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, 2021

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

Schrodinger, 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.)**
1540 Broadway, 24th 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 has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

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

As of June 30, 2021, the last business day of the registrant's most recently completed second fiscal quarter, the aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant was $3,519,898,945 based upon the closing sale price of the registrant's common stock on that date.

As of February 18, 2022, the registrant had 61,873,343 shares of common stock and 9,164,193 shares of limited common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

The registrant intends to file a definitive proxy statement pursuant to Regulation 14A relating to the 2022 Annual Meeting of Stockholders within 120 days of the end of the registrant's fiscal year ended December 31, 2021. Portions of such definitive proxy statement are incorporated by reference into Part III of this Annual Report on Form 10-K to the extent stated herein.

Auditor Firm Id: 185 Auditor Name: KPMG LLP Auditor Location: Portland, OR

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS AND INDUSTRY DATA

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 submit investigational new drug applications to the U.S. Food and Drug Administration for our internal drug discovery programs;
- 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, including pursuant to our collaboration with Bristol-Myers Squibb Company;
- 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 potential continued impact of the COVID-19 pandemic on our business, operations, liquidity and prospects;
- 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; and
- our reliance on key personnel and our ability to identify, recruit, and retain skilled personnel.

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 "Risk Factor Summary" below and "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.

RISK FACTOR SUMMARY

Our business is subject to a number of risks of which you should be aware before making an investment decision. Below we summarize what we believe are the principal risk factors but these risks are not the only ones we face, and you should carefully review and consider the full discussion of our risk factors in the section titled “Risk Factors”, together with the other information in this Annual Report.

- We have a history of significant operating losses, and we expect to incur losses over the next several years.
- 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.
- Our quarterly and annual results may fluctuate significantly, which could adversely impact the value of our common stock.
- 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.
- 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.
- The markets in which we participate are highly competitive, and if we do not compete effectively, our business and operating results could be adversely affected.
- We may never realize a return on our investment of resources and cash in our drug discovery collaborations.
- 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.
- As a company, we do not have any experience in clinical development and have not advanced any product candidate into clinical development.
- We may not be successful in our efforts to identify, discover or develop 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.
- Conducting successful clinical trials requires the enrollment of a sufficient number of patients, and suitable patients may be difficult to identify and recruit.
- A widespread outbreak of an illness or other health issue, such as the COVID-19 pandemic, could negatively affect various aspects of our business and make it more difficult to meet our obligations to our customers, and could result in reduced demand from our customers as well as delays in our drug discovery and development programs.
- 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.
- 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 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.
- Our future success depends on our ability to retain key executives and to attract, retain, and motivate qualified personnel.
- 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.

- Our executive officers, directors, and principal stockholders, if they choose to act together, have the ability to influence all matters submitted to stockholders for approval.
- Our actual operating results may differ significantly from our guidance.

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 platform is used by biopharmaceutical and industrial companies, academic institutions, and government laboratories around the world. Our multidisciplinary drug discovery team also leverages our software platform to advance collaborative drug discovery and development programs and our own pipeline of novel therapeutics to address unmet medical needs.

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 several decades 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 2021, all of the top 20 pharmaceutical companies, measured by 2020 revenue, licensed our solutions, accounting for $42.0 million, or 37%, of our software revenue in 2021. 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 demonstrated by the increasing number of our customers with an annual contract value, or ACV, in excess of $100,000. We had 190, 153, and 131 such customers, which represented 80%, 79%, and 78% of our total ACV, for the years ended December 31, 2021, 2020, and 2019, respectively. In addition, our customer retention rate for our customers with an ACV over $100,000 for the year ended December 31, 2021 was 98% and was 96% or higher for each of the previous eight fiscal years. 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 “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 internal drug discovery programs spanning a wide range of disease targets and indications. Our drug discovery group is comprised of a multidisciplinary team of over 100 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, 2021, we collaborated on more than 20 drug discovery programs with more than ten different biopharmaceutical companies. These collaborations generate drug discovery revenue, including upfront payments, research funding payments, and discovery and development milestones, and have the potential to produce additional milestone payments, option fees, and future royalties.

