. In instances where the timing of revenue recognition differs from that of invoicing, the Company has determined that its contracts generally do not include a significant financing component. The primary purpose of invoicing terms is to provide customers with simplified and predictable ways of purchasing the Company's products and services, not to facilitate financing arrangements.

Deferred Sales Commissions

The Company has applied the practical expedient for sales commission expense, as any compensation paid to sale representatives to obtain a contract relates to a period of one year or less. Therefore, the Company has not capitalized any costs related to sales commissions.

(l) Warranties

The Company typically warrants that its products will perform in a manner consistent with the product specifications provided to the customer for a period of 30 days. Historically, the Company has not been required to make payments under these obligations. Therefore, no liabilities for such obligations are presented in the consolidated financial statements.

(m) Concentrations

Financial instruments that potentially subject the Company to concentrations of credit risk consist primarily of trade receivables.

The Company does not require customers to provide collateral to support accounts receivable. If deemed necessary, credit reviews of significant customers may be performed prior to extending credit. The determination of a customer's ability to pay requires judgment, and failure to collect from a customer can adversely affect revenue, cash, and net income. The Company maintains an allowance for doubtful accounts.

As of December 31, 2018 and 2019, one customer accounted for 18% and 10% of total accounts receivable. For the year ended December 31, 2018, no customer accounted for more than 10% of total revenues. For the year ended December 31, 2019, one customer accounted for 12% of total revenues.

(n) Royalties

Royalties represent a component of cost of revenues and consist of royalties paid to owners of intellectual property used in or bundled with the Company's software. Generally, royalties are incurred and recorded at the time a customer enters into a binding purchase agreement, although some royalty agreements are based instead on cash collections. Royalty expense was $4,894 and $7,352 for the years ended December 31, 2018 and 2019, respectively.

(o) Software Development Costs

Costs to develop new software products and substantial enhancements to existing software products are expensed as incurred. Historically, the Company has not capitalized any software development costs because the software development process was essentially completed concurrent with the establishment of technological feasibility.

(p) Research and Development and Advertising

Research and development and advertising costs are expensed as incurred. The Company did not incur any significant advertising costs in 2018 or 2019.

(q) Stock-Based Compensation

The Company calculates stock-based compensation expense utilizing fair value–based methodologies and recognizes expense over the vesting period of such awards.

(r) Commissions

Commissions represent a component of sales and marketing expense and consist of the variable compensation paid to the Company's direct sales force. Generally, sales commissions are earned and recorded as expense at the time that a customer has entered into a binding purchase agreement. Commissions paid to sales personnel are recoverable only in the case that the Company cannot collect against any invoiced fee associated with a sales order. Commission expense was $602 and $754 in 2018 and 2019, respectively.

(s) Income Taxes

The Company records deferred tax assets and liabilities for the expected future tax consequences of temporary differences between the financial statement carrying amounts and the tax basis of the assets and liabilities. Deferred tax assets are reduced by a valuation allowance when it is estimated to become more likely than not that a portion of the deferred tax assets will not be realized. Accordingly, the Company currently maintains a full valuation allowance against existing net deferred tax assets.

The Company recognizes the effect of income tax positions only if such positions are deemed "more likely than not" capable to be sustained. Interest and penalties accrued on unrecognized tax benefits are included within income tax expense in the consolidated financial statements.

(t) Comprehensive Loss

Comprehensive loss includes net loss and changes in equity related to changes in unrealized gains or losses on marketable securities.

(u) Equity Investments

The Company has entered into collaboration agreements with Nimbus Therapeutics, LLC ("Nimbus"), Morphic Therapeutic, Inc., a wholly-owned subsidiary of Morphic Holding, Inc. ("Morphic"), and Petra Pharma Corporation ("Petra") to perform drug design services in exchange for minority ownership, which are included within equity investments in the Company's consolidated balance sheets.

The Company has concluded that the carrying value of its equity investment in Nimbus should reflect its contractual rights to substantive profits. The Company further determined that the hypothetical liquidation at book value method ("HLBV method") for valuing contractual rights to substantive profits provides the best representation of its financial position in Nimbus. During 2019, the Company continued to value Nimbus using the HLBV method.

The HLBV method is a balance sheet oriented approach to equity method accounting. Under the HLBV method, the Company determines its share of earnings or losses by comparing its claim on the book value at the beginning and end of each reporting period. This claim is calculated as the amount that the Company would receive (or be obligated to pay) if the investee were to liquidate all of its assets at recorded amounts, determined as of the balance sheet date in accordance with generally accepted accounting principles, and distribute the resulting cash to creditors and investors in accordance with their respective priorities.

Upon the completion of Morphic's initial public offering, the Company changed the valuation methodology used to value the Morphic investment. As there is a readily available market price for Morphic's common stock, the Company values its investment based on the closing price of Morphic's common stock as of the reporting date.

The Company has concluded that its equity investment in Petra should be valued using the historical cost method, as the Company does not exercise significant influence over Petra.

For further information regarding the Company's equity investments, see Note 5, Fair Value Measurements and Note 12, Equity Investments.

(v) Net Loss Per Share Attributable to Common Stockholders

The Company calculates basic and diluted net loss per share attributable to common stockholders in conformity with the two-class method required for companies with participating securities. The Company considers its convertible preferred stock to be participating securities. In the event a dividend is declared or paid on common stock, holders of convertible preferred

stock are entitled to a share of such dividend in proportion to the holders of common stock on an as-if converted basis. Under the two-class method, basic net loss per share attributable to common stockholders is calculated by dividing the net loss attributable to common stockholders by the weighted-average number of shares of common stock outstanding for the period. Net loss attributable to common stockholders is determined by allocating undistributed earnings between common and preferred stockholders.

The diluted net loss per share attributable to common stockholders is computed by giving effect to all potential dilutive common stock equivalents outstanding for the period determined using the treasury stock method. The net loss attributable to common stockholders was not allocated to the convertible preferred stock under the two-class method as the convertible preferred stock does not have a contractual obligation to share in the Company's losses. For purposes of this calculation, convertible preferred stock and certain stock options are considered common stock equivalents but have been excluded from the calculation of net loss per share attributable to common stockholders as their effect is anti-dilutive.

(3) Property and Equipment

Property and equipment consisted of the following:

	As of December 31,	
	2018	2019
Computers and equipment	$ 12,812	$ 11,150
Leasehold improvements	3,545	4,374
Furniture and fixtures	1,043	1,306
	17,400	16,830
Less accumulated depreciation	(9,433)	(10,562)
	$ 7,967	$ 6,268

Depreciation expense for 2018 and 2019 was $2,857 and $3,625, respectively, and is included within cost of revenues and research and development, sales and marketing, and general and administrative expenses within the consolidated statements of operations.

(4) Intangible Assets

Intangible assets are included within other assets in the consolidated balance sheets. The following table presents the Company's intangible assets and their related useful lives:

	As of December 31,		
	2018	2019	Useful life
Purchased technology	$ 1,824	$ 1,764	5–10 years
Customer relationships	—	—	5 years
Trademarks, logos, and website	—	—	5 years
	1,824	1,764	
Less accumulated amortization	(1,809)	(1,764)	
	$ 15	$ —	

Intangible asset amortization expense for 2018 and 2019 was $37 and $15, respectively, and is included within general and administrative expenses in the consolidated statements of operations. The estimated amortization expense for the year ending December 31, 2020 is zero, as all intangible assets are fully amortized.

(5) Fair Value Measurements

Various inputs are used in determining the fair value of the Company's financial assets and liabilities and are summarized into the following three broad categories:

Level 1 – quoted prices in active markets for identical securities

Level 2 – other significant observable inputs, including quoted prices for similar securities, interest rates, credit risk, etc.

Level 3 – significant unobservable inputs, including the Company's own assumptions in determining fair value

The inputs or methodology used for valuing securities are not necessarily an indication of the risk associated with investing in those securities. Marketable securities, which consists primarily of corporate and U.S. government agency bonds, are classified as available for sale and fair value does not differ significantly from carrying value as of December 31, 2018 and 2019. The following table presents information about the Company's assets and liabilities measured at fair value as of December 31, 2018:

	Level 1	Level 2	Level 3	Total
Assets:				
Marketable securities	$ —	$ 6,351	$ —	$ 6,351
Equity investments	—	—	4,288	4,288
Total	$ —	$ 6,351	$ 4,288	$ 10,639

The following table presents information about the Company's assets and liabilities measured at fair value as of December 31, 2019:

	Level 1	Level 2	Level 3	Total
Assets:				
Marketable securities	$ —	$ 59,844	$ —	$ 59,844
Equity investments	14,328	—	108	14,436
Total	$ 14,328	$ 59,844	$ 108	$ 74,280

Fair value of the Company's investment in Morphic, classified as Level 1 in the fair value hierarchy, was determined using the market price of Morphic's common stock as of the close of trading on December 31, 2019.

Fair value of the Company's investment in Nimbus, classified as Level 3 in the fair value hierarchy, was determined under the HLBV method, as further described in Note 2, Significant Accounting Policies. Significant unobservable inputs used under the HLBV method include Nimbus' annual financial statements and the Company's respective liquidation priority. The following table sets forth changes in fair value of the Company's Level 3 investments:

	Amount
As of December 31, 2017	$ 1,679
Cash contributions	3,647
Unrealized loss	(812)
Conversion of investment	(226)
As of December 31, 2018	4,288
Unrealized loss	(4,180)
As of December 31, 2019	$ 108

Unrealized losses arising from changes in fair value of the Company's equity investments are classified within change in fair value in the consolidated statements of operations. There were no transfers between Level 1, Level 2, and Level 3 investments in 2018 or 2019. The conversion of investment represents the conversion of Morphic from an equity investment to a cost investment. See Note 12, Equity Investments for further information.

(6) Commitments and Contingencies

(a) Leases

The Company leases office space under operating leases that expire at various dates through 2029. In addition to rental payments, the Company pays real property taxes, insurance, and repair and maintenance expenses for its office facilities. The Company's fixed operating leases cost was $4,703 and $5,181 for the years ended December31, 2018 and 2019, respectively. The variable and short term lease costs were immaterial for the year ended December 31, 2019.

The Company adopted Topic 842 as of January 1, 2019. In determining the present value of lease payments, the Company uses its incremental borrowing rate based on the information available at the lease commencement date if the rate implicit in the lease is not readily determinable. At the date of adoption of Topic 842, the Company determined lease liability amounts using a discount rate of 5.01%, which represents the Company's incremental borrowing rate. The Company determines its incremental borrowing rate for lease liability using its current borrowing rate, adjusted for various factors including level of collateralization and lease term. Cash paid for operating lease liabilities, included in cash flow from operating activities in the consolidated statements of cash flows, was $5,108 for the year ended December 31, 2019. As of December 31, 2019, the remaining weighted average lease term was 4 years. Three leases expire in January 2020 with the option to extend through August 2020. The company has concluded that these leases are likely to be extended and have included the extension terms in the calculation of the lease liability.

During the year ended December 31, 2019, the Company entered into two new leases, which increased ROU assets and lease liabilities by $464. ROU assets and lease liabilities were equal as no lease costs or incentives were associated with acquiring the leases.

Future minimum lease payments as of December 31, 2018 under noncancelable operating leases were as follows:

Year ending December 31:		
2019	$	4,784
2020		2,078
2021		1,542
2022		1,249
2023		1,034
Thereafter		2,856
Total future minimum lease payments		13,543

Maturities of operating lease liabilities as of December 31, 2019 under noncancelable operating leases were as follows:

Year ending December 31:		
2020	$	6,111
2021		4,456
2022		1,725
2023		1,515
2024		1,532
Thereafter		1,891
Total future minimum lease payments		17,230
Less: imputed interest		(2,758)
Present value of future minimum lease payments		14,472
Less: current portion of operating leases payments		(5,584)
Lease liabilities, long-term	$	8,888

(b) Legal Matters

From time to time, the Company may become involved in routine litigation arising in the ordinary course of business. While the results of such litigation cannot be predicted with certainty, management believes that the final outcome of such matters is not likely to have a material adverse effect on the Company’s financial position or results of operations or cash flows.

(7) Income Taxes

Income tax expense is comprised of the following:

	Year ended December 31,	
	2018	2019
Current:		
Federal	$ —	$ 583
State	41	(95)
Foreign	36	(779)
Current income tax expense (benefit)	77	(291)
Deferred:		
Federal	—	—
State	—	—
Deferred income tax expense (benefit)	—	—
	$ 77	$ (291)

Components of income (loss) before income taxes by tax jurisdiction were as follows:

	Year ended December 31,	
	2018	2019
United States	$ (28,663)	$ (25,385)
Foreign	315	523
	$ (28,348)	$ (24,862)

Reconciliation of income tax expense at the applicable statutory income tax rates to the effective rate is as follows:

	Year ended December 31,	
	2018	2019
Statutory federal income tax rate	21.0%	21.0%
State taxes, net of federal benefits	3.0	4.2
Withholding tax	—	(2.3)
Return-to-provision adjustments	0.5	3.3
Research and development credit	3.3	5.2
Tax contingencies, net of reversals	(0.4)	(0.5)
Tax Cuts and Jobs Act	—	—
Change in valuation allowance	(27.6)	(31.3)
Other	—	(0.5)
Effective income tax rate	(0.2)%	(0.9)%

Income tax expense for the year ended December 31, 2018 primarily related to state taxes, and taxes in foreign jurisdictions. Income tax expense for the year ended December 31, 2019 primarily relates state taxes, taxes in foreign jurisdictions, and foreign withholding taxes, offset from the benefit of the refundable AMT credit.

The total change in valuation allowance for the year ended December 31, 2019 was $7,648, which primarily was due to the generation of net operating losses.

Tax effects of temporary differences that give rise to significant portions of deferred income tax assets and deferred income tax liabilities were as follows:

	As of December 31,	
	2018	2019
Deferred income tax assets:		
Net operating loss carryforwards	$ 18,630	$ 26,119
Accrued expenses	2,776	2,073
Credits	6,379	7,468
Depreciation and amortization	119	32
Gross deferred tax assets	27,904	35,692
Less valuation allowance	(27,603)	(35,251)
Net deferred tax assets	301	441
Deferred income tax liabilities:		
Prepaid expenses	(301)	(441)
Depreciation and amortization	—	—
Net deferred income tax assets	$ —	$ —

As of December 31, 2019, the Company had federal and state net operating loss ("NOL") carryforwards of $104,261 and $64,767, respectively. These carryforwards, with the exception of federal NOLs generated post 2017, will expire between 2019 and 2039 if not used by the Company to reduce income taxes payable in future periods. Utilization of post-2017 federal NOL carryforwards are limited to 80% of taxable income generated in a given year and carry forward indefinitely. As of December 31, 2019, the Company had federal and state research and development tax credit carryforwards of $8,016 and $425, respectively. These carryforwards will expire between 2020 and 2039 if not used by the Company to reduce income taxes payable in future periods.

The Company has not recognized a deferred tax liability for the undistributed earnings of its foreign operations as the Company considers these earnings to be indefinitely reinvested.

The Company classifies interest and penalties related to unrecognized tax benefits within income tax expense in the consolidated statement of operations. Following is a reconciliation of total gross unrecognized tax benefits:

	Year ended December 31,	
	2018	2019
Balance, January 1	$ 686	$ 781
Additions for tax positions taken in prior years	22	24
Reductions for tax positions taken in prior years	(13)	(12)
Additions for tax positions related to the current year	86	109
Balance, December 31	$ 781	$ 902

The Company does not anticipate any significant increases or decreases in its uncertain tax positions within the next 12 months.

As of December 31, 2019, statutes of limitations were open for all of the Company's federal and state tax returns filed after the year ended December 31, 2014 and 2013, respectively. Net operating loss and credit carryforwards for all years are subject to examination and adjustments for the three years following the year in which the carryforwards are utilized. The Company is not currently undergoing any federal or state income tax examinations.

(8) Convertible Preferred Stock

(a) Series A Convertible Preferred Stock ("Series A Preferred Stock")

On April 16, 2010, the board of directors approved the issuance of 7,255,853 shares of Series A preferred stock to existing Series A stockholders as payment for $2,490 in cumulative dividends in arrears. The Series A preferred stock was issued at $0.3432 per share.

Also, on April 16, 2010, the board of directors approved the issuance of 2,987,648 shares of Series A preferred stock to existing Series A stockholders in exchange for the termination of the right to receive future cumulative dividends. The Series A preferred stock was issued at $0.3432 per share.

As the issuance of shares in the form of a stock dividend on April 16, 2010 was greater than 25% of the shares outstanding prior to the dividend, this qualified as a stock split effected in the form of a dividend and resulted in an increase in the outstanding shares and related par value and an equal reduction to additional paid-in capital.

On June 22, 2010, the board of directors approved the issuance of 89,309,763 shares of Series A preferred stock to the unit holders of Schrödinger, LLC, other than the Company in exchange for their LLC units. The exchange rate was 1.1488 shares of Series A preferred stock per LLC unit. Due to the common ownership between the units of the LLC and the equity of the Company, this was considered a transaction between entities under common control and was accounted for at historical cost. As a result of this transaction, Schrödinger, LLC became a wholly owned subsidiary of the Company.

In a liquidation event, excluding a public offering, holders of the Series A preferred stock were entitled to receive (i) following all preferential distributions made to holders of the shares of Series C, Series D, and Series E preferred stock, prior to any distribution to combined common stockholders, and on a *pari passu* basis with holders of the Series B preferred stock, an amount equal to $0.135 per share, plus any declared and unpaid dividends and (ii) following payment of all preferential amounts required to be paid to the holders of preferred stock, a portion of any proceeds remaining for distribution to preferred and combined common stockholders, pro rata based on the number of shares held by each such holder.

Holders of Series A preferred stock were entitled to receive noncumulative dividends at a rate of $0.00675 per share, when and if approved and declared by the board of directors. Through December 31, 2018 and 2019, no dividends had been approved or declared by the board of directors related to the Company's Series A preferred stock, other than as described above.

(b) Series B Convertible Preferred Stock ("Series B Preferred Stock")

On April 16, 2010, the board of directors approved the issuance of 29,468,101 shares of Series B preferred stock to Cascade Investment, LLC. The Series B preferred stock was issued at $0.33935 per share for gross proceeds of $10,000. During 2014, such shares were transferred to the Bill & Melinda Gates Foundation Trust ("BMGFT").

In a liquidation event, excluding a public offering, holders of Series B preferred stock were entitled to receive (i) following all preferential distributions made to holders of the shares of Series C, Series D, and Series E preferred stock, prior to any distribution to combined common stockholders, and on a pari passu basis with holders of the Series A preferred stock, an amount equal to $0.33935 per share, plus any declared and unpaid dividends and (ii) following payment of all preferential amounts required to be paid to the holders of preferred stock, a portion of any proceeds remaining for distribution to preferred and combined common stockholders, pro rata based on the number of shares held by each such holder.

Holders of Series B preferred stock were entitled to receive noncumulative dividends at a rate of $0.016967 per share, when and if approved and declared by the board of directors. Through December 31, 2018 and 2019, no dividends had been approved or declared by the board of directors related to the Company's Series B preferred stock.

(c) Series C Convertible Preferred Stock ("Series C Preferred Stock")

On December 11, 2012, the board of directors approved the issuance of 47,242,235 shares of Series C preferred stock to Cascade Investment, LLC. The Series C preferred stock was issued at $0.42335 per share for gross proceeds of $20,000. During 2014, the shares were transferred to the BMGFT.