Furthermore, in mid-2018, we launched a pipeline of internal, wholly-owned programs with the goal of rapidly advancing the discovery of best-in-class and first-in-class therapies. Our initial programs are focused on discovering and developing inhibitors for targets in DNA damage response pathways and genetically defined cancers. Since then, we have expanded into other therapeutic areas, including in the areas of immunology and neurology. We continue to advance multiple internal programs through investigational new drug, or IND, -enabling studies. We expect to submit an IND application to the U.S. Food and Drug Administration, or FDA, for our MALT1 program in the first half of 2022, and subject to receiving regulatory clearance, we expect to initiate a Phase 1 clinical trial of our MALT1 inhibitor in patients with relapsed and resistant lymphoma in the second half of 2022. We also plan to submit IND applications to the FDA for our CDC7 program in early 2023 and our WEE1 program in 2023, subject to

favorable data from IND-enabling studies. In addition, we plan to initiate a Phase 1 clinical trial of our CDC7 inhibitor in 2023, subject to receipt of regulatory clearance. 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, entering into collaborations, or out-licensing programs to maximize commercial opportunities.

As part of this strategy, in November 2020, we entered into an exclusive, worldwide collaboration and license agreement with Bristol-Myers Squibb Company, or BMS, pursuant to which we and BMS agreed to collaborate in the discovery, research and development of small molecule compounds for biological targets in the oncology, neurology and immunology therapeutic areas. The initial collaboration targets included HIF-2 alpha and SOS1/KRAS, which were two of our internal pipeline programs. In November 2021, we and BMS mutually agreed to replace the HIF-2 alpha target with another precision oncology target. Following the replacement election, all rights to the HIF-2 alpha target program reverted to us. Under the terms of the agreement, we received a $55.0 million upfront payment from BMS, and we are eligible to receive up to $2.7 billion in total milestones from BMS across all potential targets, as well as a tiered percentage royalty on net sales of each product commercialized by BMS ranging from mid-single digits to low-double digits, subject to certain specified reductions. See "—Collaboration Agreement with Bristol-Myers Squibb Company" for additional information relating to this agreement.

We generated revenue of $137.9 million, $108.1 million, and $85.5 million in 2021, 2020, and 2019, respectively, representing year-over-year growth of 28% and 26%, respectively. Our net loss was $101.2 million, $26.6 million, and $25.7 million for the years ended December 31, 2021, 2020, and 2019, respectively.

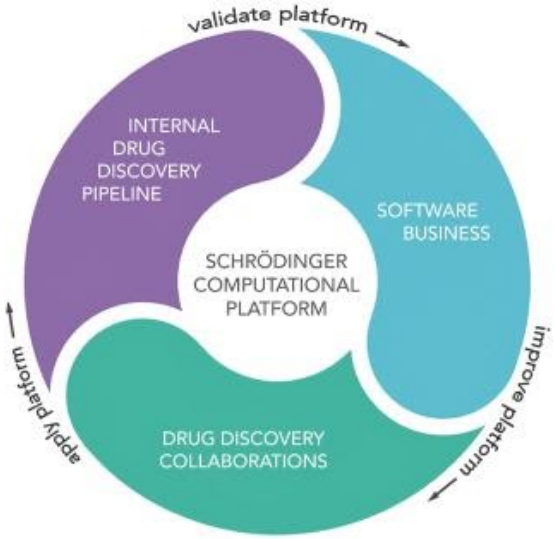
Strategy

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.

- ***Advancing 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. 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.
- ***Growing and expanding our software business:*** We have experienced steady growth in our software revenues, achieving $113.2 million in revenue in 2021, an increase of 22% compared to 2020, 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 2021, all of the top 20 pharmaceutical companies, measured by 2020 revenue, licensed our solutions, accounting for $42.0 million, or 37%, of our software revenue in 2021. However, we estimate that many of our largest customers are currently purchasing only enough software to optimally enable only a small portion of their drug discovery projects, which typically represents a small fraction of their drug discovery projects. Our ability to expand within our customer base is demonstrated by the increasing number of our customers with an ACV of over $100,000. We had 190, 153, and 131 such customers for the years ended December 31, 2021, 2020, and 2019, respectively. In addition, we had 15, 16, and 10 customers for the years ended December 31, 2021, 2020, 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.
- ***Accelerating growth of our drug discovery business:*** We also apply our computational platform across a diversified portfolio of drug discovery programs through collaborations with biopharmaceutical companies, and through our own efforts on internal programs. Our collaborations generate revenues through upfront payments, research funding, preclinical and clinical milestones as well as the potential for option fees, commercial milestones, and future royalties. We also benefit from equity positions in certain of our collaborators
  - 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 internal programs, including our MALT1, CDC7 and WEE1 inhibitor 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 preclinical and clinical development ourselves, entering into collaborations, or out-licensing programs to maximize commercial opportunities.

- ***Leveraging 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 internal 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 industry 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

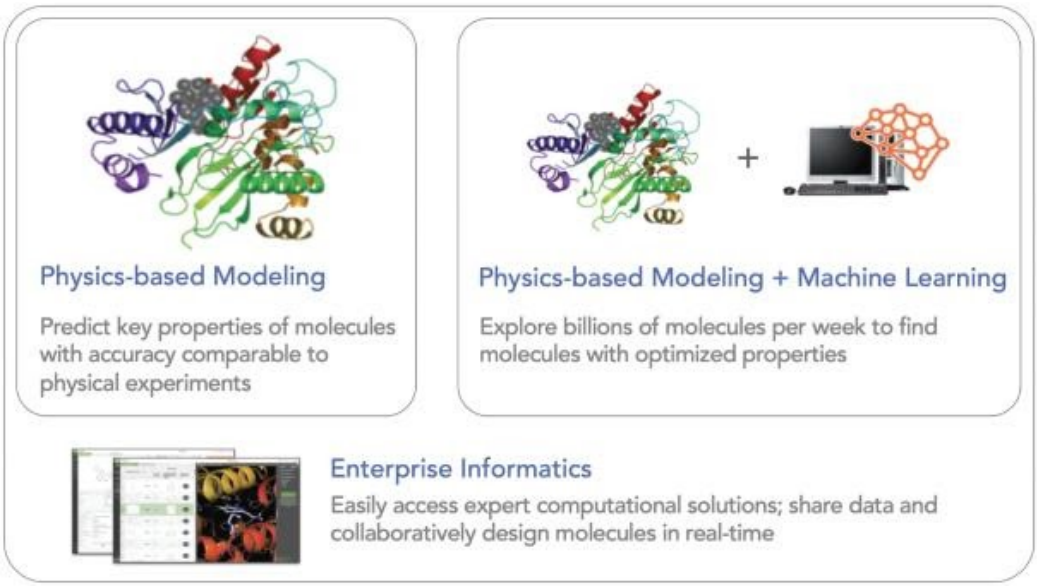
Over the past several decades and with the concerted effort of hundreds of our scientists and software engineers, we have developed a computational platform that is capable of predicting critical properties of molecules with a high degree of accuracy. We have built our platform on a foundation of rigorous, 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.