In a liquidation event, excluding a public offering, holders of Series C preferred stock were entitled to receive (i) following all preferential distributions made to holders of the shares of Series E preferred stock, prior to any distribution to combined common stockholders and holders of Series A and Series B preferred stock, and on a pari passu basis with holders of the Series D preferred stock, an amount equal to $0.42335 per share, plus any declared and unpaid dividends and (ii) following payment of all preferential amounts required to be paid to the holders of preferred stock, a portion of any proceeds remaining for distribution to preferred and combined common stockholders, pro rata based on the number of shares held by each such holder.

Holders of Series C preferred stock were entitled to receive noncumulative dividends at a rate of $0.0211675 per share, when and if approved and declared by the board of directors. Through December 31, 2018 and 2019, no dividends had been approved or declared by the board of directors related to the Company's Series C preferred stock.

(d) Series D Convertible Preferred Stock ("Series D Preferred Stock")

On June 15, 2015, the board of directors approved the issuance of 35,946,010 shares of Series D preferred stock to the BMGFT and 3,594,601 shares of Series D preferred stock to an employee. The Series D preferred stock was issued at $0.55639 per share for gross proceeds of $22,000.

In a liquidation event, excluding a public offering, holders of Series D preferred stock were entitled to receive (i) following all preferential distributions made to holders of the shares of Series E preferred stock, prior to any distribution to combined common stockholders and holders of Series A and Series B preferred stock, and on a pari passu basis with holders of the Series C preferred stock, an amount equal to $0.55639 per share, plus any declared and unpaid dividends and (ii) following payment of all preferential amounts required to be paid to the holders of preferred stock, a portion of any proceeds remaining for distribution to preferred and combined common stockholders, pro rata based on the number of shares held by each such holder.

Holders of Series D preferred stock were entitled to receive noncumulative dividends at a rate of $0.0278195 per share, when and if approved and declared by the board of directors. Through December 31, 2018 and 2019, no dividends had been approved or declared by the board of directors related to the Company's Series D preferred stock.

(e) Series E Convertible Preferred Stock ("Series E Preferred Stock")

On November 9, 2018, the board of directors authorized 67,087,074 shares of Series E preferred stock, of which 53,669,659 were issued at $1.4906 per share for gross proceeds of $80,000.. In 2019, the Company issued an additional 20,126,118 shares of Series E preferred stock at $1.4906 per share for gross proceeds of $30,000.

In a liquidation event, excluding a public offering, holders of Series E preferred stock were entitled to receive (i) prior to any distribution to combined common stockholders and holders of Series A, Series B, Series C and Series D preferred stock, an amount equal to $1.4906 per share, plus any declared and unpaid dividends and (ii) following payment of all preferential amounts required to be paid to the holders of preferred stock, a portion of any proceeds remaining for distribution to preferred and combined common stockholders, pro rata based on the number of shares held by each such holder.

Holders of Series E preferred stock were entitled to receive noncumulative dividends at a rate of $0.07453 per share, when and if approved and declared by the board of directors. Through December 31, 2019 no dividends had been approved or declared by the board of directors related to the Company's Series E preferred stock.

(f) Convertibility of Preferred Stock

Each share of preferred stock was convertible at any time, at the option of the holder, into a number of shares of common stock determined by dividing the original issuance price by the conversion price, in effect at the time of conversion, as defined in the Company's Amended and Restated Certificate of Incorporation. All shares of a series of preferred stock would automatically convert into common stock upon the earlier of (a) the Company's initial public offering with a price to the public of at least $2.98 per share and at least $100,000 aggregate proceeds to the Company or (b) the date specified by written consent of the holders of a majority of the then outstanding shares of the applicable series of preferred stock.

(9) Stockholders' Deficit

(a) Common Stock

As of December 31, 2019, the Company had authorized 425,000,000 shares of common stock with a par value of $0.01 per share. Holders of common stock are entitled to one vote per share, receive dividends, if and when declared by the board of directors, and upon liquidation or dissolution, receive a portion of the assets available for distributions to stockholders, subject to preferential amounts owed to holders of the Company's preferred stock.

Common stockholders have no preemptive or other subscription rights and there are no redemption or sinking fund provisions with respect to such shares. Common stock is subordinate to preferred stock with respect to dividend rights and rights upon liquidation, winding up, and dissolution of the Company.

(b) Non-Voting Common Stock

As of December 31, 2019, the Company had authorized 146,199,885 shares of non-voting common stock with a par value of $0.01 per share. Holders of non-voting common stock were entitled to receive dividends, if and when declared by the board of directors, and upon liquidation or dissolution, receive a portion of the assets available for distributions to stockholders, subject to preferential amounts owed to holders of the Company's preferred stock.

Non-voting common stockholders had no preemptive or other subscription rights and there were no redemption or sinking fund provisions with respect to such shares. Non-voting common stock was subordinate to preferred stock with respect to dividend rights and rights upon liquidation, winding up, and dissolutions of the Company. As of December 31, 2018 and 2019, no non-voting common stock was outstanding.

(10) Stock-Based Compensation

Stock Incentive Plan

As of December 31, 2019, the Company's stock incentive plans included the 2000 Stock Incentive Plan as amended in 2002 (the "2002 Plan") and the Company's 2010 Stock Plan (the "2010 Plan") (together, the "Plans"), and provided for the granting of incentive stock options and nonqualified stock options. Under the 2010 Plan, stock options must be granted at an exercise price not less than 100% of the fair market value per share at the grant date. Under the 2002 Plan, incentive stock options must be granted at an exercise price not less than 100% of the fair market value per share on the grant date, but there is no minimum exercise price set for nonqualified stock options. The maximum contractual term of options granted under the Plans is 10 years, and rights to exercise options generally vest over four years with 25% of the shares underlying the option vesting at the end of each of the first four years. The 2002 Plan expired during 2010. Shares issuable under options currently outstanding under the 2002 Plan will not be available for reissuance upon cancellation.

During 2018 and 2019, 446,583 and 214,845 options under the Plans were exercised at a total exercise price of $896 and $549, respectively.

The fair value of each option award is determined on the date of grant using the Black Scholes Merton option-pricing model. The calculation of fair value includes several assumptions that require management's judgment. The expected terms of options granted to employees during 2018 and 2019 were calculated using an average of historical exercises. Estimated volatility for 2018 and 2019 incorporates a calculated volatility derived from the historical closing prices of shares of common stock of similar entities whose share prices were publicly available for the expected term of the option. The risk free interest rate is based on the U.S. Treasury constant maturities in effect at the time of grant for the expected term of the option. The Company accounts for forfeitures as they occur, as such, the Company does not estimate forfeitures at the time of grant.

Because there had been no public market for the Company's common stock, the board of directors historically estimated the price of the Company's common stock based upon several factors, including, but not limited to, third party valuations and the Company's operating and financial performance. The third party valuations took into consideration several factors, including prices for preferred stock that were sold to outside investors in arm's length transactions, and the rights, preferences, and privileges of the preferred stock and the common stock; the fact that the option grants involved illiquid securities in a private company; the Company's stage of development and revenue growth; the state of the industry and the economy; the marketplace and major competitors; and the likelihood of achieving a liquidity event for the shares of common stock underlying the options, such as an initial public offering or sale of the Company, given prevailing market conditions. These valuations were performed in accordance with the *American Institute of Certified Public Accountants' Audit and Accounting Practice Aid, Valuation of Privately Held Company Equity Securities Issued as Compensation*.

As of December 31, 2018 and 2019, respectively, there were 1,334,859 and 236,005 additional shares available for grant under the 2010 Plan, respectively. Following are the weighted average valuation assumptions used for options:

	Year ended December 31,	
	2018	2019
Valuation assumptions		
Expected dividend yield	—%	—%
Expected volatility	57%	57%
Expected term (years)	6.60	6.05
Risk-free interest rate	2.86%	2.33%

The following table presents classification of stock-based compensation expense within the consolidated statements of operations:

	Year ended December 31,	
	2018	2019
Cost of sales	$ 301	$ 376
Research and development	481	460
Sales and marketing	182	311
General and administrative	349	1,046
	$ 1,313	$ 2,193

Stock option activity was as follows:

	Number of shares	Weighted average exercise price	Weighted average remaining contractual term (years)	Aggregate intrinsic value
Beginning, January 1, 2019	4,025,039	$ 2.99		
Granted	1,255,242	5.23		
Exercised	(214,845)	2.54		
Forfeited	(83,078)	3.66		
Expired	(38,580)	2.24		
Balance, December 31, 2019	4,943,778	3.57	7.50	$ 39,280
Exercisable, December 31, 2019	2,103,820	2.54	6.05	$ 18,807

The weighted average grant date fair value of options granted during 2018 and 2019 was $1.65 and $2.93, respectively. The intrinsic value of options exercised during 2018 and 2019 was $465 and $546, respectively.

As of December 31, 2019, there was $5,475 of unrecognized compensation cost related to unvested stock options granted under the 2010 Plan, which is expected to be recognized over a weighted average period of 2.84 years. The fair value of shares vested during 2018 and 2019 was $1,176 and $1,734, respectively.

(11) Net Loss Per Share Attributable to Common Stockholders

The following table sets forth the computation of basic and diluted net loss per share attributable to common stockholders (in thousands, except per share data):

	Year ended December 31,	
	2018	2019
Numerator:		
Net loss	$ (28,425)	$ (24,571)
Denominator:		
Weighted average common shares used to compute net loss per share attributable to common stockholders, basic and diluted	5,771,305	6,004,500
Net loss per share	$ (4.93)	$ (4.09)

Since the Company was in a loss position for all periods presented, basic net loss per share is the same as diluted net loss per share as the inclusion of all potential common shares outstanding would have been anti-dilutive. Potentially dilutive securities that were not included in the diluted per share calculations because they would be anti-dilutive were as follows:

	Year ended December 31,	
	2018	2019
Convertible preferred stock	34,613,658	42,734,884
Shares subject to outstanding common stock options	3,396,628	4,805,562
	38,010,286	47,540,446

(12) Equity Investments

The Company classifies the Nimbus investment as an equity investment within the consolidated balance sheets. The Nimbus investment was received as compensation for collaboration services provided under a separate service agreement. The Company held 8.0% and 6.7% of the issued and outstanding units of Nimbus as of December 31, 2018 and 2019, respectively.

The Company also has the right to designate one of nine board seats, provide software used by Nimbus to pursue drug discovery activities, and participate via the board seat in the governance of the entity. Based upon these factors, the Company's management believes that it has significant influence over the entity and therefore accounts for the entity as an equity method investment.

The Company provides collaboration services for Nimbus under the terms of a master services agreement executed on May 18, 2010, as amended. Collaboration agreements are separate from the transaction which resulted in equity ownership and related fees are paid in cash to the Company.

Under the HLBV method, the Company reported losses of $133 and $4,180 on the Nimbus investment during 2018 and 2019, respectively. The carrying value of the Nimbus investment was $4,288 and $108 as of December 31, 2018 and 2019, respectively. The Company has no obligation to fund Nimbus losses in excess of its initial investment.

In June 2019, Morphic successfully completed an initial public offering. The Company accounts for its investment in Morphic at fair value based on the share price of Morphic's common stock at the measurement date. The Company held 3.23% and 2.74% of the issued and outstanding shares of Morphic's common stock as of December 31, 2018 and 2019, respectively.

Prior to December 2018, the Company valued its investment in Morphic using the HLBV method. Under the HLBV method, the Company reported losses of $679 for the year ended December 31, 2018. As of December 31, 2018 and 2019, the carrying value of the investment in Morphic was $226 and $14,328, respectively. The Company has no obligation to fund Morphic losses in excess of its initial investment.

On January 1, 2018, the Company adopted ASU 2016-01, *Recognition and Measurement of Financial Assets and Liabilities*, whereby the carrying values of its non-marketable equity securities are adjusted based on price changes from observable transactions of identical or similar securities of the same issuer or for impairment (referred to as the measurement alternative). Any changes in carrying value are classified within other (expense) income in the consolidated statements of operations. As of December 31, 2018 and 2019, the carrying value of non-marketable equity securities was $930.

(13) Employee Benefit Plan

The Company offers a 401(k) employee savings plan to its U.S.-based employees. The Company made discretionary matching contributions equal to 100% of the first 1.5% and 4.0% of compensation contributed by employees for the years ended December 31, 2018 and 2019, respectively. Matching contributions during 2018 and 2019 were $489 and $1,492, respectively.

(14) Related Party Transactions

(a) D.E. Shaw

As of December 31, 2018 and 2019, companies collectively controlled by David E. Shaw and/or affiliates of companies controlled by David E. Shaw ("D.E. Shaw entities"), owned 123,314,389 shares of the issued and outstanding Series A Preferred stock.

During 2018 and 2019, the Company licensed technology and purchased services for $3,704 and $5,190, respectively, from D.E. Shaw entities. In addition, D.E. Shaw entities purchased certain products and services from, and provided cost reimbursements to, the Company totaling $197 and $195 in 2018 and 2019, respectively. At December 31, 2018 and 2019, the Company had net payables of $1,028 and $1,760, respectively, to D.E. Shaw entities.

(b) Board Member

During 2018 and 2019, the Company paid consulting fees of $347 and $361 respectively, to a member of its board of directors.

(c) Bill & Melinda Gates Foundation

As of December 31, 2018 and 2019, BMGFT owned 29,468,101 shares, 47,242,235 shares, 35,946,010 shares, and 33,543,539 shares of issued and outstanding Series B, Series C, Series D, and Series E Preferred stock.

During 2018 and 2019, the Bill & Melinda Gates Foundation, an entity under common control of BMGFT, issued a grant under which it agreed to pay the Company directly for certain licenses and services provided to a specified group of third-party organizations. Revenue recognized for services provided by the Company were $833 and $1,065 in 2018 and 2019, respectively. As of December 31, 2018 and 2019, the Company had net receivables of $207 and $294, respectively, due from the Bill & Melinda Gates Foundation.

(d) Nimbus

During 2018 and 2019, the Company recognized revenue of $1,080 and $1,093, respectively, from collaboration services agreements with Nimbus.

(15) Segment Reporting

The Company has determined that its chief executive officer ("CEO") is its chief operating decision maker ("CODM"). The Company's CEO evaluates the financial performance of the Company based on two reportable segments: Software and Drug Discovery. The Software segment is focused on licensing the Company's software to transform molecular discovery. The Drug Discovery segment is focused on building a portfolio of preclinical and clinical drug programs, internally and through collaborations.

The CODM reviews segment performance and allocates resources based upon segment revenue and segment gross profit of the Software and Drug Discovery reportable segments. Segment gross profit is derived by deducting operational expenditures, with the exception of research and development, sales and marketing, and general and administrative activities from U.S. GAAP revenue. Operational expenditures are expenditures made that are directly attributable to the reportable segment. These expenditures are allocated to the segments based on headcount. The reportable segment expenditures include compensation, supplies, and services from contract research organizations.

Certain cost items are not allocated to the Company's reportable segments. These cost items primarily consist of compensation and general operational expenses associated with the Company's research and development, sales and marketing, and general and administrative. These costs are incurred by both segments and due to the integrated nature of the Company's Software and Drug Discovery segments, any allocation methodology would be arbitrary and provide no meaningful analysis.

All segment revenue is earned in the United States and there are no intersegment revenues. Additionally, the Company reports assets on a consolidated basis and does not allocate assets to its reportable segments for purposes of assessing segment performance or allocating resources. Presented below is the financial information with respect to the Company's reportable segments for the periods presented:

	Year ended December 31,	
	2018	2019
Segment revenues:		
Software	$ 59,885	$ 66,735
Drug discovery	6,754	18,808
Total segment revenues	$ 66,639	$ 85,543
Segment gross profit:		
Software	$ 49,198	$ 53,089
Drug discovery	(6,261)	(3,996)
Total segment gross profit	42,937	49,093
Unallocated:		
Research and development expense	(34,523)	(39,404)
Sales and marketing expense	(17,831)	(21,364)
General and administrative expense	(18,552)	(27,040)
Gain on equity investment	—	943
Change in fair value	(812)	9,922
Interest income	433	1,878
Income tax expense	(77)	291
Consolidated net loss	$ (28,425)	$ (25,681)

The following table sets forth revenues by geographic area for the years ended December 31, 2018 and 2019:

	Year ended December 31,	
	2018	2019
United States	$ 35,688	$ 47,622
Europe	14,868	17,504
Japan	10,026	14,367
Rest of World	6,057	6,050
	$ 66,639	$ 85,543

(16) Subsequent Events

In January 2020, the Company's Board of Directors and stockholders approved a one-for-7.47534 reverse stock split of the Company's issued and outstanding shares of common stock and a proportional adjustment to the existing conversion ratios for the Company's preferred stock. All share and per share amounts in the consolidated financial statements and notes thereto have been retrospectively adjusted for all periods presented to give effect to the reverse stock split and the adjustment of the preferred stock conversion ratios.

In January 2020, the Company adopted the 2020 Equity Incentive Plan, (the "2020 Plan"), which became effective with the Company's initial public offering. The 2020 Plan authorizes the award of incentive stock options, non-qualified stock options, stock appreciation rights, restricted stock awards, restricted stock units, and other stock-based awards. The number of shares of common stock reserved for issuance under the 2020 Plan equals the sum of (i) 5,645,228 shares of common stock; plus (ii) (A) the number of shares of common stock reserved for issuance under the 2010 Plan that remained available for grant under the 2010 Plan immediately prior to the effectiveness of the registration statement related to the Company's initial public offering and (ii) (B) the number of shares of common stock subject to outstanding awards granted under the 2010 Plan that expire, terminate, or are otherwise surrendered, cancelled, forfeited, or repurchased by the Company at their original issuance price pursuant to a contractual repurchase right; and plus (iii) an annual increase to be added on the first day of each fiscal year, beginning with the fiscal year ending December 31, 2021 and continuing for each fiscal year until, and including, the fiscal year ending December 31, 2025, by a number of shares of common stock equal to the smallest of (A) 1.5% of the sum of (a) the outstanding shares of common stock, (b) the outstanding shares of limited common stock and (c) the outstanding stock options granted by the Company (which sum is referred to as the "outstanding equity"), calculated on the last business day of the prior fiscal year or (B) the number of shares of common stock determined by the board of directors and (iv) an annual increase to be added on the first day of each fiscal year, beginning with the fiscal year ending December 31, 2026 and continuing for each fiscal year until, and including, the fiscal year ending December 31, 2030, by a number of shares of common stock equal to the smallest of (A) 1.0% of the outstanding equity, calculated on the last business day of the prior fiscal year or (B) the number of shares of common stock determined by the board of directors.

In January 2020, the Company made a cash investment in Nimbus of $2,869, which increased its ownership interest in Nimbus to 8.0% on a fully diluted basis.

On February 10, 2020, the Company completed the sale of 11,882,352 shares of its common stock in the initial public offering (the "IPO") at a price to the public of $17.00 per share. The underwriters fully exercised their over-allotment option and purchased an additional 1,782,352 shares of the Company's common stock. The offer and sale of the shares in the IPO was registered under the Securities Act pursuant to a registration statement on Form S-1 (File No. 333-235890), which was originally filed with the Securities and Exchange Commission (the "SEC") on January 10, 2020, as subsequently amended, and declared effective by the SEC on February 5, 2020, as supplemented by a registration statement on Form S-1 (File No. 333 235890) filed pursuant to Rule 462 under the Securities Act of 1933, as amended. The Company raised approximately $209.9 million in net proceeds in the IPO after deducting underwriting discounts and commissions and estimated offering expenses payable by the Company.