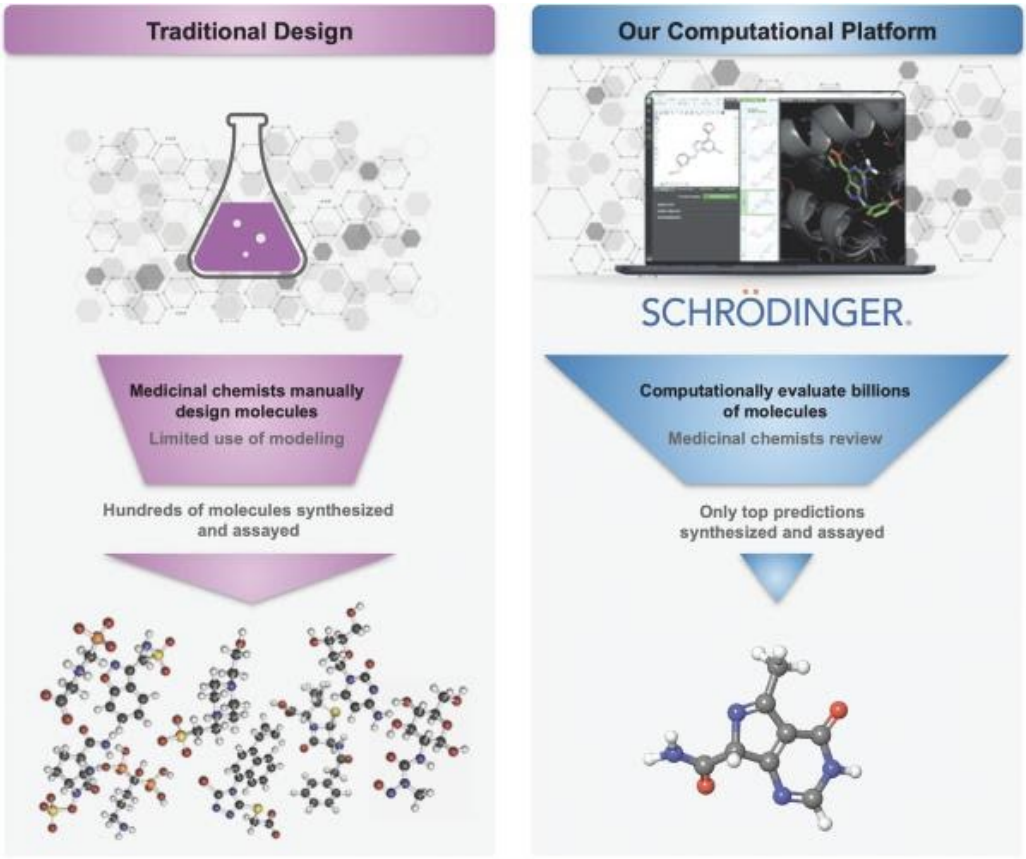
As shown below, we achieve these outcomes by tightly integrating our predictive physics-based methods, which have a high degree of accuracy, with machine learning, which is highly scalable. In addition, our platform enables real-time collaboration on drug discovery projects to inform decision-making 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 day, 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 billions of molecules to enable more rapid and successful identification of high-quality drug candidate molecules; 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 one of the most cited papers 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.

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 the leading provider of computational software solutions for drug discovery to the biopharmaceutical industry. In 2021, all of the top 20 pharmaceutical companies, measured by 2020 revenue, licensed our solutions, accounting for $42.0 million, or 37%, of our software revenue in 2021. Additionally, in 2021, our software was used by researchers around the world at more than 1,710 academic institutions. The widespread adoption of our software is supported by an approximately 150-person global team of sales, technical, and scientific personnel. Our direct sales operations span across the United States, Europe, Japan, India, and South Korea, and we have sales distributors in other important markets, including China.

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 33% of our software revenue in 2021, including one customer that makes up 14% of total 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, 2021, we had 1,647 active customers, which we define as the number of customers who had an ACV of at least $1,000 in a given fiscal year.

We believe there is a 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 demonstrated by the increasing number of our customers with an ACV over $100,000. We had 190, 153, and 131 such customers for the years ended December 31, 2021, 2020, and 2019, respectively. In addition, we had 15, 16, and 10 customers for the years ended December 31, 2021, 2020, and 2019, respectively, with an ACV of over $1.0 million. For the year ended December 31, 2021, our top 10 customers, measured by ACV, accounted for $34.1 million of our total ACV compared to $28.5 million for the year ended December 31, 2020. 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 long-standing relationships and reoccurring sales. This is demonstrated by the length of our key relationships, with the average tenure of our 10 largest customers in 2021 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, 2021, our year-over-year customer retention rate for our customers with an ACV over $100,000 was 98% and was 96% or higher for each of the previous eight fiscal years. 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 "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.
  - **GlideEM, PrimeX and Phenix/OPLS4** enable optimization of intermediate quality experimental protein structures to a quality sufficient to drive structure-based drug discovery.