Immediately prior to the closing of the IPO, preferred stockholders voluntary exchanged 98,406,823 shares of preferred stock for an aggregate of 13,164,193 shares of limited common stock. In addition, in connection with the closing of the IPO, the remaining 226,344,686 shares of preferred stock automatic converted into an aggregate of 30,278,832 shares of common stock.

In February 2020, the Company's Board of Directors granted 3,687,296 options to executives, directors, and employees at an exercise price of $17.00 per share under the 2020 Plan.

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 principal executive officer and principal financial officer, has evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a- 15(e) and 15d- 15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act , as of December 31, 2019. The term "disclosure controls and procedures," means controls and other procedures of a company that are 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 recorded, processed, summarized and reported, within the time periods specified in the Securities and Exchange Commission's rules and forms. 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 the company's management, including its principal executive and principal financial officers, or persons performing similar functions, 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 judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on such evaluation of our disclosure controls and procedures as of December 31, 2019, our principal executive officer and principal financial officer have concluded that as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Management's Annual Report on Internal Control Over Financial Reporting and Attestation Report of Registered Public Accounting Firm

This Annual Report on Form 10-K does not include a report of management's assessment regarding internal control over financial reporting or an attestation report of our independent registered public accounting firm due to a transition period under the rules of the SEC for newly public companies.

Changes in Internal Control Over Financial Reporting

During the year ended December 31, 2018, a material weakness in internal control over financial reporting was identified relating to our controls to review equity method investee financial information at a level of precision that would identify material misstatements in our financial statements, which was due to a deficiency in the design of entity-level controls.

During the year ended December 31. 2019,we implemented measures designed to improve our internal control over financial reporting to remediate this material weakness, including increasing communication with our equity investee companies to ensure timely receipt of relevant financial information, instructing our material investees to provide quarterly U.S. GAAP financial statements, and implementing completeness and accuracy controls surrounding the financial data received from investees.

Based upon the remediation actions taken and completed during 2019, and our testing and evaluation of the newly implemented control activities and our internal control over financial reporting, we have concluded that the material weakness has been remediated as of December 31, 2019.

Except with respect to the changes in connection with our implementation of the remediation plan discussed above, there were no changes in our internal control over financial reporting (as defined in Rules 13a-15(f) under the Exchange Act) that occurred during the fourth quarter of 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Inherent Limitations on Effectiveness of Controls

Our management, including our principal executive officer and principal financial officer, do not expect that our disclosure controls or our internal control over financial reporting will prevent all errors and all fraud. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, have been detected. These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of a simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by management override of the controls. The design of any system of controls is also based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions, over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The following sets forth certain information regarding our executive officers and directors as of December 31, 2019:

Name	Age	Position
Executive Officers		
Ramy Farid, Ph.D.	55	Chief Executive Officer and President, Director
Robert Abel, Ph.D.	37	Executive Vice President, Science
Karen Akinsanya, Ph.D.	52	Executive Vice President, Chief Biomedical Scientist, Head of Discovery R&D
Shane Brauner	42	Senior Vice President and Chief Information Officer
Jennifer Daniel	50	Senior Vice President and Chief Human Resources Officer
Cony D'Cruz	57	Executive Vice President and Chief Business Officer
Joel Lebowitz	56	Executive Vice President and Chief Financial Officer
Kenneth "Patrick" Lorton	36	Senior Vice President and Chief Technology Officer
Yvonne Tran	49	Executive Vice President and Chief Legal Officer
Jörg Weiser	52	Executive Vice President and Managing Director
Non-Employee Directors		
Michael Lynton(1)(3)	59	Chairman of the Board of Directors
Richard A. Friesner, Ph.D.	67	Director
Rosana Kapeller-Libermann, M.D., Ph.D. (1)(2)	56	Director
Gary Sender(1)(2)	57	Director
Nancy Thornberry(3)	63	Director
Timothy M. Wright, M.D.(2)	64	Director

(1) Member of the Audit Committee.
(2) Member of the Compensation Committee.
(3) Member of the Nominating and Corporate Governance Committee.

Executive Officers

Ramy Farid, Ph.D. has served as our president since January 2008, our chief executive officer since January 2017 and as a member of our board of directors since December 2012. Dr. Farid has been with our company for over 17 years and has served as senior vice president from January 2005 to December 2007, vice president, scientific development and product management from January 2003 to December 2004 and product manager from January 2002 to December 2002. Dr. Farid serves on the board of directors of multiple biotechnology companies co-founded by us, and previously served on the board of directors of Morphic Holding, Inc., a biotechnology company. Prior to joining our company, Dr. Farid was an assistant professor in the Chemistry Department at Rutgers University. Dr. Farid received a B.S. in Chemistry from the University of Rochester and a Ph.D. from the California Institute of Technology, and he was a National Institutes of Health postdoctoral fellow in the Department of Biochemistry and Biophysics at the University of Pennsylvania. We believe that Dr. Farid's extensive knowledge of our company and current role as our president and chief executive officer qualifies him to serve on our board of directors.

Robert Abel, Ph.D. has served as our executive vice president, science, since January 2020. Dr. Abel has been with our company for over 10 years and previously served as our senior vice president, science, from April 2017 to December 2019, vice president, scientific development from January 2014 to April 2017, director of structure-based science from January 2011 to December 2013, senior principal scientist and product manager from January 2010 to December 2010 and senior scientist from March 2009 to December 2009. Dr. Abel received a B.S. in Chemistry from the University of Florida and a Ph.D. in Chemical Physics from Columbia University. In graduate school, Dr. Abel was a National Science Foundation Graduate Research Fellow and a Department of Homeland Security Research Fellow, and worked from May 2005 to August 2005 at Los Alamos National Laboratory under the auspices of the DHS Research Fellowship.

Karen Akinsanya, Ph.D. has served as our executive vice president, chief biomedical scientist, head of discovery R&D since January 2020 and previously served as our senior vice president and chief biomedical scientist from April 2018 to December 2019. Dr. Akinsanya spent 12 years at Merck & Co., Inc., or Merck, a pharmaceutical company, where she held a variety of positions across Merck Research Labs, including associate vice president, early scientific assessment lead, business development & licensing from December 2013 to July 2017, collaboration lead and executive director, cardiovascular research from January 2010 to December 2013, and associate director, clinical pharmacology from October 2005 to December 2009. Prior to Merck, Dr. Akinsanya held a number of roles in drug discovery at Ferring Pharmaceuticals in the United Kingdom and the United States from 1997 to 2005. In 2007, Dr. Akinsanya founded Envision Science Group LLC, or Envision, a translational science consulting company, where she currently serves as president. Dr. Akinsanya provided consulting services on behalf of Envision to companies in the pharmaceutical industry between July 2017 and April 2018. Dr. Akinsanya received a B.Sc. in Biochemistry from Queen Mary College, University of London, a Ph.D. in Endocrine Physiology from the Imperial College and completed postdoctoral studies at the Ludwig Institute for Cancer Research, University College, London.

Shane Brauner has served as our chief information officer since January 2019. Mr. Brauner has been with our company for over 10 years and previously served as our senior vice president, information systems from January 2017 to January 2019, vice president, information technology and operations from January 2015 to January 2017, executive director, information technology and operations from January 2014 to January 2015, senior director, information technology from January 2012 to January 2014, director, information technology from January 2010 to January 2012 and manager, information technology from February 2009 to January 2010. Prior to joining our company, Mr. Brauner served as a consultant, managing global grid computing support at Pfizer, Inc., or Pfizer, from June 2007 to October 2008. Mr. Brauner received a B.S. in Computer Science from the University of Houston.

Jennifer Daniel has served as our senior vice president and chief human resources officer since February 2017 and as our vice president of human resources from January 2002 to June 2009. Prior to rejoining our company in February 2017, Ms. Daniel served as senior vice president, human resources at Outbrain Inc., an advertising technology company, from December 2011 to February 2017. Prior to that, Ms. Daniel served as senior vice president, strategic growth, at Juno Online Services, an internet service provider company, from June 1996 to October 2001. Ms. Daniel received a B.A. in International Relations from American University and an M.L.A, Environmental Studies from the University of Pennsylvania.

Cony D'Cruz has served as our executive vice president and chief business officer since January 2016. Previously, Mr. D'Cruz served as our senior vice president of business development from April 2013 to December 2015. Prior to joining our company, Mr. D'Cruz served as president of Proteros US, Inc., or Proteros, a biotechnology company, from 2010 to March 2013. Prior to joining Proteros, Mr. D'Cruz served as senior vice president, North America, at Evotec SE, or Evotec, a biotechnology company, from 2001 to 2010. Mr. D'Cruz received a B.Sc. in Applied Biology from the University of London and an M.B.A from The Open University, Milton Keynes United Kingdom.

Joel Lebowitz has served as our executive vice president and chief financial officer since November 2018. Mr. Lebowitz previously spent 26 years at Merck, a pharmaceutical company, where he served as global finance lead, project management from September 2013 to December 2014, executive director, pipeline valuation and portfolio analysis from October 2011 to March 2014 and executive director, corporate planning and management reporting from 2005 to 2011. From January 2015 to October 2018, Mr. Lebowitz was retired. Mr. Lebowitz received a B.A. in Applied Mathematics and Economics from Brown University and an M.B.A. in Finance and International Business from Columbia Graduate School of Business.

Patrick Lorton has served as our senior vice president and chief technology officer since April 2017. Mr. Lorton has been with our company for over 13 years and previously served as our vice president of engineering from January 2016 to April 2017, director of software engineering from January 2015 to January 2016, associate director of software engineering from December 2012 to January 2015, project leader from January 2011 to December 2012 and scientific developer from September 2006 to December 2012. Prior to joining our company, Mr. Lorton served as a chemistry research assistant from December 2005 to September 2006 and a computer science research assistant from August 2004 to July 2006 at Indiana University Bloomington. Mr. Lorton received a B.S. in Computer Science and a B.A. in Mathematics and Chemistry from Indiana University Bloomington.

Yvonne Tran has served as our executive vice president and chief legal officer since April 2017, and previously served as our general counsel from April 2010 to April 2017. Prior to joining our company, Ms. Tran previously served as senior corporate counsel at Oracle America, Inc., or Oracle, a technology company, from January 2008 to April 2010. Prior to joining Oracle, Ms. Tran served as outside legal consultant from January 2006 to January 2008 and deputy general counsel from April 2000 to January 2006 at DoubleClick, Inc., an advertising technology company since acquired by Google LLC. Ms. Tran received a B.A. in Molecular Biophysics and Biochemistry from Yale University and a J.D. from the University of Virginia School of Law.

Jörg Weiser has served as the executive vice president and managing director of our German office and wholly owned subsidiary, Schrödinger GmbH, since October 2002. Dr. Weiser previously served as co-founder and managing director at Anterio Consult & Research GmbH, a German consulting and research company, from June 1999 to September 2002. Dr. Weiser received a doctorate in Organic Chemistry from the University of Göttingen and was a post-doctoral fellow at Columbia University.

Non-Employee Directors

Michael Lynton has served as a member of our board of directors since January 2018 and chairman of our board of directors since October 2018. He has served as a director at General Catalyst Partners, a venture capital firm, since December 2018. Mr. Lynton served as chief executive officer of Sony Entertainment Inc., an international entertainment company, from April 2012 to August 2017, as chairman and chief executive officer of Sony Pictures Entertainment Inc., from January 2004 to May 2017 and as chief executive officer of Sony Corporation of America, from March 2012 to August 2017. Mr. Lynton currently serves as chairman of the board of directors of Snap Inc., a publicly-traded technology company, and as a member of the board of directors of Ares Management Corporation, a publicly traded, global alternative asset manager, and Pearson plc., a publicly traded publishing and education company. Mr. Lynton also served as a member on the board of directors of Pandora Media, Inc. from August 2017 to February 2019. Mr. Lynton received a B.A. in History and Literature from Harvard College and an M.B.A. from Harvard Business School. We believe that Mr. Lynton's public company board and management experience and his extensive business and leadership experience qualifies him to serve as chairman of our board of directors.

Richard A. Friesner, Ph.D. has served as a member of our board of directors since August 1990, when he co-founded us. Dr. Friesner is currently the William P. Schweitzer professor of chemistry at Columbia University, the principal investigator of the Friesner Research Group, a research laboratory within the Department of Chemistry at Columbia University, and he has served as a professor of chemistry at Columbia University since September 1990. Dr. Friesner is a Fellow of the American Academy of Sciences and a member of the National Academy of Sciences. Dr. Friesner received a B.S. in Chemistry from the University of Chicago and a Ph.D. in Chemistry from the University of California, Berkeley. We believe that Dr. Friesner's extensive experience in theoretical chemistry and his extensive knowledge of our company since inception, as well as his distinguished scientific record, qualifies him to serve on our board of directors.

Rosana Kapeller-Libermann, M.D., Ph.D. has served as a member of our board of directors since January 2019. Dr. Kapeller-Libermann has served as president and chief executive officer of Rome Therapeutics, Inc., a therapeutics company, since April 2019. She has also served as an entrepreneur in residence at GV, a venture capital investment arm of Alphabet Inc. since November 2018. Prior to that, Dr. Kapeller-Libermann served as founding chief scientific officer of Nimbus Therapeutics, or Nimbus, a biotechnology company, from February 2010 to March 2018. Prior to joining Nimbus, she served as vice president of research at Aileron Therapeutics, Inc., a biopharmaceutical company, from August 2005 to September 2009. Dr. Kapeller-Libermann received an M.D. from Universidade do Estado do Rio de Janeiro and a Ph.D. in Molecular and Cellular Physiology from Tufts University. We believe Dr. Kapeller-Libermann's scientific experience in the field of drug discovery and extensive experience working with life sciences companies qualifies her to serve on our board of directors.

Gary Sender has served as a member of our board of directors since July 2019. Mr. Sender has served as chief financial officer of Nabriva Therapeutics plc, or Nabriva, a publicly-traded biopharmaceutical company, since May 2016. Prior to joining Nabriva, Mr. Sender served as chief financial officer and executive vice president at Synergy Pharmaceuticals Inc., or Synergy, a publicly-traded biopharmaceutical company, from November 2015 to April 2016. Prior to joining Synergy, from August 2009 to June 2015, Mr. Sender served as senior vice president, finance at Shire plc., or Shire, a biopharmaceutical company since acquired by Takeda Pharmaceutical Company Limited. Prior to joining Shire, Mr. Sender served as founding chief financial officer of Tengion, Inc., a regenerative medicine company, from August 2004 to July 2009. Mr. Sender also spent over 15 years in several leadership roles within Merck, a pharmaceutical company. Mr. Sender received a B.S. in Finance from Boston University and an M.B.A. from Carnegie-Mellon University. We believe Mr. Sender's extensive experience in the life sciences industry, and in particular his financial acumen, qualifies him to serve on our board of directors.

Nancy Thornberry has served as a member of our board of directors since September 2019. Ms. Thornberry has served as chief executive officer of Kallyope, Inc., a biotechnology company, since November 2015. Between August 2013 and October 2015, Ms. Thornberry was self-employed as a consultant to companies in the biotechnology and pharmaceutical industries. Prior to that, Ms. Thornberry spent over 30 years at Merck, a pharmaceutical company, where she held a variety of positions including senior vice president and franchise head, diabetes and endocrinology, from April 2011 to July 2013, senior vice president and franchise head, diabetes and obesity, from September 2009 to April 2011, vice president, worldwide basic research head, diabetes and obesity, from February 2007 to September 2009 and executive director, metabolic disorders, from 2004 to February 2007, among other positions. Ms. Thornberry received a B.S. in Chemistry and Biology from Muhlenberg College. We believe Ms. Thornberry's scientific background and experience in the life sciences industry qualifies her to serve on our board of directors.

Timothy M. Wright, M.D. has served as a member of our board of directors since April 2015. Dr. Wright has served as general partner at Time BioVentures, a life sciences venture capital firm, since April 2019. Prior to that, Dr. Wright served as chief research and development officer at Regulus Therapeutics, Inc. or Regulus, a biopharmaceutical company, from September 2016 to March 2019. Prior to joining Regulus, Dr. Wright served as executive vice president, translational sciences at the California Institute for Biomedical Research, a non-profit organization, from February 2015 to August 2016. Prior to that, Dr. Wright held positions of increasing responsibility at Novartis Pharmaceuticals, a multinational pharmaceutical company, from April 2004 to January 2015, including deputy head of translational research, global head of translational medicine, global head of translational sciences and global head of pharma development. Dr. Wright currently serves as a scientific advisor to the Bill and Melinda Gates Foundation and to the Leonard Schaeffer Center for Health Policy and Economics at University of Southern California. Dr. Wright received a B.A. in Biology from the University of Delaware and an M.D. from the Johns Hopkins University School of Medicine where he also completed postdoctoral training. We believe Dr. Wright's business experience and knowledge of the life sciences industry in which we operate qualifies him to serve on our board of directors.

Board Composition

Our board of directors is currently authorized to have seven members and consists of seven members. Our directors hold office until their successors have been elected and qualified or until the earlier of their death, resignation or removal.

In accordance with the terms of our certificate of incorporation and bylaws that became effective upon the closing of our initial public offering, our board of directors is divided into three classes, class I, class II and class III, with members of each class serving staggered three-year terms. The members of the classes are divided as follows:

- the class I directors are Ramy Farid and Timothy M. Wright, and their term will expire at the annual meeting of stockholders to be held in 2021;
- the class II directors are Michael Lynton and Nancy Thornberry, and their term will expire at the annual meeting of stockholders to be held in 2022; and
- the class III directors are Richard A. Friesner, Rosana Kapeller-Libermann, and Gary Sender, and their term will expire at the annual meeting of stockholders to be held in 2023.

Upon the expiration of the term of a class of directors, directors in that class will be eligible to be elected for a new three-year term at the annual meeting of stockholders in the year in which their term expires. There are no family relationships among any of our directors or executive officers.

Code of Business Conduct and Ethics

We have adopted a written code of business conduct and ethics that applies to our directors, officers, and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. We have posted a current copy of the code on our website, www.schrodinger.com. In addition, we intend to post on our website all disclosures that are required by law or Nasdaq listing standards concerning any amendments to, or waivers from, any provision of the code. Our website is not incorporated by reference into this Annual Report and you should not consider any information contained in or accessible from our website to be a part of this Annual Report.

Audit Committee and Audit Committee Financial Expert

Our audit committee consists of Gary Sender, Rosana Kapeller-Libermann and Michael Lynton. Gary Sender is the chair of the audit committee. Our board of directors has determined that Gary Sender is an “audit committee financial expert” within the meaning of SEC regulations and that he possesses the financial sophistication required for audit committee membership under the Nasdaq rules. Our board of directors has determined that Gary Sender is an “independent director” as defined under applicable Nasdaq rules, including the independence criteria set forth in Rule 10A-3 under the Securities Exchange Act of 1934.

Stockholder Recommendation of Director Nominees

Our nominating and corporate governance committee will consider director candidates recommended by stockholders. The nominating and corporate governance committee does not intend to alter the manner in which it evaluates candidates, based on whether or not the candidate was recommended by a stockholder. Stockholders who wish to recommend individuals for consideration by the nominating and corporate governance committee to become nominees for election to our board of directors may do so by delivering a written recommendation to our Secretary at the following address: 120 West 45th Street, 17th Floor, New York, New York, at least 90 days, but not more than 120 days, prior to the first anniversary of the preceding year's annual meeting. Submissions must include (1) such person's name, age, business address and, if known, residence address, (2) such person's principal occupation or employment, (3) the class and series and number of shares of stock of the corporation that are, directly or indirectly, owned, beneficially or of record, by such person, (4) a description of all direct and indirect compensation and other material monetary agreements, arrangements and understandings during the past three years, and any other material relationships, between or among (x) the stockholder, the beneficial owner, if any, on whose behalf the nomination is being made and the respective affiliates and associates of, or others acting in concert with, such stockholder and such beneficial owner, on the one hand, and (y) each proposed nominee, and his or her respective affiliates and associates, or others acting in concert with such nominee(s), on the other hand, including all information that would be required to be disclosed pursuant to Item 404 of Regulation S-K if the stockholder making the nomination and any beneficial owner on whose behalf the nomination is made or any affiliate or associate thereof or person acting in concert therewith were the "registrant" for purposes of such Item and the proposed nominee were a director or executive officer of such registrant, and (5) any other information concerning such person that must be disclosed as to nominees in proxy solicitations pursuant to Regulation 14A under the Exchange Act. Any such submission must be accompanied by the written consent of the proposed nominee to be named as a nominee and to serve as a director if elected.