- **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. FEP+ can also be used to calculate absolute binding affinities, which enables the software to evaluate and triage diverse molecules sharing no common peripheral features in a hit discovery context.
  - **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** 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.

Furthermore, in January 2022, we acquired XTAL BioStructures, Inc., a company that provides structural biology services, including biophysical methods, protein production and purification, and X-ray crystallography, which we believe will expand our offerings to include an advanced and differentiated service that provides customers access to protein structures that have been computationally validated and are ready for structure-based virtual screening and lead optimization.

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 industries 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.

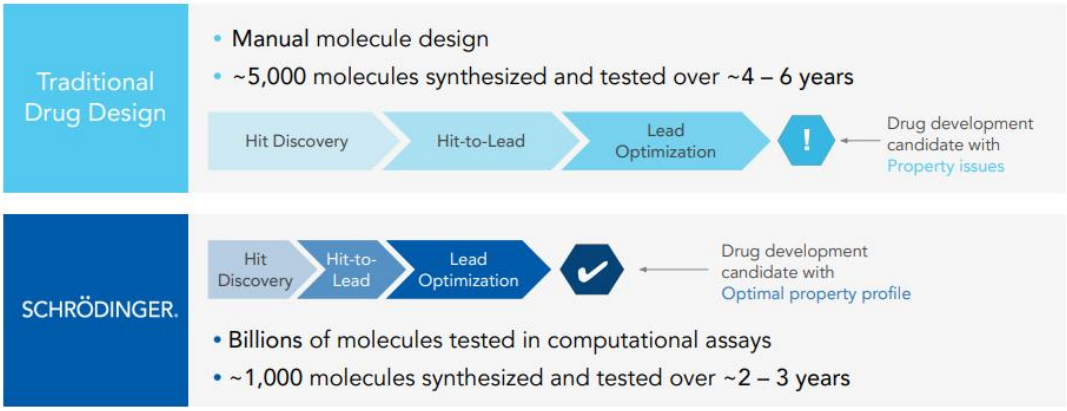
As part of our ongoing efforts to further advance our software solutions for materials science applications, in June 2020, we entered into a three-year agreement with Gates Ventures, LLC to develop and apply atomistic simulations methods to improve battery performance.

Drug Discovery Business

Overview

We are using our computational platform in both collaborative and internal 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.

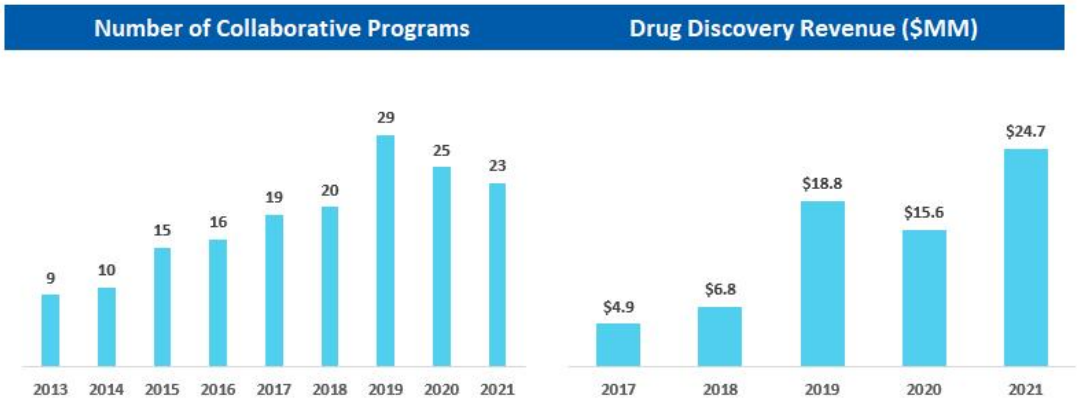
The figure below illustrates the advantages in time, cost, and molecule quality of our computational drug design approach over traditional drug discovery approaches.