Item 11. Executive Compensation.

The following discussion relates to the compensation of Ramy Farid, our president and chief executive officer, Cony D'Cruz, our executive vice president and chief business officer, and Yvonne Tran, our executive vice president and chief legal officer for fiscal year 2019. Dr. Farid, Mr. D'Cruz, and Ms. Tran are collectively referred to in this Annual Report as our named executive officers. On January 24, 2020, we effected a one-for-7.47534 reverse stock split of shares of our common stock. All issued and outstanding shares of common stock and per share amounts referenced in this section have been retroactively adjusted to reflect this reverse stock split for all periods presented.

Summary Compensation Table

The following table sets forth information regarding compensation awarded to, earned by or paid to each of our named executive officers for the years ended December 31, 2019 and 2018.

Name and Principal Position	Year	Salary ($)	Bonus ($)(1)	Option Awards ($)(2)	Non-Equity Incentive Plan Compensation ($)(3)	All Other Compensation ($)		Total ($)
Ramy Farid *President and Chief Executive Officer*	2019	478,000	-	-	143,400	11,701	(4)	633,101
	2018	464,000	80,000	821,525	-	4,614	(5)	1,370,139
Cony D'Cruz *Executive Vice President and Chief Business Officer*	2019	443,000	-	-	132,900	11,701	(4)	587,601
	2018	428,000	107,000	65,722	-	4,614	(5)	605,336
Yvonne Tran *Executive Vice President and Chief Legal Officer*	2019	415,000	-	-	124,500	8,118	(6)	547,618

(1) The amounts reported in the "Bonus" column reflect discretionary annual cash bonuses paid to our executive officers for their performance in 2018.

(2) The amounts reported in the "Option Awards" column reflect the aggregate grant date fair value of stock-based compensation awarded during the year computed in accordance with the provisions of Financial Accounting Standards Board, or FASB, Accounting Standards Codification, or ASC, Topic 718. See Note 10 to our consolidated financial statements appearing elsewhere in this Annual Report regarding assumptions underlying the valuation of equity awards. These amounts reflect the accounting cost for these stock options and do not reflect the actual economic value that may be realized by the named executive officer upon the vesting of the stock options, the exercise of the stock options or the sale of the common stock underlying such stock options.

(3) The amounts reported in the "Non-Equity Incentive Plan Compensation" column reflect annual cash bonuses earned by our executive officers for their performance in 2019 under the Senior Executive Incentive Compensation Plan. For a description of the plan, see "—Senior Executive Incentive Compensation Plan" below.

(4) Represents (i) premiums of $501 paid by us during 2019 with respect to group life, accidental death and dismemberment and long-term disability insurance policies consistent with those provided to all of our employees, and (ii) matching contributions of $11,200 made by us under our 401(k) plan.

(5) Represents (i) premiums of $489 paid by us during 2018 with respect to group life, accidental death and dismemberment and long-term disability insurance policies consistent with those provided to all of our employees, and (ii) matching contributions of $4,125 made by us under our 401(k) plan.

(6) Represents (i) premiums of $501 paid by us during 2019 with respect to group life, accidental death and dismemberment and long-term disability insurance policies consistent with those provided to all of our employees, and (ii) matching contributions of $7,617 made by us under our 401(k) plan.

Narrative to Summary Compensation Table

Base Salary. In 2018, we paid Dr. Farid an annualized base salary of $464,000 and Mr. D'Cruz an annualized base salary of $428,000. In 2019, we paid Dr. Farid an annualized base salary of $478,000, Mr. D'Cruz an annualized base salary of $443,000 and Ms. Tran an annualized base salary of $415,000. Dr. Farid's 2020 annual base salary is $525,800, Mr. D'Cruz's 2020 annual base salary is$456,000 and Ms. Tran's 2020 annual base salary is $428,000.

We use base salaries to recognize the experience, skills, knowledge, and responsibilities required of all our employees, including our named executive officers. None of our named

executive officers is currently party to an employment agreement or other agreement or arrangement that provides for automatic or scheduled increases in base salary.

Annual Bonus. Our board of directors may, in its discretion, award bonuses to our named executive officers from time to time. Our board of directors has approved discretionary annual cash bonuses to our named executive officers with respect to their prior year performance. With respect to 2018 performance, our board of directors awarded bonuses of $80,000 and $107,000 to Dr. Farid and Mr. D'Cruz, respectively.

In August 2019, our board of directors adopted our Senior Executive Incentive Compensation Plan. The Senior Executive Incentive Compensation Plan provides for cash bonus payments to be made to certain eligible executive officers, including named executive officers, based upon the attainment of performance targets established by our compensation committee, which are related to financial and operational measures or objectives with respect to our company. Each executive officer who is selected to participate in the plan has a targeted bonus opportunity set for each performance period, but payments under this plan may be higher or lower than the executive's target bonus opportunity, depending upon our performance. This plan is designed to motivate our executive officers to achieve annual goals based on financial and operating performance objectives.

The 2019 corporate performance goals included, but were not limited to, those related to drug discovery and the drug discovery pipeline, software sales, collaborations, technology enhancement, corporate hiring, and our initial public offering. Each named executive officer's individual target bonus amount for 2019, expressed as a percentage of his or her annual base salary, was 25%. With respect to 2019 performance, our board of directors awarded cash bonuses under our Senior Executive Incentive Compensation Plan of $143,400, $132,900, and $124,500 to Dr. Farid, Mr. D'Cruz and Ms. Tran, respectively, which represents cash bonus awards at 30% of each named executive officer's 2019 base salary, which exceeds the target bonus percentage for each such officer.

For a further description of the plan, see "—Senior Executive Incentive Compensation Plan" below.

Equity Incentives. Although we do not have a formal policy with respect to the grant of equity incentive awards to our executive officers, or any formal equity ownership guidelines applicable to them, we believe that equity grants provide our executives with a strong link to our long-term performance, create an ownership culture and help to align the interests of our executives and our stockholders. In addition, we believe that equity grants with a time-based vesting feature promote executive retention because this feature incentivizes our executive officers to remain in our employment during the vesting period. Accordingly, our board of directors periodically reviews the equity incentive compensation of our executive officers, including our named executive officers, and from time to time may grant equity incentive awards to them in the form of stock options which may include time-based vesting features.

Prior to our initial public offering, our executives were eligible to receive equity awards under our 2002 Stock Incentive Plan, which plan is now expired, and our 2010 Stock Plan, as amended to date, or the 2010 Plan. During 2018 and 2019, all stock options were granted pursuant to our 2010 Plan. Following the closing of our initial public offering, our employees and executives are eligible to receive stock options and other equity-based awards pursuant to

our 2020 Equity Incentive Plan, or the 2020 Plan. For a description of our 2010 Plan and our 2020 Plan, see "—Stock Option and Other Compensation Plans" below.

In November 2018, we granted options to purchase 334,432 and 26,754 shares of our common stock to Dr. Farid and Mr. D'Cruz, respectively, each at an exercise price of $4.34 per share, which price was equal to the fair market value of our common stock on the date of grant as determined by our board of directors. These option grants were granted pursuant to our 2010 Stock Plan, were merit-based awards, and such options vested as to 25% of the original number of shares underlying the options on December 31, 2019 and will vest as to an additional 2.0833% of the original number of shares underlying the options monthly thereafter. The options have a term of ten years. We did not grant option awards to our named executive officers in 2019. In February 2020, we granted options to purchase 896,280, 33,443 and 200,659 shares of our common stock to Dr. Farid, Mr. D'Cruz and Ms. Tran, respectively, each at an exercise price per share of $17.00 per share. These options were granted pursuant to our 2020 Plan, were merit-based awards, and such options will vest as to 25% of the original number of shares underlying the options on February 5, 2021 and as to an additional 2.0833% of the original number of shares underlying the options monthly thereafter. The options have a term of ten years.

We use stock options to compensate our executive officers in the form of initial grants in connection with the commencement of employment and also at various times, often but not necessarily annually, if we or they have performed as expected or better than expected. None of our executive officers is currently party to an employment agreement that provides for the automatic award of stock options. We have granted option awards to our executive officers with time-based vesting. The options that we have granted to our executive officers prior to November 2018 typically vest and become exercisable as to 25% of the shares underlying the option on each anniversary of the vesting commencement date until the fourth anniversary of the vesting commencement date. The options that we have granted to our executive officers in or following November 2018 typically vest and become exercisable as to 25% of the shares underlying the option on the first anniversary of the vesting commencement date and as to an additional 2.0833% of the original number of shares underlying the option monthly thereafter. Vesting rights cease upon termination of employment and exercise rights for previously vested stock options cease shortly after termination of employment, though exercisability is extended in the case of death or disability. Prior to the exercise of an option, the holder has no rights as a stockholder with respect to the shares subject to such option, including no voting rights and no right to receive dividends or dividend equivalents.

We have historically granted stock options with exercise prices that are equal to the fair market value of our common stock on the date of grant as determined by our board of directors, based on a number of objective and subjective factors. The exercise price of all stock options granted after our initial public offering will be equal to the fair market value of shares of our common stock on the date of grant, which will be determined by reference to the closing market price of our common stock on the date of grant. The typical term of such stock options will be ten years.

Outstanding Equity Awards at December 31, 2019

The following table sets forth information regarding all outstanding stock options held by each of our named executive officers as of December 31, 2019.

	Option Awards			
Name	Number of securities underlying unexercised options (#) exercisable	Number of securities underlying unexercised options (#) unexercisable	Option exercise price ($)	Option expiration date
Ramy Farid	66,886[1]	—	1.20	1/7/2023
	120,395	40,132[2]	3.07	5/10/2026
	83,608	250,824[3]	4.34	11/29/2028
Cony D'Cruz	—	33,443[4]	3.07	5/10/2026
	—	5,865[5]	2.92	6/1/2027
	6,688	20,066[6]	4.34	11/29/2028
Yvonne Tran	13,377[7]	—	1.13	1/17/2021
	13,377[8]	—	1.57	7/19/2025
	10,032	3,345[9]	3.07	5/10/2026
	5,865	5,866[10]	2.92	6/1/2027
	6,688	20,066[11]	4.34	11/29/2028

(1) This option is fully vested.
(2) This option to purchase 160,527 shares vests over four years, in equal yearly installments through April 1, 2020, subject to continued service.
(3) This option to purchase 334,432 shares vests over four years, with 25% of the original number of shares underlying such option having vested on December 31, 2019, and 2.0833% of the original number of shares underlying such option vesting thereafter in equal monthly installments through December 31, 2022, subject to continued service.
(4) This option to purchase 133,773 shares vests over four years, in equal yearly installments through March 1, 2020, subject to continued service. All vested shares under this option have been exercised as of December 31, 2019, and the unvested portion of the option vests as to 33,443 shares on March 1, 2020.
(5) This option to purchase 11,731 shares vests over four years, in equal yearly installments through January 1, 2021, subject to continued service. All vested shares under this option have been exercised as of December 31, 2019, and the unvested portion of the option vests as to 2,933 shares on January 1, 2020 and 2,932 shares on January 1, 2021.
(6) This option to purchase 26,754 shares vests over four years, with 25% of the original number of shares underlying such option having vested on December 31, 2019, and 2.0833% of the original number of shares underlying such option vesting thereafter in equal monthly installments through December 31, 2022, subject to continued service.
(7) This option is fully vested.
(8) This option is fully vested.
(9) This option to purchase 13,377 shares vests over four years, in equal yearly installments through April 1, 2020, subject to continued service.
(10) This option to purchase 11,731 shares vests over four years, in equal yearly installments through January 1, 2021, subject to continued service.
(11) This option to purchase 26,754 shares vests over four years, with 25% of the original number of shares underlying such option having vested on December 31, 2019, and 2.0833% of the original number of shares underlying such option vesting thereafter in equal monthly installments through December 31, 2022, subject to continued service.

Employment Agreements

We have entered into employment agreements with each of our named executive officers. These agreements set forth the terms of the named executive officer's compensation, including initial base salary. Each named executive officer's salary is reviewed by our compensation committee and the board of directors on an annual or more frequent basis and is subject to change in the discretion of our board of directors or compensation committee. Our named executive officers are eligible to participate in company-sponsored benefit programs that are generally available to all of our similarly-situated employees. Under these agreements, each named executive officer is also eligible to receive equity awards at such times and on such terms and conditions as the board of directors may determine.

Employment Agreement with Ramy Farid

We entered into an employment agreement with Ramy Farid, dated May 11, 2010. Under the employment agreement, Dr. Farid is an at-will employee and his employment may be terminated by us or by him at any time, for any reason, upon 30 days' written or verbal notice. In the event we elect to terminate Dr. Farid's employment immediately without 30 days' notice, he is entitled to continued payment of his then-current base salary and continued benefit coverage for a period of 30 days following such termination. The employment agreement provides that Dr. Farid was entitled to an annualized base salary of $250,000, prorated for the period beginning May 11, 2010 and ending on December 31, 2010, and that Dr. Farid's salary may be increased or decreased thereafter in our sole discretion. Dr. Farid's current salary is $525,800.

Employment Agreement with Cony D'Cruz

We entered into an employment agreement with Cony D'Cruz, dated April 15, 2013. Under the employment agreement, Mr. D'Cruz is an at-will employee and his employment may be terminated by us or by him at any time, for any reason, upon 30 days' written or verbal notice. In the event we elect to terminate Mr. D'Cruz's employment immediately without 30 days' notice, he is entitled to continued payment of his then-current base salary for a period of 30 days following such termination. The employment agreement provides that Mr. D'Cruz was entitled to an annualized base salary of $290,000, prorated for the period beginning April 15, 2013 and ending on December 31, 2013, and that Mr. D'Cruz's salary may be increased or decreased thereafter in our sole discretion. Mr. D'Cruz's current salary is $456,000.

Employment Agreement with Yvonne Tran

We entered into an employment agreement with Yvonne Tran, dated April 27, 2010. Under the employment agreement, Ms. Tran is an at-will employee and her employment may be terminated by us or by her at any time, for any reason, upon 30 days' written or verbal notice. In the event we elect to terminate Ms. Tran's employment immediately without 30 days' notice, she is entitled to continued payment of her then-current base salary and continued benefit coverage for a period of 30 days following such termination. The employment agreement provides that Ms. Tran was entitled to an annualized base salary of $235,000, prorated for the period beginning April 27, 2010 and ending on December 31, 2010, and that Ms. Tran's salary may be increased or decreased thereafter in our sole discretion. Mr. Tran's current salary is $428,000.

Employee Non-Competition, Non-Solicitation, Confidentiality, and Assignment of Inventions

As part of their employment agreements, each of our named executive officers has agreed to certain standard non-competition, non-solicitation, confidential information, and assignment of invention restrictions. Pursuant to their employment agreements, each of Dr. Farid and Mr. D'Cruz has agreed that we own all developments that are made, created, developed, conceived or reduced to practice by such officer, alone or with others, (i) in the course of employment with us, whether during regular working hours or other hours, or (ii) during the period of employment with us, whether or not in the course of such employment, to the extent the same is related to our business or actual or demonstrably anticipated research or development or is made, created, developed, conceived or first reduced to practice with the time, private or proprietary information, or facilities of our company, our subsidiaries or our other affiliates, which we refer to collectively as the Schrödinger Companies. Pursuant to Ms. Tran's employment agreement, Ms. Tran has agreed that we own all developments that are conceived, developed, made or produced by her, alone or in conjunction with others, (i) in the course of her employment with us, or (ii) with the time, private or proprietary information, or facilities of the Schrödinger Companies. In addition, each of our named executive officers has agreed not to, during his or her employment and for a period of one year thereafter, (i) solicit or encourage any customers, prospective customers, vendors, strategic partners or business associates of the Schrödinger Companies to cease or reduce their relationship with the Schrödinger Companies or to refrain from establishing or expanding a relationship with Schrödinger Companies, (ii) solicit or induce any employees, consultants, sales agents, contract researchers, contract programmers or other independent agents of the Schrödinger Companies or of certain D. E. Shaw group entities to cease employment or retention with the Schrödinger Companies or such D. E. Shaw group entities, or (iii) hire or engage any employee of the Schrödinger Companies or of certain D. E. Shaw group entities. Each of our named executive officers has agreed not to, during the term of his or her employment, knowingly engage in any activity or business which is the same nature as, or substantively similar to, our business or an activity or business which a Schrödinger Company is developing and of which such named executive officer has knowledge, and to protect our confidential and proprietary information indefinitely.

Senior Executive Incentive Compensation Plan

In August 2019, our board of directors adopted the Senior Executive Incentive Compensation Plan, or the Executive Cash Incentive Plan. The Executive Cash Incentive Plan provides for cash bonus payments to certain eligible executive officers, including named executive officers, based upon the attainment of performance targets established by our compensation committee, which are related to financial and operational measures or objectives with respect to our company.

Our compensation committee administers the Executive Cash Incentive Plan, selects the eligible executive officers and may select corporate performance goals in its discretion. The 2020 corporate performance goals include, but are not limited to, those related to drug discovery deals and the internal drug discovery pipeline, software sales, collaborations, technology enhancement, corporate hiring and retention of key employees, and our initial public offering.

Under the Executive Cash Incentive Plan, each executive officer who is selected to participate in the Executive Cash Incentive Plan has a targeted bonus opportunity set for each performance period, but payments under this plan may be higher or lower than the executive's target bonus opportunity, depending upon our performance. Bonuses paid under the Executive Cash Incentive Plan are based upon bonus formulas that tie such bonuses to one or more performance targets relating to the corporate performance goals. The bonus formulas are adopted in each performance period by the compensation committee and communicated to each executive officer at the beginning of each performance period. The level of achievement of the corporate performance goals will be determined by the compensation committee, in its discretion and after applying any adjustments that the committee determines to be appropriate, at the end of each fiscal year after our financial reports have been issued. If the corporate performance goals are met, payments will be made as soon as practicable following the compensation committee's determination of the bonus payable to each executive officer. Subject to the compensation committee's discretion to pay a pro-rated bonus under limited circumstances, each executive officer must be employed by us on the date the bonus is payable in order to be eligible to receive the bonus payment. The board of directors or the compensation committee may amend or terminate the Executive Cash Incentive Plan at any time for any reason.

Dr. Farid's individual target bonus amount for 2020, expressed as a percentage of his annual base salary, is 60%. Mr. D'Cruz's individual target bonus amount for 2020, expressed as a percentage of his annual base salary, is 40%. Ms. Tran's individual target bonus amount for 2020, expressed as a percentage of her annual base salary, is 40%.

Executive Severance and Change in Control Benefits Plan

The Executive Severance and Change in Control Benefits Plan, which we refer to as the Severance Plan, became effective following the closing of our initial public offering and provides severance benefits to certain of our executives, including our named executive officers, if their employment is terminated by us without "cause" or, only in connection with a "change in control" of our company, they terminate employment with us for "good reason" (as each of those terms is defined in the Severance Plan).

Under the Severance Plan, if we terminate an eligible executive's employment without cause prior to or more than 12 months following the closing of a change in control of our company, the executive is entitled to (i) continue receiving his or her base salary for a specified period (in the case of Dr. Farid, for 12 months, in the case of Ms. Tran, for nine months and, in the case of Mr. D'Cruz, for six months) following the date of termination, (ii) company contributions to the cost of health care continuation under the Consolidated Omnibus Budget Reconciliation Act, or COBRA, for up to 12 months following the date of termination, and (iii) the amount of any unpaid annual bonus determined by our board of directors in its discretion to be payable to the executive for any completed bonus period which ended prior to the date of such executive's termination.

The Severance Plan also provides that, if, within 12 months following the closing of a change in control of our company, we terminate an eligible executive's employment without cause or such executive terminates his or her employment with us for good reason, the executive is entitled to (i) a single lump-sum payment equal to a percentage of his or her annual base salary (in the case of Dr. Farid, 100%, in the case of Ms. Tran, 75%, and, in the case Mr. D'Cruz, 50%), (ii) a single lump sum payment in an amount equal to a percentage of his or her target annual bonus for the year in which the termination of employment occurs or for the year in which the change in control occurs, if greater (in the case of Dr. Farid, 100%, in the case of Ms. Tran, 75%, and, in the case Mr. D'Cruz, 50%), (iii) company contributions to the cost of health care continuation under COBRA for up to 12 months following the date of termination of employment (18 months in the case of Dr. Farid), and (iv) the amount of any unpaid annual bonus determined by our board of directors to be payable to the executive for any completed bonus period which ended prior to the date of such executive's termination. In addition, all of the executive's outstanding unvested equity awards that vest solely based on the passage of time will vest and become fully exercisable or non-forfeitable on the date of such termination.

To the extent that any severance or other compensation payment to any of our executives pursuant to the Severance Plan, any employment agreement or any other agreement constitutes an "excess parachute payment" within the meaning of Sections 280G and 4999 of the Internal Revenue Code of 1986, as amended, then such executive will receive the full amount of such severance and other payments, or a reduced amount intended to avoid the application of Sections 280G and 4999, whichever provides the executive with the highest amount on an after-tax basis.

All payments and benefits provided under the Severance Plan are contingent upon the execution and effectiveness of a release of claims by the executive in our favor and continued compliance by the executive with any proprietary information and inventions, nondisclosure, non-competition, non-solicitation (or similar) agreement to which we and the executive are party.

Stock Option and Other Compensation Plans

In this section we describe our 2010 Plan, our 2020 Plan, and our 2020 Employee Stock Purchase Plan, or the 2020 ESPP. Prior to our initial public offering, we granted awards to eligible participants under the 2010 Plan. We expect to grant awards to eligible participants from time to time only under the 2020 Plan.

2010 Stock Plan

The 2010 Plan was initially approved by our board of directors in October 2010 and by our stockholders in November 2010 and was subsequently amended in 2011, 2012, 2016, 2017, and 2018, in each case solely to increase the total number of shares reserved for issuance under the 2010 Plan. The 2010 Plan provided for the direct award or sale of shares of our common stock and for the grant of incentive stock options and nonstatutory stock options. Our employees, directors, and consultants were eligible to receive awards or purchase shares under the 2010 Plan; however, incentive stock options could only be granted to our employees. The type of award granted under the 2010 Plan and the terms of such award, or the terms of a sale of shares under the plan, are set forth in the applicable award or purchase agreement. Pursuant to the terms of the 2010 Plan, our board of directors (or a committee appointed by our board of directors) administers the 2010 Plan and, subject to any limitations in the plan, selects the recipients of awards or purchasers of shares and determines:

- the number of shares of our common stock covered by options and the dates upon which the options become exercisable;
- the type of options to be granted;
- the duration of options, which may not be in excess of ten years;
- the exercise price of options, which must be at least equal to the fair market value of our common stock on the date of grant; and
- the number of shares of our common stock subject to and the terms and conditions of any direct award or sale of shares of our common stock, including conditions for forfeiture or repurchase, and the purchase price of such shares, if any.

The maximum number of shares of common stock authorized for issuance under the 2010 Plan is 6,964,231. Our board of directors may amend, suspend, or terminate the 2010 Plan at any time and for any reason, except that stockholder approval may be required to comply with applicable law. Unless terminated earlier by our board of directors, the 2010 Plan will automatically terminate ten years after the date when our board of directors approved the most recent increase in the number of shares of stock authorized for issuance under the plan that was also approved by our stockholders, which occurred on November 9, 2018. The termination of the 2010 Plan, or any amendment thereof, will not affect any shares of common stock or any option previously granted and outstanding thereunder.

Effect of Certain Changes in Capitalization. In the event of a subdivision of our outstanding stock, a stock dividend, a combination or consolidation of our outstanding stock into a lesser number of shares, a reclassification, or any other increase or decrease in the number of issued shares of our common stock effected without receipt of consideration by us, under the terms of the 2010 Plan, proportionate adjustments will be automatically made to each of:

- the number of shares of our common stock available for future grants under the 2010 Plan;
- the number of shares of our common stock covered by each outstanding option; and
- the exercise price under each outstanding option.

In the event of the declaration of an extraordinary dividend payable in a form other than shares of our common stock in an amount that has a material effect on the fair market value of our common stock, a recapitalization, a spin-off, or a similar occurrence, our board of directors, in its sole discretion, may make appropriate adjustments in one or more of:

- the number of shares of our common stock available for future grants under the 2010 Plan;
- the number of shares of our common stock covered by each outstanding option; and
- the exercise price under each outstanding option.

Effect of Certain Transactions. In the event we are a party to a merger or consolidation, outstanding options, and shares of our common stock acquired under the 2010 Plan will be subject to the agreement of merger or consolidation, which may not treat all outstanding options in an identical manner. The agreement of merger or consolidation, without the optionee's consent, may dispose of options that are not exercisable as of the effective date of the merger or consolidation in any manner permitted by applicable law, including the cancellation of such options without payment of any consideration. The agreement of merger or consolidation, without the optionee's consent, will provide for one or more of the following with respect to options that are exercisable as of the effective date of the merger or consolidation:

- the continuation of the options by us (if we are the surviving corporation);
- the assumption of the options by the surviving corporation or its parent;
- the substitution of the options by the surviving corporation or its parent for new options;
- the cancellation of the options and a payment to the optionees equal to the excess, if any, of (A) the fair market value of the shares of our common stock subject to such options as of the effective date of the merger or consolidation over (B) the exercise price of the options (which payment will be made in the form of cash, cash equivalents, or securities of the surviving corporation or its parent with a fair market value equal to the required amount); or
- the cancellation of the options without the payment of any consideration (any exercise of such option prior to the closing date of the merger or consolidation may be contingent on the closing of the merger or consolidation).

Subject to the terms of the 2010 Plan, our board of directors may modify, extend, or assume outstanding options or may accept the cancellation of outstanding options in return for the grant of new options for the same or a different number of shares of our common stock and at the same or a different exercise price. However, no modification of an option will impair the optionee's rights or increase the optionee's obligations under the option without the consent of the optionee.

The 2010 Plan contains four sub-plans that include additional terms applicable to awards or sales of shares and options to acquire shares granted to residents of each of California, India, Ireland, and the United Kingdom. The sub-plan for residents of California contains provisions that govern the treatment of options upon the optionee's termination from service other than by reason of death or disability, termination of service by reason of disability, termination of service due to optionee's death, or leave of absence. The sub-plan for residents of India contains provisions limiting the eligible recipients of awards under the plan to employees (and excludes

consultants and non-employee directors resident in India) and requires that the exercise price for options be paid in cash and not through services rendered or a promissory note. The sub-plan for residents of Ireland contains provisions stipulating that references to "withholding taxes" in the sub-plan include all taxes, charges, levies, and contributions in Ireland and elsewhere, including the Universal Social Charge and Pay Related Social Insurance, establishes a tax indemnity by the participant in respect of any tax liabilities of the participant associated with participation in the sub-plan and includes required data privacy provisions. The sub-plan for residents of the United Kingdom contains provisions related to the counting of shares subject to the sub-plan, limits the awards granted under the sub-plan to options, permits the company to require holders of options to make certain United Kingdom tax elections in connection with the exercise of options, and permits the transferability of options solely upon the death of the holder.

As of December 31, 2019, there were options to purchase an aggregate of 4,943,778 shares of our common stock outstanding under the 2010 Plan at a weighted average exercise price of $3.57 per share and options to purchase 236,005 shares of our common stock were available for future issuance under the 2010 Plan. No further awards will be made under the 2010 Plan, however, awards outstanding under the 2010 Plan will continue to be governed by their existing terms.

2020 Equity Incentive Plan

In January 2020, our board of directors adopted and our stockholders approved the 2020 Plan, which became effective immediately prior to the effectiveness of the registration statement for our initial public offering, which occurred on February 5, 2020. The 2020 Plan provides for the grant of incentive stock options, non-qualified stock options, stock appreciation rights, restricted stock awards, restricted stock units, and other stock-based awards. The number of shares of our common stock reserved for issuance under the 2020 Plan is the sum of: (1) 5,645,228 shares of our common stock; plus (2) the number of shares (up to a maximum of 5,180,194 shares) equal to the sum of (x) the number of shares of our common stock reserved for issuance under the 2010 Plan that remained available for grant under the 2010 Plan immediately prior to the effectiveness of the registration statement for our initial public offering, which occurred on February 5, 2020 and (y) the number of shares of our common stock subject to outstanding awards granted under the 2010 Plan that expire, terminate, or are otherwise surrendered, cancelled, forfeited, or repurchased by us at their original issuance price pursuant to a contractual repurchase right; plus (x) an annual increase to be added on the first day of each fiscal year, beginning with the fiscal year ending December 31, 2021 and continuing for each fiscal year until, and including, the fiscal year ending December 31, 2025, by a number of shares of common stock equal to the smallest of (i) 1.5% of the sum of (A) the outstanding shares of common stock, (B) the outstanding shares of limited common stock and (C) the outstanding stock options granted by us (which sum we refer to as the "outstanding equity"), calculated on the last business day of the prior fiscal year or (ii) the number of shares of common stock determined by our board of directors and (y) an annual increase to be added on the first day of each fiscal year, beginning with the fiscal year ending December 31, 2026 and continuing for each fiscal year until, and including, the fiscal year ending December 31, 2030, by a number of shares of common stock equal to the smallest of (i) 1.0% of the outstanding equity, calculated on the last business day of the prior fiscal year or (ii) the number of shares of common stock determined by our board of directors.

Subject to adjustment under the 2020 Plan, no more than 5,645,228 shares of common stock may be issued as incentive stock options under the 2020 Plan.

Subject to adjustment under the 2020 Plan, any award that is not a "full-value award" (as defined below) shall be counted against the share limits set forth in the 2020 Plan as one share for each share of common stock subject to such award and any award that is a full-value award shall be counted against the share limits specified in the plan as 1.775 shares for each one share of common stock subject to such full-value award. "Full-value award" means any award of restricted stock, restricted stock units or other stock-based award with a per share price or per unit purchase price lower than 100% of the fair market value per share of common stock (valued in the manner determined or approved by the board of directors) on the date of grant. To the extent a share that was subject to an award that counted as one share is returned to the 2020 Plan, each applicable share reserve will be credited with one share. To the extent that a share that was subject to an award that counts as 1.775 shares is returned to the 2020 Plan, each applicable share reserve will be credited with 1.775 shares.

Notwithstanding anything in the 2020 Plan to the contrary, in no event may more than 20% of the maximum number of shares of common stock available for the granting of awards under the 2020 Plan be issued in the form of full-value awards. For purposes of this limitation, the number of shares subject to each award shall be counted on a one (1)-for-one (1) basis and without regard to the fungible counting ratio described above.

The maximum aggregate amount of cash and value (calculated based on grant date fair value for financial reporting purposes) of awards granted in any calendar year to any individual non-employee director in his or her capacity as a non-employee director shall not exceed $750,000; provided, however, that such maximum aggregate amount shall not exceed $1,000,000 in any calendar year for any individual non-employee director in such non-employee director's initial year of election; and provided, further, however, that fees paid by us on behalf of any non-employee director in connection with regulatory compliance and any amounts paid to a non-employee director as reimbursement of an expense shall not count against the foregoing limit. Our board of directors may make additional exceptions to this limit for individual non-employee directors in extraordinary circumstances, as the board may determine in its discretion, provided that the non-employee director receiving such additional compensation may not participate in the decision to award such compensation. For the avoidance of doubt, cash and awards granted under the 2020 Plan to non-employee directors in their capacity as consultants or advisors to us are not subject to the foregoing limitation.

Our employees, officers, directors, consultants, and advisors are eligible to receive awards under the 2020 Plan. Incentive stock options, however, may only be granted to our employees.

Pursuant to the terms of the 2020 Plan, our board of directors (or a committee delegated by our board of directors) administers the 2020 Plan and, subject to any limitations in the 2020 Plan, selects the recipients of awards and determines:

- the number of shares of our common stock covered by options and the dates upon which the options become exercisable;
- the type of options to be granted;

- the duration of options, which may not be in excess of ten years;
- the exercise price of options, which must be at least equal to the fair market value of our common stock on the date of grant; and
- the number of shares of our common stock subject to and the terms of any stock appreciation rights, restricted stock awards, restricted stock units, or other stock-based awards, including conditions for repurchase, measurement price, issue price and repurchase price (though the measurement price of stock appreciation rights must be at least equal to the fair market value of our common stock on the date of grant and the duration of such awards may not be in excess of ten years).

If our board of directors delegates authority to one or more of our officers to grant awards under the 2020 Plan, the officers will have the power to make awards to all of our employees, except executive officers (as such terms are defined in the 2020 Plan). Our board of directors will fix the terms of the awards to be granted by any such officer, the maximum number of shares subject to awards that such officer may grant, and the time period in which such awards may be granted.

Effect of Certain Changes in Capitalization. Upon the occurrence of any stock split, reverse stock split, stock dividend, recapitalization, combination of shares, reclassification of shares, spin-off, or other similar change in capitalization or event, or any dividend or distribution to holders of our common stock other than an ordinary cash dividend, under the terms of the 2020 Plan, we are required to equitably adjust (or make substitute awards, if applicable), in the manner determined by our board of directors:

- the number and class of securities available under the 2020 Plan;
- the share counting rules under the 2020 Plan;
- the number and class of securities and exercise price per share of each outstanding option;
- the share and per-share provisions and the measurement price of each outstanding stock appreciation right;
- the number of shares and the repurchase price per share subject to each outstanding award of restricted stock; and
- the share and per-share related provisions and the purchase price, if any, of each outstanding restricted stock unit award and other stock-based award.

Effect of Certain Corporate Transactions. In connection with a merger or other reorganization event (as defined in the 2020 Plan), our board of directors may, on such terms as our board of directors determines (except to the extent specifically provided otherwise in an applicable award agreement or other agreement between the participant and us), take any one or more of the following actions pursuant to the 2020 Plan as to all or any (or any portion of) outstanding awards, other than certain awards of restricted stock:

- provide that outstanding awards will be assumed, or substantially equivalent awards will be substituted, by the acquiring or succeeding corporation (or an affiliate thereof);
- upon written notice to a participant, provide that all of the participant's unvested awards will be forfeited immediately prior to the consummation of the reorganization event and/or unexercised awards will terminate immediately prior to the consummation of the reorganization event unless exercised by the participant (to the extent then exercisable) within a specified period following the date of the notice;
- provide that outstanding awards will become exercisable, realizable, or deliverable, or restrictions applicable to an award will lapse, in whole or in part, prior to or upon such reorganization event;
- in the event of a reorganization event pursuant to which holders of shares of our common stock will receive a cash payment for each share surrendered in the reorganization event, make or provide for a cash payment to participants with respect to each award held by a participant equal to (1) the number of shares of our common stock subject to the vested portion of the award (after giving effect to any acceleration of vesting that occurs upon or immediately prior to such reorganization event) multiplied by (2) the excess, if any, of the cash payment for each share surrendered in the reorganization event over the exercise, measurement, or purchase price of such award and any applicable tax withholdings, in exchange for the termination of the award;
- provide that, in connection with our liquidation or dissolution, awards will convert into the right to receive liquidation proceeds (if applicable, net of the exercise, measurement, or purchase price thereof and any applicable tax withholdings); or
- any combination of the foregoing.

Our board of directors is not obligated under the 2020 Plan to treat all awards, all awards held by a participant, or all awards of the same type, identically.

In the case of certain restricted stock units, no assumption or substitution is permitted, and the restricted stock units will instead be settled in accordance with the terms of the applicable restricted stock unit agreement.

Upon the occurrence of a reorganization event, other than our liquidation or dissolution, our repurchase and other rights with respect to outstanding awards of restricted stock will continue for the benefit of the succeeding company (or any affiliate of the succeeding company) and will, unless our board of directors determines otherwise, apply to the cash, securities, or other property which our common stock was converted into or exchanged for pursuant to the reorganization event. However, our board of directors may provide for the termination or deemed satisfaction of such repurchase or other rights under the restricted stock award

agreement or in any other agreement between a participant and us, either initially or by amendment. Upon our liquidation or dissolution, except to the extent specifically provided to the contrary in the restricted stock award agreement or any other agreement between the participant and us, all restrictions and conditions on all restricted stock awards then outstanding will automatically be deemed terminated or satisfied.

At any time, our board of directors may provide that any award under the 2020 Plan will become immediately exercisable in full or in part, free of some or all restrictions or conditions, or otherwise realizable in whole or in part, as the case may be.

Except with respect to certain actions requiring stockholder approval under the Internal Revenue Code or Nasdaq Stock Market rules, our board of directors may amend, modify, or terminate any outstanding award under the 2020 Plan, including but not limited to, substituting for the award another award of the same or a different type, changing the date of exercise or realization, and converting an incentive stock option to a non-qualified stock option, subject to certain participant consent requirements. However, unless our stockholders approve such action, the 2020 Plan provides that we may not (except as otherwise permitted in connection with a change in capitalization or reorganization event):

- amend any outstanding stock option or stock appreciation right granted under the 2020 Plan to provide an exercise or measurement price per share that is lower than the then-current exercise or measurement price per share of such outstanding award;
- cancel any outstanding stock option or stock appreciation right (whether or not granted under the 2020 Plan) and grant a new award under the 2020 Plan in substitution for the cancelled award (other than substitute awards permitted in connection with a merger or consolidation of an entity with us or our acquisition of property or stock of another entity) covering the same or a different number of shares of our common stock and having an exercise or measurement price per share lower than the then-current exercise or measurement price per share of the cancelled award;
- cancel in exchange for a cash payment any outstanding option or stock appreciation right with an exercise or measurement price per share above the then-current fair market value of our common stock (valued in the manner determined by (or in the manner approved by) our board of directors); or
- take any other action that constitutes a “repricing” within the meaning of Nasdaq Stock Market rules or rules of any other exchange or marketplace on which our common stock is listed or traded.

No award may be granted under the 2020 Plan on or after February 5, 2030. Our board of directors may amend, suspend, or terminate the 2020 Plan at any time, except that stockholder approval may be required to comply with applicable law or stock market requirements.

2020 Employee Stock Purchase Plan

In January 2020, our board of directors adopted and our stockholders approved the 2020 ESPP, which became effective immediately prior to the effectiveness of the registration statement for our initial public offering, which occurred on February 5, 2020. The 2020 ESPP will be administered by our board of directors or by a committee appointed by our board of directors. The 2020 ESPP initially provides participating employees with the opportunity to purchase up to an aggregate of 586,845 shares of our common stock.