The figures below show the number of collaborative programs we have worked on in each given year, as well as the amount of drug discovery revenue we have generated for the periods presented. While our revenue-generating collaborations are an important component of our business, our strategy is also to pursue an increasing number of internal programs and strategically evaluate on a program-by-program basis entering into preclinical and clinical development ourselves, entering into collaboration, or out-licensing programs to maximize commercial opportunities. As part of this strategy, in November 2020, we entered into an exclusive, worldwide collaboration and license agreement with BMS pursuant to which we and BMS agreed to collaborate in the discovery, research and clinical development of small molecule compounds for biological targets in the oncology, neurology and immunology therapeutic areas. Furthermore, in August 2021, we entered into a global discovery, development and commercialization collaboration with Zai Lab Limited focused on a novel program in oncology targeting DNA damage response. These programs are not included in the number of collaborative programs described below. See "—Our Pipeline" for a further discussion of these programs.

Furthermore, collaborative programs which we did not actively work on in a given year, but for which we are still eligible to receive potential milestone payments and royalties, are not included in the number of collaborative programs below. For the year ended December 31, 2021, we had seven such programs compared to nine and two for the years ended December 31, 2020, and 2019, respectively.

Our drug discovery revenue consists of revenue generated from collaborations through the combination of upfront payments, research funding payments, discovery and development milestones, and other fees, as well as any revenue generated from our pipeline of internal drug discovery programs, including revenue generated from our collaboration with BMS. As part of the BMS collaboration in November 2020, we received an upfront payment of $55.0 million. Approximately $13.7 million and $1.0 million of the upfront payment were included in our drug discovery revenue for the years ended December 31, 2021 and 2020, with the remainder recorded as deferred revenue as of December 31, 2021.



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.

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 at scale, thereby avoiding the time and cost needed to build such computational 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., Morphic Holding, Inc., or Morphic, Nimbus Therapeutics, LLC, Sanofi S.A., ShouTi Inc., 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 on an issued and outstanding basis as of December 31, 2021:

Company	Ownership %
Ajax Therapeutics, Inc.	6.3%
Bright Angel Therapeutics Inc.	33.3%
Faxian Therapeutics, LLC (JV)	50.0%
Morphic Holding, Inc. (1)	2.3%
Nimbus Therapeutics, LLC (2)	5.5%
Ravenna Pharmaceuticals, Inc.	3.1%
ShouTi, Inc.	4.5%

(1) Based on the number of shares of common stock outstanding as of November 1, 2021, as reported on Morphic's Quarterly Report on Form 10-Q for the period ended September 30, 2021, as filed with the SEC on November 4, 2021.
(2) On a fully diluted 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.

Many 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 "Risk Factors—Risks Related to Drug Discovery—We may never realize a 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. With the exception of Takeda, where we retain all intellectual property rights until Takeda exercises its option to acquire a program, 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.