All of our employees and employees of any designated subsidiary, as defined in the 2020 ESPP, are eligible to participate in the 2020 ESPP, provided that:

- such person is customarily employed by us or a designated subsidiary for more than 20 hours a week and for more than five months in a calendar year;
- such person has been employed by us or by a designated subsidiary for at least three months prior to enrolling in the 2020 ESPP; and
- such person was our employee or an employee of a designated subsidiary on the first day of the applicable offering period under the 2020 ESPP.

We retain the discretion to determine which eligible employees may participate in an offering under applicable regulations.

We expect to make one or more offerings to our eligible employees to purchase stock under the 2020 ESPP beginning at such time and on such dates as our board of directors may determine, or the first business day thereafter. Each offering will consist of a six-month offering period during which payroll deductions will be made and held for the purchase of our common stock at the end of the offering period. Our board of directors or a committee designated by the board of directors may, at its discretion, choose a different period of not more than 27 months for offerings.

On each offering commencement date, each participant will be granted the right to purchase, on the last business day of the offering period, up to a number of shares of our common stock determined by multiplying $2,083 by the number of full months in the offering period and dividing that product by the closing price of our common stock on the first day of the offering period. No employee may be granted an option under the 2020 ESPP that permits the employee’s rights to purchase shares under the 2020 ESPP and any other employee stock purchase plan of ours or of any of our subsidiaries to accrue at a rate that exceeds $25,000 of the fair market value of our common stock (determined as of the first day of each offering period) for each calendar year in which the option is outstanding. In addition, no employee may purchase shares of our common stock under the 2020 ESPP that would result in the employee owning 5% or more of the total combined voting power or value of our stock or the stock of any of our subsidiaries.

Each eligible employee may authorize up to a maximum of 15% of his or her compensation to be deducted by us during the offering period. Each employee who continues to be a participant in the 2020 ESPP on the last business day of the offering period will be deemed to have exercised an option to purchase from us the number of whole shares of our common stock that

his or her accumulated payroll deductions on such date will pay for, not in excess of the maximum numbers set forth above. Under the terms of the 2020 ESPP, the purchase price shall be determined by our board of directors or the committee for each offering period and will be at least 85% of the applicable closing price of our common stock. If our board of directors or the committee does not make a determination of the purchase price, the purchase price will be 85% of the lesser of the closing price of our common stock on the first business day of the offering period or on the last business day of the offering period.

An employee may at any time prior to the close of business on the fifteenth business day prior to the end of an offering period (or such other number of days as is determined by us), and for any reason, permanently withdraw from participating in an offering and permanently withdraw the balance accumulated in the employee's account. Partial withdrawals are not permitted. If an employee elects to discontinue his or her payroll deductions during an offering period but does not elect to withdraw his or her funds, funds previously deducted will be applied to the purchase of common stock at the end of the offering period. If a participating employee's employment ends before the last business day of an offering period, no additional payroll deductions will be taken and the balance in the employee's account will be paid to the employee.

We will be required to make equitable adjustments to the extent determined by our board of directors or a committee thereof to the number and class of securities available under the 2020 ESPP, the share limitations under the 2020 ESPP, and the purchase price for an offering period under the 2020 ESPP to reflect stock splits, reverse stock splits, stock dividends, recapitalizations, combinations of shares, reclassifications of shares, spin-offs, and other similar changes in capitalization or events or any dividends or distributions to holders of our common stock other than ordinary cash dividends.

In connection with a merger or other reorganization event, as defined in the 2020 ESPP, our board of directors or a committee of our board of directors may take any one or more of the following actions as to outstanding options to purchase shares of our common stock under the 2020 ESPP on such terms as our board of directors or committee thereof determines:

- provide that options will be assumed, or substantially equivalent options will be substituted, by the acquiring or succeeding corporation (or an affiliate thereof);
- upon written notice to employees, provide that all outstanding options will be terminated immediately prior to the consummation of such reorganization event and that all such outstanding options will become exercisable to the extent of accumulated payroll deductions as of a date specified by our board of directors or committee thereof in such notice, which date shall not be less than ten days preceding the effective date of the reorganization event;
- upon written notice to employees, provide that all outstanding options will be cancelled as of a date prior to the effective date of the reorganization event and that all accumulated payroll deductions will be returned to participating employees on such date;

- in the event of a reorganization event under the terms of which holders of our common stock will receive upon consummation thereof a cash payment for each share surrendered in the reorganization event, change the last day of the offering period to be the date of the consummation of the reorganization event and make or provide for a cash payment to each employee equal to (1) the cash payment for each share surrendered in the reorganization event times the number of shares of our common stock that the employee's accumulated payroll deductions as of immediately prior to the reorganization event could purchase at the applicable purchase price, where the cash payment for each share surrendered in the reorganization event is treated as the fair market value of our common stock on the last day of the applicable offering period for purposes of determining the purchase price and where the number of shares that could be purchased is subject to the applicable limitations under the 2020 ESPP minus (2) the result of multiplying such number of shares by the purchase price; and/or
- provide that, in connection with our liquidation or dissolution, options will convert into the right to receive liquidation proceeds (net of the purchase price thereof).

Our board of directors may at any time, and from time to time, amend or suspend the 2020 ESPP or any portion of the 2020 ESPP. We will obtain stockholder approval for any amendment if such approval is required by Section 423 of the Internal Revenue Code. Further, our board of directors may not make any amendment that would cause the 2020 ESPP to fail to comply with Section 423 of the Internal Revenue Code. The 2020 ESPP may be terminated at any time by our board of directors. Upon termination, we will refund all amounts in the accounts of participating employees.

401(k) Plan

We maintain a defined contribution employee retirement plan for our employees, including our named executive officers. The plan is intended to qualify as a tax-qualified 401(k) plan so that contributions to the 401(k) plan, and income earned on such contributions, are not taxable to participants until withdrawn or distributed from the 401(k) plan (except in the case of contributions under the 401(k) plan designated as Roth contributions). Under the 401(k) plan, each employee is fully vested in his or her deferred contributions. Vesting in our discretionary matching contributions is based on years of service to us, with 25% vesting per year of service to us and 100% vesting at the end of the fourth year of service to us. Employee contributions are held and invested by the plan's trustee as directed by participants. Our 401(k) plan provides that each participant can contribute up to 75% of such participant's eligible compensation (pre-tax or post-tax Roth contributions), up to the statutory limit, which was $18,500 for 2018, $19,000 for 2019, and $19,500 for 2020. Participants who are at least 50 years old were also eligible to make "catch-up" contributions of up to an additional $6,000 above the statutory limit in 2018 and 2019, and are eligible to make "catch-up" contributions of up to an additional $6,500 above the statutory limit in 2020. The 401(k) plan provides us with the discretion to match participant contributions up to certain specified amounts. In 2018, we made a matching contribution equal to 1.5% of the total eligible compensation up to the 2018 annual limit of $275,000, equating to a maximum matching contribution amount of $4,125. We provided a true-up to eligible participants to ensure that our match was 1.5% of eligible compensation up to the 2018 annual limit. Effective January 1, 2019, we began making discretionary matching contributions to participants under our 401(k) plan equal to 50% of the participant's contribution to the 401(k) plan up to a maximum participant contribution of 8% of participant's eligible compensation for a total match of up to 4%, or $11,200.

Rule 10b5-1 Sales Plans

Our directors and executive officers may adopt written plans, known as Rule 10b5-1 plans, in which they will contract with a broker to buy or sell shares of our common stock on a periodic basis. Under a Rule 10b5-1 plan, a broker executes trades pursuant to parameters established by the director or officer when entering into the plan, without further direction from the director or officer.

Director Compensation

The table below shows all compensation to our non-employee directors during the year ended December 31, 2019.

Name	Fees Earned or Paid in Cash ($)	Option Awards ($)[1][2]	All Other Compensation ($)	Total ($)
Michael Lynton	—	—	—	—
Richard Friesner, Ph.D.	—	—	347,000[6]	347,000
Timothy Wright, M.D.	—	—	—	—
Rosana Kapeller-Libermann, M.D., Ph.D. [3]	—	130,226	—	130,226
Gary Sender [4]	13,306	117,064	—	130,370
Nancy Thornberry [5]	—	307,588	—	307,588

(1) The amounts reported in the "Option Awards" column reflect the aggregate grant date fair value of stock-based compensation awarded during the year computed in accordance with the provisions of FASB ASC 718. See Note 10 to our consolidated financial statements appearing elsewhere in this Annual Report regarding assumptions underlying the valuation of equity awards. These amounts reflect the accounting cost for these stock options and do not reflect the actual economic value that may be realized by the directors upon the vesting of the stock options, the exercise of the stock options or the sale of the common underlying such stock options.

(2) As of December 31, 2019, the aggregate number of shares of our common stock subject to outstanding option awards for each non-employee director serving during 2019 was as follows: Mr. Lynton, 80,263 shares; Dr. Friesner, 160,527 shares; Dr. Wright, 0 shares; Dr. Kapeller-Libermann, 53,509 shares; Mr. Sender, 40,131 shares; and Ms. Thornberry, 46,820 shares.

(3) Dr. Kapeller-Libermann joined our board of directors on January 9, 2019.

(4) Mr. Sender joined our board of directors on July 22, 2019.

(5) Ms. Thornberry joined our board of directors on September 13, 2019.

(6) Represents consulting fees paid to Dr. Friesner in connection with his consulting agreement. For further information about our consulting agreement with Dr. Friesner, as well our transactions with Dr. Freisner and his employer, Columbia University, see "Item 13. Certain Relationships and Related Transactions, and Director Independence."

Prior to the closing of our initial public offering, we paid cash fees and granted options to purchase shares of our common stock to certain of our non-employee directors for their service on our board of directors; however, we did not have a formal non-employee director compensation program. Prior to the closing of our initial public offering, we reimbursed our non-employee directors, on an as requested basis, for reasonable travel expenses incurred in connection with attending board of director and committee meetings.

Dr. Farid, one of our directors who also serves as our president and chief executive officer, does not receive any additional compensation for his service as a director. Dr. Farid is one of our named executive officers and, accordingly, the compensation that we pay to Dr. Farid is discussed above under "—Summary Compensation Table" and "—Narrative to Summary Compensation Table."

In January 2020, our board of directors approved a director compensation program that became effective on the effective date of the registration statement for our initial public offering, which was February 5, 2020. Under this director compensation program, we pay our non-employee directors a cash retainer for service on the board of directors and for service on each committee on which the director is a member. The chairman of the board of directors and of each committee receive higher retainers for such service. These fees are payable in arrears in four equal quarterly installments on the last day of each quarter, provided that the amount of such payment will be prorated for any portion of such quarter that the director is not serving on our board of directors and no fee under the program is payable in respect of any period prior to the completion of our initial public offering. The fees paid to non-employee directors for service on the board of directors and for service on each committee of the board of directors on which the director is a member are as follows:

	Member Annual Fee	Chairman Supplemental Annual Fee
Board of Directors	$ 40,000	$ 35,000
Audit Committee	$ 10,000	$ 10,000
Compensation Committee	$ 6,000	$ 6,000
Nominating and Corporate Governance Committee	$ 5,000	$ 5,000

We also will continue to reimburse our non-employee directors for reasonable travel and other expenses incurred in connection with attending meetings of our board of directors and any committee of our board of directors on which he or she serves.

In addition, under our director compensation program, each non-employee director will receive, upon his or her initial election or appointment to our board of directors, an option to purchase 25,216 shares of our common stock under the 2020 Plan. Each of these options will vest as to one-third of the shares of our common stock underlying such option on each of the first, second and third anniversaries of the grant. Further, on the date of the first board meeting held after each annual meeting of stockholders commencing with our 2021 annual meeting of stockholders, each non-employee director will receive an option to purchase 12,909 shares of our common stock under the 2020 Plan; provided, however, that for a non-employee director who was initially elected to our board of directors within the 12 months preceding the annual meeting of stockholders, the number of shares subject to such option shall be pro-rated on a monthly basis for time in service. Each of these options will vest on the twelve-month anniversary of the date of grant of the award (or, if earlier, the date of the next annual meeting of stockholders following the date of grant of the award). All options issued to our non-employee directors under our director compensation program will be issued at exercise prices equal to the fair market value of our common stock on the date of grant, will vest based on continued service, and will become exercisable in full upon specified change in control events. The foregoing share numbers for initial and annual option grants to our non-employee directors are subject to adjustment in the event of stock splits, reverse stock splits and other events.

In February 2020, we granted to each of our non-employee directors an option to purchase 12,909 shares of our common stock under our 2020 Plan, each at an exercise price per share of $17.00. These options will vest on February 5, 2021.

Compensation Committee Interlocks and Insider Participation

None of our executive officers serves, or in the past year has served, as a member of the board of directors or compensation committee, or other committee serving an equivalent function, of any other entity that has one or more of its executive officers serving as a member of our board of directors or our compensation committee. None of the members of our compensation committee is, or has ever been, an officer or employee of our company.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The following table sets forth information with respect to the beneficial ownership of our capital stock as of February 29, 2020 by:

- each of our directors;
- each of our named executive officers;
- all of our directors and executive officers as a group; and
- each person, or group of affiliated persons, who is known by us to beneficially own more than 5% of our capital stock.

The columns entitled “Percentage of Shares Beneficially Owned” are based on a total of 50,091,685 shares of our common stock and 13,164,193 shares of our limited common stock outstanding as of February 29, 2020. Beneficial ownership is determined in accordance with the rules and regulations of the SEC and includes voting or investment power with respect to our common stock and limited common stock. Shares of our common stock subject to options that are currently exercisable or exercisable within 60 days after February 29, 2020 are considered outstanding and beneficially owned by the person holding the options for the purpose of calculating the percentage ownership of that person but not for the purpose of calculating the percentage ownership of any other person. Except as otherwise noted, the persons and entities in this table have sole voting and investment power with respect to all of the shares of our common stock and limited common stock beneficially owned by them, subject to community property laws, where applicable.

Except as otherwise set forth below, the address of each beneficial owner is c/o Schrödinger, Inc., 120 West 45th Street, 17th Floor, New York, New York 10036.

Name of Beneficial Owner	Number of Shares Beneficially Owned		Percentage of Shares Beneficially Owned	
	Common Stock	Limited Common Stock	Common Stock	Limited Common Stock
5% Stockholders				
Bill & Melinda Gates Foundation Trust (1)	6,981,664	13,164,193	13.9 %	100.0 %
Entities affiliated with David E. Shaw (2)	16,496,156	—	32.9	—
Directors and Named Executive Officers				
Ramy Farid (3)	666,355	—	1.3 %	—
Yvonne Tran(4)	97,420	—	*	—
Cony D'Cruz (5)	217,816	—	*	—
Michael Lynton (6)	45,148	—	*	—
Richard A. Friesner (7)	2,020,902	—	4.0	—
Rosana Kapeller-Libermann (8)	16,721	—	*	—
Gary Sender	—	—	—	—
Nancy Thornberry	—	—	—	—
Timothy M. Wright	—	—	—	—
All executive officers and directors as a group (16 persons) (9)	3,720,853	—	7.3	—

* Less than one percent

(1) Based solely on a Form 4 filed by the Bill & Melinda Gates Foundation Trust, or the Trust, on February 12, 2020. Consists of (i) 6,981,664 shares of common stock held by the Trust, and (ii) 13,164,193 shares of limited common stock held by the Trust. For purposes of Rule 13d-3 under the Securities Exchange Act of 1934, as amended, all shares beneficially owned by the Trust may be deemed to be beneficially owned by William H. Gates III and Melinda French Gates, as Co-Trustees of the Trust. The address of the Trust is 2365 Carillon Point, Kirkland, Washington 98033.

(2) Based solely on a Form 4 filed jointly by David E. Shaw and Schrodinger Equity Holdings LLC on February 10, 2020. Consists of (i) 14,890,845 shares of common stock held by Schrodinger Equity Holdings, LLC, (ii) 1,133,158 shares of common stock held by D. E. Shaw & Co., L.P., (iii) 467,889 shares of common stock held by D. E. Shaw Valence Portfolios, L.L.C., and (iv) 4,264 shares of common stock held by D. E. Shaw Technology Development, LLC. By virtue of David E. Shaw's position as the manager of Schrodinger Equity Holdings, LLC, and by virtue of David E. Shaw's position as president and sole shareholder of D. E. Shaw & Co., Inc., which is the general partner of D. E. Shaw & Co., L.P., which in turn is the investment adviser of D. E. Shaw Valence Portfolios, L.L.C., and by virtue of David E. Shaw's position as president and sole shareholder of D. E. Shaw & Co. II, Inc., which is the sole member of D. E. Shaw Technology Development, LLC and the managing member of D. E. Shaw & Co., L.L.C., which in turn is the manager of D. E. Shaw Valence Portfolios, L.L.C., David E. Shaw may be deemed to have the shared power to vote or direct the vote of, and the shared power to dispose or direct the disposition of, the shares held by Schrodinger Equity Holdings, LLC, D. E. Shaw & Co., L.P., D. E. Shaw Valence Portfolios, L.L.C., and D. E. Shaw Technology Development, LLC. The principal business address of Schrodinger Equity Holdings, LLC and D. E. Shaw Technology Development, LLC is 120 West 45th Street, 39th Floor, New York, New York 10036; the principal business address of D. E. Shaw & Co., L.P. and D. E. Shaw Valence Portfolios, L.L.C. is 1166 Avenue of the Americas, Ninth Floor, New York, New York 10036.

(3) Consists of (i) 334,432 shares of common stock held by Dr. Farid and (ii) 331,923 shares of common stock underlying options held by Dr. Farid that are exercisable as of February 29, 2020 or will become exercisable within 60 days after such date.

(4) Consists of (i) 40,131 shares of common stock held by Ms. Tran and (ii) 57,289 shares of common stock underlying options held by Ms. Tran that are exercisable as of February 29, 2020 or will become exercisable within 60 days after such date.

(5) Consists of (i) 173,081 shares of common stock held by Cony and Pearl D'Cruz Revocable Trust dated August 20, 2019, and any amendments thereto, of which Mr. D'Cruz is a co-trustee, and (ii) 44,735 shares of common stock underlying options held by Mr. D'Cruz that are exercisable as of February 29, 2020 or will become exercisable within 60 days after such date.

(6) Consists of 45,148 shares of common stock underlying options held by Mr. Lynton that are exercisable as of February 29, 2020 or will become exercisable within 60 days after such date.

(7) Consists of (i) 1,105,450 shares of common stock held by Dr. Friesner, (ii) 754,925 shares of common stock held by RF 2018 GRAT, of which Dr. Friesner is trustee, and (iii) 160,527 shares of common stock underlying options held by Dr. Friesner that are exercisable as of February 29, 2020 or will become exercisable within 60 days after such date.

(8) Consists of 16,721 shares of common stock underlying options held by Dr. Kapeller-Libermann that are exercisable as of February 29, 2020 or will become exercisable within 60 days after such date.

(9) Consists of 2,747,131 shares of common stock and 973,722 shares of common stock underlying options that are exercisable as of February 29, 2020 or will become exercisable within 60 days after such date.

Equity Compensation Plan Information

The following table provides certain information with respect to our equity compensation plans in effect as of December 31, 2019:

Plan category	Number of securities to be issued upon exercise of outstanding options (a)	Weighted-average exercise price of outstanding options (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders: 2010 Stock Plan (1)	4,943,778	$ 3.57	236,005
Equity compensation plans not approved by security holders	—	—	—
Total	4,943,778	3.57	236,005

(1) Our 2010 Stock Plan, which was approved by our board of directors and stockholders, was the only equity compensation plan we had in place as of December 31, 2019. In connection with our initial public offering in 2020, our board of directors and our stockholders approved two new equity compensation plans, the 2020 Plan and the 2020 ESPP. Each plan became effective on February 5, 2020. See "Item 11. Executive Compensation" for further information regarding the 2020 Plan and the 2020 ESPP.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

Certain Relationships and Related Transactions

Since January 1, 2018, we have engaged in the following transactions in which the amounts involved exceeded $120,000 and any of our directors, executive officers or holders of more than 5% of our voting securities, or any member of the immediate family of, or person sharing the household with, the foregoing persons, had or will have a direct or indirect material interest.

Series E Preferred Stock Financing

From November 9, 2018 to May 14, 2019, we issued and sold an aggregate of 73,795,777 shares of our Series E preferred stock at a price per share of $1.4906 in cash, for an aggregate purchase price of $109,999,985. The following table sets forth the aggregate number of shares of our Series E preferred stock that we issued and sold to our holders of more than 5% of our voting securities in this transaction and the aggregate amount of consideration for such shares:

Purchaser	Date	Shares of Series E Preferred Stock	Cash Purchase Price
Bill & Melinda Gates Foundation Trust(1)	11/9/2018	33,543,539	$ 49,999,999

(1) See “Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters” for additional information about shares held by this entity.

Participation in Initial Public Offering

On February 10, 2020, the Bill & Melinda Gates Foundation Trust, which is a holder of more than 5% of our voting securities, purchased shares of our common stock in our initial public offering. The following table sets forth the aggregate number of shares of our common stock purchased by such holder and the aggregate amount of consideration paid for such shares:

Purchaser	Shares of Common Stock	Aggregate Consideration
Bill & Melinda Gates Foundation Trust(1)	588,235	$ 9,999,995

(1) See “Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters” for additional information about shares held by this entity.

Share Exchange Agreement with Bill & Melinda Gates Foundation Trust

On November 9, 2018, we entered into a share exchange agreement, or the Share Exchange Agreement, with the Bill & Melinda Gates Foundation Trust, a holder of more than 5% of our voting securities. Under the Share Exchange Agreement, the Bill & Melinda Gates Foundation Trust had the right to elect to exchange all or any portion of its shares of our common stock and/or our preferred stock for shares of our non-voting common stock, at any time without the payment of additional consideration, and we had covenanted to reserve and keep available such number of duly authorized shares of our non-voting common stock as shall be sufficient to permit the Bill & Melinda Gates Foundation Trust to exchange its shares of our common stock and/or our preferred stock for shares of our non-voting common stock. Under the Share Exchange Agreement, each share of preferred stock was exchangeable for a number of shares of our non-voting common stock that equals the number of shares of common stock into which

such share of preferred stock is then convertible and cash for any fractional shares. Each share of common stock was exchangeable for one share of our non-voting common stock. On January 24, 2020, we changed the name of our non-voting common stock to limited common stock and entered into an amended and restated share exchange agreement with the Bill & Melinda Gates Foundation Trust pursuant to which we and the Bill & Melinda Gates Foundation Trust have agreed that in lieu of exchanging shares of their common stock and/or preferred stock into non-voting common stock, they have the right to exchange shares of their common stock and/or preferred stock for limited common stock. Upon the closing of our initial public offering, the Bill & Melinda Gates Foundation Trust exchanged 98,406,823 shares of its preferred stock for an aggregate of 13,164,193 shares of our limited common stock.

Relationship with Richard Friesner

Consulting Agreement with Richard Friesner

We are party to a consulting agreement with Richard Friesner dated July 1, 1999, as amended, pursuant to which Dr. Friesner provides certain services related to enhancing, improving and further developing of our molecular modeling software. Dr. Friesner is one of our co-founders and has been a member of our board of directors since 1990. Under the consulting agreement, we paid Dr. Friesner $347,000 and $347,000 for consulting services during 2018 and 2019, respectively. Under his consulting agreement, we have agreed to pay Dr. Friesner a monthly consulting fee of $28,917 from January 1, 2020 through June 30, 2020, of which $57,833 was paid as of the date hereof.

In addition, on February 5, 2020, our board of directors granted to Dr. Friesner, in connection with his services to us as a consultant, an option to purchase 535,092 shares of our common stock, at an exercise price of $17.00 per share. This option vests as to 25% of the shares underlying the option on February 5, 2021 and will vest as to an additional 2.0833% of the original number of shares underlying the options monthly thereafter until February 5, 2024.

Columbia License Agreements and Royalty Payments to Columbia University and Richard Friesner

We have entered into various license agreements with the Trustees of Columbia University, or Columbia University, pursuant to which we license software and code from Columbia University in exchange for our obligation to make specified royalty payments to Columbia University. For a description of certain of our license agreements with Columbia University, see “Item 1. Business—License Agreements with Columbia University”. Dr. Friesner, the William P. Schweitzer Professor of Chemistry at Columbia University and the principal investigator of the Friesner Research Group, a research laboratory within the Department of Chemistry at Columbia University, and one of our co-founders and a member of our board of directors, was the inventor of certain of the technologies licensed to us pursuant to certain of our license agreements with Columbia University. Columbia University distributes a portion of the royalties we pay to it pursuant to such license agreements to Dr. Friesner and to Dr. Friesner’s laboratory at Columbia University. Columbia University distributed $138,047 and $265,618 to Dr. Friesner on account of royalties we paid to Columbia University in 2018 and 2019, respectively. Columbia University distributed $218,244 and $480,280 to Dr. Friesner’s laboratory on account of royalties we paid to Columbia University in 2018 and 2019, respectively.

Gift to Columbia University for Richard Friesner's Laboratory

On May 31, 2019, we entered into a letter agreement with the Trustees of Columbia University in the City of New York, or the Trustees of Columbia University, pursuant to which we agreed to provide a gift of up to $1,500,000, in five annual installments of $300,000 beginning on June 30, 2019, to the Trustees of Columbia University to establish the Computational Chemistry & Pharmaceutical Sciences Research Fund at Columbia University. Such gift will be used to support Dr. Friesner's laboratory at Columbia University. As of the date hereof, we have provided $300,000 of the $1,500,000 gift to the Trustees of Columbia University.

Relationship with David Shaw

Services Agreement with D. E. Shaw India Private Limited

Schrödinger, LLC, our wholly owned subsidiary, is party to a services agreement, dated as of June 25, 2013 and effective as of January 1, 2013, with D. E. Shaw India Private Limited (f/k/a D. E. Shaw India Software Private Limited), or DESIS. DESIS is wholly owned by D. E. Shaw & Co., L.P., or DESCO LP. David E. Shaw, who is a beneficial owner of more than 5% of our voting securities, is a limited partner of DESCO LP and the president and sole shareholder of D. E. Shaw & Co., Inc., which is the general partner of DESCO LP. Pursuant to the services agreement, DESIS provides a number of services to Schrödinger, LLC, including development and maintenance of software, support for technical and scientific research projects, programming, functional testing and validation of products and support for our data entry team. Schrödinger, LLC paid to DESIS $1,790,410, $1,808,516 and $609,041 for such services in 2018, 2019 and 2020, respectively. In connection with the services agreement, Schrödinger, LLC also paid to DESCO LP $267,410, $324,162 and $609,041 in 2018, 2019 and 2020, respectively, for certain indirect costs and expenses, including travel-related expenses, incurred by DESCO LP in connection with DESIS's provision of services to us.

Agreements with D. E. Shaw Research LLC

From time to time, Schrödinger, LLC, our wholly owned subsidiary, has engaged in transactions with D. E. Shaw Research, LLC, or DESRES. David E. Shaw, who is a beneficial owner of more than 5% of our voting securities, is the chief scientist and a member of DESRES and the president and sole shareholder of D. E. Shaw & Co., II, Inc., the sole member of D. E. Shaw Technology Development, LLC, or DESTECH, which is the managing member of DESRES.

Schrödinger, LLC sold licenses to a number of our software products to DESRES in exchange for aggregate consideration of $163,456 in 2018. From January 1, 2019 through the date hereof, Schrödinger, LLC sold licenses to a number of our software products to DESRES in exchange for aggregate consideration of $147,328.

On March 14, 2013, Schrödinger, LLC entered into a license and software development agreement with DESRES. Pursuant to the agreement, Schrödinger, LLC and DESRES agreed to develop and commercialize a software product, referred to as the Desmond/GPU Product, which combines certain of our software with certain DESRES software related to molecular simulation in connection with graphic processing units, which we refer to as the GPU DESRES Software. Under the agreement, Schrödinger, LLC and DESRES license each other's software so as to enable (i) Schrödinger, LLC and DESRES to market and distribute the Desmond/GPU Product and (ii) Schrödinger, LLC to market and distribute any of our other products, or the Other Schrödinger Products, incorporating or statically or dynamically linking to any portion of the GPU DESRES Software. Schrödinger, LLC pays to DESRES a royalty equal to a low double-digit percentage of annual payments received by Schrödinger, LLC for licensing, leasing, renting or providing maintenance on the Desmond/GPU Product and any Other Schrödinger Product. Such royalties are calculated on a graduated basis and are payable in perpetuity. In addition, in the event Schrödinger, LLC performs services using the Desmond/GPU Product or Other Schrödinger Products on behalf of or in collaboration with third parties, Schrödinger, LLC pays to DESRES a single-digit royalty on the services fees that directly relate to such usage. Schrödinger, LLC paid to DESRES $981,500, $1,880,209 and $695,712 in royalties in 2018, 2019 and 2020, respectively. To the extent DESRES were to commercially market or distribute the Desmond/GPU Product, we would be entitled to a royalty equal to a mid-double digit percentage of annual payments received by DESRES for licensing, leasing, renting or providing maintenance on the Desmond/GPU Product. Such royalties are calculated on a graduated basis and are payable in perpetuity. DESRES does not currently commercially sell or license the Desmond/GPU Product, and as such, DESRES did not pay us any royalties from January 1, 2018 through the date hereof.

On May 20, 2014, Schrödinger, LLC entered into an amended and restated license and software development agreement with DESRES. Pursuant to the agreement, Schrödinger, LLC and DESRES agreed to develop and commercialize a software product, or the Software Product, which combines certain of our software with certain DESRES software related to molecular simulation for central processing units, or the DESRES Software. Under the agreement, Schrödinger, LLC and DESRES license each other's software so as to enable (i) Schrödinger, LLC and DESRES to market and distribute the Software Product, and (ii) Schrödinger, LLC to market and distribute any of our other products, or the Other Schrödinger Software Products, incorporating or statically or dynamically linking to any portion of the DESRES Software. Schrödinger, LLC pays to DESRES a royalty equal to a low-double-digit percentage of annual payments received by Schrödinger, LLC for licensing, leasing, renting or providing maintenance on the Software Product and any Other Schrödinger Software Product. Such royalties are calculated on a graduated basis and are payable in perpetuity. In addition, in the event Schrödinger, LLC performs services using the Software Product or Other Schrödinger Software Products on behalf of or in collaboration with third parties, Schrödinger, LLC pays to DESRES a single-digit royalty on the services fees that directly relate to such usage. The royalties are graduated and are payable in perpetuity. Under the agreement, Schrödinger, LLC paid to DESRES $591,796, $601,141 and $130,000 in aggregate royalties in 2018, 2019 and 2020, respectively. To the extent DESRES were to commercially market or distribute the Software Product, we would be entitled to a royalty equal to a mid double-digit percentage of annual payments received by DESRES for licensing, leasing, renting or providing maintenance on the Software Product. Such royalties are calculated on a graduated basis and are payable in perpetuity. DESRES does not currently commercially sell or license the Software Product, and as such, DESRES did not pay us any royalties from January 1, 2018 through the date hereof.

Under both license and software development agreements, Schrödinger, LLC provides certain maintenance and support services for end users using the software product under unpaid non-commercial licenses. In consideration of these maintenance and support services, DESRES paid to Schrödinger, LLC $50,023, $51,544 and $13,042 in 2018, 2019 and 2020, respectively.

Charles Ardai, the managing director of DESTECH, previously served as a member of our board of directors. He resigned from our board of directors in October 2018.

Registration Rights

We are a party to an investor rights agreement with certain holders of our voting securities, including our 5% stockholders and their affiliates. This investor rights agreement provides these holders the right, subject to certain conditions, to demand that we file a registration statement or to request that their shares be covered by a registration statement that we are otherwise filing.

Indemnification Agreements

Our certificate of incorporation provides that we will indemnify our directors and officers to the fullest extent permitted by Delaware law. In addition, we have entered into indemnification agreements with all of our directors and executive officers. These indemnification agreements may require us, among other things, to indemnify each such director or executive officer for some expenses, including attorneys' fees, judgments, fines, and settlement amounts incurred by him or her in any action or proceeding arising out of his or her service as one of our directors or executive officers.

Employment Arrangements

We have entered into employment agreements with our executive officers. For more information regarding the agreements with our named executive officers, see "Item 11. Executive Compensation."

Policies and Procedures for Related Person Transactions

Our board of directors has adopted written policies and procedures for the review of any transaction, arrangement, or relationship in which our company is a participant, the amount involved exceeds $120,000 and one of our executive officers, directors, director nominees, or 5% stockholders, or their immediate family members, each of whom we refer to as a "related person," has a direct or indirect material interest.

If a related person proposes to enter into such a transaction, arrangement, or relationship, which we refer to as a "related person transaction," the related person must report the proposed related person transaction to our chief legal officer. The policy calls for the proposed related person transaction to be reviewed and, if deemed appropriate, approved by our audit committee. Whenever practicable, the reporting, review and approval will occur prior to entry into the transaction. If advance review and approval is not practicable, the committee will review, and, in its discretion, may ratify the related person transaction. The policy also permits the chairman of the audit committee to review and, if deemed appropriate, approve proposed related person transactions that arise between committee meetings, subject to ratification by the committee at its next meeting. Any related person transactions that are ongoing in nature will be reviewed annually.

A related person transaction reviewed under the policy will be considered approved or ratified if it is authorized by the audit committee after full disclosure of the related person's interest in the transaction. As appropriate for the circumstances, the audit committee will review and consider:

- the related person's interest in the related person transaction;
- the approximate dollar value of the amount involved in the related person transaction;
- the approximate dollar value of the amount of the related person's interest in the transaction without regard to the amount of any profit or loss;
- whether the transaction was undertaken in the ordinary course of our business;
- whether the terms of the transaction are no less favorable to us than terms that could have been reached with an unrelated third party;
- the purpose, and the potential benefits to us, of the transaction; and
- any other information regarding the related person transaction or the related person in the context of the proposed transaction that would be material to investors in light of the circumstances of the particular transaction.

Our audit committee may approve or ratify the transaction only if it determines that, under all of the circumstances, the transaction is in, or is not inconsistent with, our best interests. Our audit committee may impose any conditions on the related person transaction that it deems appropriate.

In addition to the transactions that are excluded by the instructions to the Securities and Exchange Commission's related person transaction disclosure rule, our board of directors has determined that the following transactions do not create a material direct or indirect interest on behalf of related persons and, therefore, are not related person transactions for purposes of this policy:

- interests arising solely from the related person's position as an executive officer of another entity, whether or not the person is also a director of the entity, that is a participant in the transaction where the related person and all other related persons own in the aggregate less than a 10% equity interest in such entity, the related person and his or her immediate family members are not involved in the negotiation of the terms of the transaction and do not receive any special benefits as a result of the transaction and the amount involved in the transaction is less than the greater of $200,000 or 5% of the annual gross revenues of the company receiving payment under the transaction; and
- a transaction that is specifically contemplated by provisions of our certificate of incorporation or bylaws.

The policy provides that transactions involving compensation of executive officers shall be reviewed and approved by our compensation committee in the manner specified in the compensation committee's charter.

We did not have a written policy regarding the review and approval of related person transactions prior to our initial public offering. Nevertheless, with respect to such transactions, it has been the practice of our board of directors to consider the nature of and business reasons for such transactions, how the terms of such transactions compared to those which might be obtained from unaffiliated third parties and whether such transactions were otherwise fair to and in the best interests of, or not contrary to, our best interests.

Director Independence

Applicable Nasdaq rules require a majority of a listed company's board of directors to be comprised of independent directors within one year of listing. In addition, Nasdaq rules require that, subject to specified exceptions, each member of a listed company's audit, compensation and nominating, and corporate governance committees be independent. Audit committee members must also satisfy the independence criteria set forth in Rule 10A-3 under the Exchange Act, and compensation committee members must also satisfy the independence criteria set forth in Rule 10C-1 under the Exchange Act.

Under applicable Nasdaq rules, a director will only qualify as an "independent director" if, in the opinion of the listed company's board of directors, that person does not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director. In order to be considered independent for purposes of Rule 10A-3, a member of an audit committee of a listed company may not, other than in his or her capacity as a member of the audit committee, the board of directors, or any other board committee, accept, directly or indirectly, any consulting, advisory, or other compensatory fee from the listed company or any of its subsidiaries or otherwise be an affiliated person of the listed company or any of its subsidiaries. In order to be considered independent for purposes of Rule 10C-1, the

board must consider, for each member of a compensation committee of a listed company, all factors specifically relevant to determining whether a director has a relationship to such company which is material to that director's ability to be independent from management in connection with the duties of a compensation committee member, including, but not limited to: (1) the source of compensation of the director, including any consulting advisory or other compensatory fee paid by such company to the director; and (2) whether the director is affiliated with the company or any of its subsidiaries or affiliates.

In December 2019, our board of directors undertook a review of the composition of our board of directors and its committees and the independence of each director. Based upon information requested from and provided by each director concerning his or her background, employment, and affiliations, including family relationships, our board of directors has determined that each of our directors, with the exception of Dr. Farid and Dr. Friesner, is an "independent director" as defined under applicable Nasdaq rules, including, in the case of all the members of our audit committee, the independence criteria set forth in Rule 10A-3 under the Exchange Act, and in the case of all the members of our compensation committee, the independence criteria set forth in Rule 10C-1 under the Exchange Act. In making such determination, our board of directors considered the relationships that each such non-employee director has with our company and all other facts and circumstances that our board of directors deemed relevant in determining his or her independence, including the beneficial ownership of our capital stock by each non-employee director. Dr. Farid is not an independent director under these rules because he is our president and chief executive officer, and Dr. Friesner is not an independent director under these rules because he has received more than $120,000 in consulting fees from us during a 12-month period within the last three years. See "Item 13. Certain Relationships and Related Transactions, and Director Independence" for more information regarding Dr. Friesner.

Item 14. Principal Accounting Fees and Services.

Fees Paid to Independent Auditors

The following table summarizes the aggregate fees paid or accrued by us for professional services provided by KPMG LLP, our independent registered public accounting firm, in the fiscal years ended December 31, 2018 and 2019.

	December 31,	
	2018	2019
Audit Fees	$ 313,700	$ 1,340,845
Audit-Related Fees	25,400	22,891
Tax Fees	115,246	117,847
All Other Fees	—	—
Total	$ 454,346	$ 1,481,583

Audit Fees. This category consists of professional services provided by KPMG LLP in connection with the audit of our annual consolidated financial statements and the review of our unaudited quarterly consolidated financial statements. The fees for fiscal year 2019 included services in connection with our initial public offering.

Audit-Related Fees. This category consists of assurance and related services provided by KPMG LLP that were reasonably related to the performance of the audit or review of our consolidated financial statements and which are not reported above under "Audit Fees".

Tax Fees. This category consists primarily of professional services provided by KPMG LLP that encompass a variety of permissible tax services, including federal and state tax compliance services, technical tax advice related to federal and state income tax matters, assistance with sales tax, and other tax consulting matters.

All Other Fees. This category consists of professional services other than the services reported in audit fees, audit-related fees, and tax fees. There were no such services or fees for fiscal years 2018 and 2019.

In fiscal years 2018 and 2019, all audit, audit-related, tax and all other services and fees were pre-approved by our audit committee. Our audit committee considered whether the non-audit services provided to us by KPMG LLP were compatible with maintaining the independence of KPMG LLP from us and determined that the provision of these services by KPMG LLP was compatible with maintaining that independence.

Pre-Approval Policies and Procedures

In March 2020, our audit committee adopted policies and procedures relating to the approval of all audit and other permitted non-audit services provided to us by our independent auditors. These policies provide that we will not engage our independent auditors to render audit or non-audit services unless the service is specifically approved in advance by our audit committee or the engagement to render the service is entered into pursuant to the pre-approval procedure. From time to time, our audit committee may pre-approve services that are expected to be provided to us by the independent auditors during the next 12 months. These services may include audit services, audit-related services, tax services and other permissible non-audit services. Our independent auditors and senior management will periodically report to the audit committee regarding the extent of services provided by the independent auditors.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

(1) **Financial Statements**

The following documents are included on pages F-2 through F-8 attached hereto and are filed as part of this Annual Report.

(2) **Financial Statement Schedules**

All financial statement schedules have been omitted because they are not applicable, not required, or the information required is shown in the consolidated financial statements or the notes thereto.

(3) **Exhibits**

The exhibits filed as part of this Annual Report are listed below.

Exhibit Number	Description of Exhibit	Form	File No.	Exhibit	Filing Date	Filed Herewith
3.1	Restated Certificate of Incorporation	8-K	001-39206	3.1	2/10/2020	
3.2	Amended and Restated Bylaws	8-K	001-39206	3.2	2/10/2020	
4.1	Specimen Stock Certificate evidencing the shares of common stock	S-1/A	333-235890	4.1	1/27/2020	
4.2	Amended and Restated Share Exchange Agreement, dated January 24, 2020, by and between the Registrant and Bill & Melinda Gates Foundation Trust	S-1/A	333-235890	4.2	1/27/2020	

4.3	Description of Securities Registered Under Section 12 of the Exchange Act					X
10.1	Amended and Restated Investors' Rights Agreement, dated as of November 9, 2018, by and among the Registrant and the other parties thereto, as amended	S-1/A	333-235890	10.1	1/27/2020	
10.2	2010 Stock Plan, as amended	S-1	333-235890	10.2	1/10/2020	
10.3	Form of Notice of Stock Option Grant and Stock Option Agreement under 2010 Stock Plan	S-1	333-235890	10.3	1/10/2020	
10.4+	2020 Equity Incentive Plan	S-1/A	333-235890	10.4	1/27/2020	
10.5+	Form of Stock Option Agreement and Form of Restricted Stock Unit Agreement under the 2020 Equity Incentive Plan	S-1/A	333-235890	10.5	1/27/2020	
10.6+	2020 Employee Stock Purchase Plan	S-1/A	333-235890	10.6	1/27/2020	
10.7+	Director Compensation Policy	S-1/A	333-235890	10.7	1/27/2020	
10.8+	Senior Executive Incentive Compensation Plan	S-1	333-235890	10.8	1/10/2020	
10.9+	Executive Severance and Change in Control Benefits Plan	S-1	333-235890	10.9	1/10/2020	
10.10+	Employment Agreement, dated May 11, 2010, by and between the Registrant and Ramy Farid	S-1	333-235890	10.10	1/10/2020	
10.11+	Employment Agreement, dated November 14, 2018, by and between the Registrant and Joel Lebowitz	S-1	333-235890	10.11	1/10/2020	
10.12+	Employment Agreement, dated April 15, 2013, by and between the Registrant and Cony D'Cruz	S-1	333-235890	10.12	1/10/2020	
10.13+	Managing Director Agreement, dated October 1, 2002, by and between Schrödinger GmbH and Jörg Weiser	S-1	333-235890	10.13	1/10/2020	
10.14+	Employment Agreement, dated May 14, 2018, by and between the Registrant and Karen Akinsanya	S-1	333-235890	10.14	1/10/2020	

10.15+	Employment Agreement, dated February 22, 2017, by and between the Registrant and Jennifer Daniel	S-1	333-235890	10.15	1/10/2020
10.16+	Employment Agreement, dated April 27, 2010, by and between the Registrant and Yvonne Tran	S-1	333-235890	10.16	1/10/2020
10.17+	Employment Agreement, dated September 11, 2006, by and between the Registrant and Patrick Lorton	S-1	333-235890	10.17	1/10/2020
10.18+	Employment Agreement, dated June 1, 2010, by and between the Registrant and Shane Brauner	S-1	333-235890	10.18	1/10/2020
10.19+	Employment Agreement, dated March 9, 2009, by and between the Registrant and Robert Abel	S-1	333-235890	10.19	1/10/2020
10.20+	Consultant Agreement, dated July 1, 1999, between the Registrant and Richard A. Friesner, as amended	S-1	333-235890	10.20	1/10/2020
10.21+	Form of Indemnification Agreement between the Registrant and each of its Executive Officers and Directors	S-1	333-235890	10.21	1/10/2020
10.22	Lease, dated July 8, 2009, between SLG Tower 45 LLC and Registrant, as amended	S-1	333-235890	10.22	1/10/2020
10.23	Lease, dated August 6, 2008, between One Main Place Portland – Oregon, Inc., Landlord, and Registrant, Tenant, as amended	S-1	333-235890	10.23	1/10/2020
10.24†	Agreement, dated as of May 5, 1994, between The Trustees of Columbia University in the City of New York and Registrant, as amended	S-1	333-235890	10.24	1/10/2020
10.25†	Agreement, dated as of July 15, 1998, between The Trustees of Columbia University in the City of New York and Registrant, as amended	S-1	333-235890	10.25	1/10/2020
10.26†	Agreement, dated as of September 2001, between The Trustees of Columbia University in the City of New York and Schrödinger, LLC, as amended	S-1	333-235890	10.26	1/10/2020

10.27†	Agreement, dated as of June 19, 2003, between The Trustees of Columbia University in the City of New York and Schrödinger, LLC	S-1	333-235890	10.27	1/10/2020	
10.28†	Software and Patent License Agreement, dated May 27, 2008, between The Trustees of Columbia University in the City of New York and Schrödinger, LLC	S-1	333-235890	10.28	1/10/2020	
10.29†	Services Royalty Amendment, dated November 1, 2008, by and between The Trustees of Columbia University in the City of New York and Schrödinger, LLC	S-1	333-235890	10.29	1/10/2020	
10.30†	Services Agreement, dated June 25, 2013, between D.E. Shaw India Software Private Limited and Schrödinger, LLC, as amended	S-1	333-235890	10.30	1/10/2020	
10.31†	License and Software Development Agreement, dated March 14, 2013, by and between D. E. Shaw Research LLC and Schrödinger, LLC	S-1	333-235890	10.31	1/10/2020	
10.32†	Amended and Restated License and Software Development Agreement, dated May 20, 2014, by and between D. E. Shaw Research, LLC and Schrödinger, LLC	S-1	333-235890	10.32	1/10/2020	
10.33+	Global Bonus Plan	S-1/A	333-235890	10.33	1/27/2020	
21.1	Subsidiaries of the Registrant	S-1	333-235890	21.1	1/10/2020	
23.1	Consent of KPMG LLP, independent registered public accounting firm					X
31.1	Certification of Principal Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002					X
31.2	Certification of Principal Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002					X

32.1#	Certification of Principal Executive Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002	X
32.2#	Certification of Principal Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002	X

† Portions of this exhibit have been omitted pursuant to Item 601(b)(10)(iv) of Regulation S-K.

The certifications attached as Exhibits 32.1 and 32.2 that accompany this Annual Report, are deemed furnished and not filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of Schrödinger, 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, irrespective of any general incorporation language contained in such filing.

+ Management contract or compensatory plan or arrangement filed in response to Item 15(a)(3) of the Instructions to the Annual Report on Form 10-K.

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, as amended, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized**.**

SCHRÖDINGER, INC.

Date: March 16, 2020

By: /s/ Ramy Farid

Ramy Farid, Ph.D.
President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this report has been signed below by the following persons on behalf of the Registrant in the capacities and on the dates indicated.

Name	Title	Date
/s/ Ramy Farid Ramy Farid, Ph.D.	President and Chief Executive Officer, Director (Principal Executive Officer)	March 16, 2020
/s/ Joel Lebowitz Joel Lebowitz	Chief Financial Officer (Principal Financial Officer)	March 16, 2020
/s/ Jenny Herman Jenny Herman	Vice President, Controller (Principal Accounting Officer)	March 16, 2020
/s/ Michael Lynton Michael Lynton	Chairman of the Board	March 16, 2020
/s/ Richard Friesner Richard Friesner, Ph.D.	Director	March 16, 2020
/s/ Rosana Kapeller-Libermann Rosana Kapeller-Libermann, M.D., Ph.D.	Director	March 16, 2020
/s/ Gary Sender Gary Sender	Director	March 16, 2020
/s/ Nancy Thornberry Nancy Thornberry	Director	March 16, 2020
/s/ Timothy Wright Timothy Wright, M.D.	Director	March 16, 2020

DESCRIPTION OF SECURITIES REGISTERED UNDER SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934, AS AMENDED

The following description of the securities of Schrödinger, Inc. ("us," "our," "we" or the "Company") registered under Section 12 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), is intended as a summary only and therefore is not a complete description of our common stock. This description is based upon, and is qualified by reference to, our certificate of incorporation, our bylaws, our amended and restated share exchange agreement and applicable provisions of the Delaware General Corporation Law (the "DGCL"). You should read our certificate of incorporation, our bylaws and our amended and restated share exchange agreement, which are incorporated by reference as Exhibit 3.1, Exhibit 3.2 and Exhibit 4.2, respectively, to the Annual Report on Form 10-K of which this Exhibit 4.3 is a part, for the provisions that are important to you.

Authorized Capital Stock

Our authorized capital stock consists of 500,000,000 shares of our common stock, par value $0.01 per share, 100,000,000 shares of our limited common stock, par value $0.01 per share and 10,000,000 shares of our preferred stock, par value $0.01 per share, all of which preferred stock is undesignated. Our common stock is registered under Section 12(b) of the Exchange Act.

Common Stock and Limited Common Stock

Voting Rights. Holders of our common stock are entitled to one vote for each share of common stock held on all matters submitted to a vote of stockholders and do not have cumulative voting rights. Holders of our limited common stock are entitled to one vote for each share of limited common stock held on all matters submitted to a vote of stockholders, except such holders of limited common stock are not entitled to vote any shares of limited common stock in any election of directors or on the removal of directors. At all meetings of stockholders at which directors are to be elected, other than in a contested election, when a quorum is present the election of directors by our stockholders will be determined by majority voting, meaning each nominee will be elected to the board of directors if the votes cast "for" such nominee's election by the stockholders entitled to vote exceed the votes cast "against" the nominee's election, with abstentions and "broker non-votes" not counting as votes "for" or "against." In a contested election, when a quorum is present the election of directors by our stockholders will be determined by a plurality of the votes cast by the stockholders entitled to vote on the election.

Dividends. Holders of common stock and limited common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend rights of any of our outstanding preferred stock.

Liquidation, Dissolution and Winding Up. In the event of our liquidation, dissolution or winding up, the holders of our common stock and limited common stock are entitled to receive proportionately all assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any of our outstanding preferred stock.

Other Rights. Holders of our common stock have no preemptive, subscription, redemption or conversion rights. The Bill & Melinda and Gates Foundation Trust, or the Trust, is party to an amended and restated share exchange agreement with us pursuant to which the Trust is entitled to exchange each share of common stock held by the Trust into one share of limited common stock at the Trust's election. Holders of our limited common stock have no preemptive, subscription or redemption rights. Holders of our limited common stock have the right to convert each share of our limited common stock into one share of common stock at such holder's election. The rights, preferences and privileges of holders of our common stock and limited common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of our preferred stock that we may designate and issue in the future.

Preferred Stock

Under the terms of our certificate of incorporation, our board of directors is authorized to issue shares of preferred stock in one or more series without stockholder approval. Our board of directors has the discretion to determine the rights, preferences, privileges, and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges, and liquidation preferences, of each series of preferred stock. The purpose of authorizing our board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions, future financings, and other corporate purposes, could have the effect of making it more difficult for a third party to acquire, or could discourage a third party from seeking to acquire, a majority of our outstanding voting stock.

Provisions of Our Certificate of Incorporation and Bylaws and the DGCL That May Have Anti-Takeover Effects

Delaware Business Combination Statute. We are subject to Section 203 of the DGCL. Subject to certain exceptions, Section 203 prevents a publicly held Delaware corporation from engaging in a "business combination" with any "interested stockholder" for three years following the date that the person became an interested stockholder, unless either the interested stockholder attained such status with the approval of our board of directors, the business combination is approved by our board of directors and stockholders in a prescribed manner or the interested stockholder acquired at least 85% of our outstanding voting stock in the transaction in which it became an interested stockholder. A "business combination" includes, among other things, a merger or consolidation involving us and the "interested stockholder" and the sale of more than 10% of our assets. In general, an "interested stockholder" is any entity or person beneficially owning 15% or more of our outstanding voting stock and any entity or person affiliated with or controlling or controlled by such entity or person.

Board of Directors; Removal of Directors. Our certificate of incorporation and our bylaws divide our board of directors into three classes with staggered three-year terms. In addition, our certificate of incorporation and our bylaws provide that until the first date on which the Trust, Schrodinger Equity Holdings, LLC, D. E. Shaw & Co., L.P., D. E. Shaw Technology Development, LLC and D. E. Shaw Valence Portfolios, L.L.C. and their respective successors and affiliates cease collectively to beneficially own (directly or indirectly) more than 40% of our outstanding shares of common stock and limited common stock (which date we refer to as the "Trigger Date"), any director may be removed at any time with or without cause by the affirmative vote of the holders of at least a majority of the voting power of our outstanding shares of common stock. On and after the Trigger Date, our directors may be removed only for cause and only by the affirmative vote of the holders of at least a majority of the voting power of all outstanding shares of common stock. Under our certificate of incorporation and our bylaws, any vacancy on our board of directors, including a vacancy resulting from an enlargement of our board of directors, may be filled only by vote of a majority of our directors then in office. Furthermore, our certificate of incorporation provides that the authorized number of directors may be changed only by the resolution of our board of directors. The classification of our board of directors and the limitations on the ability of our stockholders to remove directors, change the authorized number of directors and fill vacancies could make it more difficult for a third party to acquire, or discourage a third party from seeking to acquire, control of our company.

Stockholder Action; Special Meeting of Stockholders; Advance Notice Requirements for Stockholder Proposals and Director Nominations. Our certificate of incorporation and our bylaws provide that any action required or permitted to be taken by our stockholders at an annual meeting or special meeting of stockholders may only be taken if it is properly brought before such meeting; stockholders may not take action by written consent in lieu of a meeting, except that prior to the Trigger Date, the stockholders may act by written consent in lieu of a meeting for the sole purpose of removing a director with or without cause; and except as otherwise required by law, special meetings of the stockholders can only be called by our board of directors or by our secretary at the request of the holders of at least 25% of the outstanding shares of our common stock and limited common stock. In addition, our bylaws establish an advance notice procedure for stockholder proposals to be brought before an annual or special meeting of stockholders, including proposed nominations of candidates for election to our board of directors. Stockholders at an annual or special meeting may only consider proposals or nominations specified in the notice of meeting or brought before the meeting by or at the direction of our board of directors, or by a stockholder of record on the record date for the meeting who is entitled to vote at the meeting and who has delivered timely written notice in proper form to our secretary of the stockholder's intention to bring such business before the meeting. The advance notice provisions in our bylaws could have the effect of delaying stockholder actions that are favored by the holders of a majority of our outstanding voting securities. Moreover, the prohibition on stockholder action by written consent except as noted above could discourage a third party from making a tender offer for our common stock because even if the third party acquired a majority of our outstanding voting stock, it would be able to take action as a stockholder, such as electing new directors or approving a merger, only at a duly called stockholders meeting and not by written consent.

Exclusive Forum Selection. Our certificate of incorporation provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware (or, if the Court of Chancery of the State of Delaware does not have jurisdiction, the federal district court for the District of Delaware) shall, to the fullest extent permitted by law, be the sole and exclusive forum for (1) any derivative action or proceeding brought on our behalf, (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers, other employees or stockholders to our company or our stockholders, (3) any action asserting a claim arising pursuant to any provision of the DGCL or as to which the DGCL confers jurisdiction on the Court of Chancery of the State of Delaware or (4) any action asserting a claim arising pursuant to any provision of our certificate of incorporation or bylaws (in each case, as they may be amended from time to time) or governed by the internal affairs doctrine. These choice of forum provisions do not apply to suits brought to enforce any duty or liability created by the Securities Act of 1933, as amended, or the rules and regulations thereunder, the Exchange Act, or the rules and regulations thereunder or any other claim for which the federal courts have exclusive jurisdiction. Although our certificate of incorporation contains the choice of forum provisions described above, it is possible that a court could rule that such provisions are inapplicable for a particular claim or action or that such provisions are unenforceable.

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

The Board of Directors
Schrödinger, Inc.:

We consent to the incorporation by reference in the registration statement (No. 333-236297) on Form S-8 of Schrödinger, Inc. of our report dated March 16, 2020, with respect to the consolidated balance sheets of Schrödinger, Inc. as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive loss, convertible preferred stock and stockholders' deficit, and cash flows for the years then ended, and the related notes, which report appears in the December 31, 2019 annual report on Form 10-K of Schrödinger, Inc.

Our report on the consolidated financial statements refers to a change in the method of accounting for leases in 2019 due to the adoption of Accounting Standards Codification Topic 842, *Leases*.

/s/ KPMG LLP

Portland, Oregon
March 16, 2020

EXHIBIT 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER
PURSUANT TO RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES
EXCHANGE ACT OF 1934, AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Ramy Farid, certify that:

1. I have reviewed this Annual Report on Form 10-K of Schrödinger, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:
    a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
    b. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
    c. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
    a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
    b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 16, 2020

/s/ Ramy Farid

President and Chief Executive Officer (Principal Executive Officer)

EXHIBIT 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER
PURSUANT TO RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES
EXCHANGE ACT OF 1934, AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Joel Lebowitz, certify that:

1. I have reviewed this Annual Report on Form 10-K of Schrödinger, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:
    a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
    b. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
    c. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
    a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
    b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 16, 2020

/s Joel Lebowitz

Chief Financial Officer (Principal Financial Officer)

Exhibit 32.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, the undersigned officer of Schrödinger, Inc. (the "Company") hereby certifies, to his knowledge, that:

(i) the accompanying Annual Report on Form 10-K of the Company for the fiscal year ended December 31, 2019 (the "Report") fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 16, 2020

/s/ Ramy Farid

President and Chief Executive Officer (Principal Executive Officer)

Exhibit 32.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, the undersigned officer of Schrödinger, Inc. (the "Company") hereby certifies, to his knowledge, that:

(i) the accompanying Annual Report on Form 10-K of the Company for the fiscal year ended December 31, 2019 (the "Report") fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 16, 2020

/s/ Joel Lebowitz

Chief Financial Officer (Principal Financial Officer)