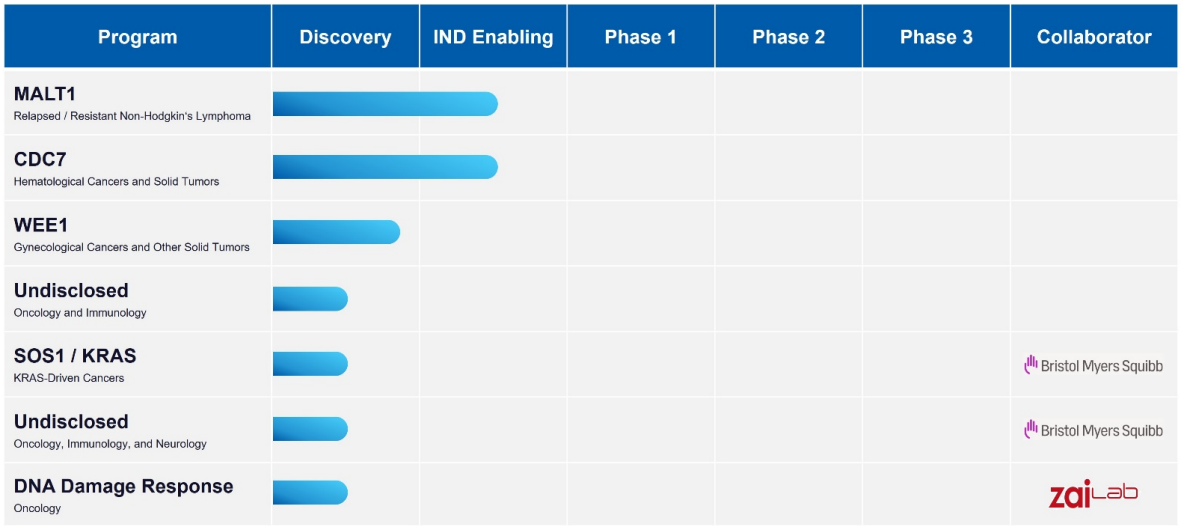
Our Pipeline

In mid-2018, we launched a pipeline of internal, wholly-owned programs with the goal of rapidly advancing the discovery of best-in-class and first-in-class therapies. Our initial programs are focused on discovering and developing inhibitors for targets in DNA damage response pathways and genetically defined cancers. Since then, we have expanded into other therapeutic areas, including in the areas of immunology and neurology. We continue to advance multiple internal programs through investigational new drug, or IND, -enabling studies. We expect to submit an IND application to the FDA for our MALT1 program in the first half of 2022, and subject to receiving regulatory clearance, we expect to initiate a Phase 1 clinical trial of our MALT1 inhibitor in patients with relapsed and resistant lymphoma in the second half of 2022. We also plan to submit IND applications to the FDA for our CDC7 program in early 2023 and our WEE1 program in 2023, subject to favorable data from IND-enabling studies. In addition, we plan to initiate a Phase 1 clinical trial of our CDC7 inhibitor in 2023, subject to receipt of regulatory clearance. Our strategy is to pursue an increasing number of wholly-owned programs and strategically evaluate on a program-by-program basis entering into preclinical and clinical development ourselves, entering into collaborations, or out-licensing programs to maximize commercial opportunities.

As part of this strategy, in November 2020, we entered into an exclusive, worldwide collaboration and license agreement with BMS pursuant to which we and BMS agreed to collaborate in the discovery, research and development of small molecule compounds for biological targets in the oncology, neurology and immunology therapeutic areas. The initial collaboration targets included HIF-2 alpha and SOS1/KRAS, which were two of our internal pipeline programs. In November 2021, the Company and BMS mutually agreed to replace the HIF-2 alpha target with another precision oncology target. Following the replacement election, all rights to the HIF-2 alpha target program reverted to us. Under the terms of the agreement, we received a $55.0 million upfront payment from BMS, and we are eligible to receive up to $2.7 billion in total milestones from BMS across all potential targets, as well as a tiered percentage royalty on net sales of each product commercialized by BMS ranging from mid-single digits to low-double digits, subject to certain specified reductions. See “—Collaboration Agreement with Bristol-Myers Squibb Company” for additional information relating to this agreement.

Furthermore, in August 2021, we entered into a global discovery, development and commercialization collaboration with Zai Lab Limited focused on a novel program in oncology targeting DNA damage response. Under the terms of the agreement, we are entitled to receive an upfront payment, and if we elect to co-fund clinical development of a product candidate under the collaboration, we will be entitled to receive 50% of any profits from the commercialization of an approved therapeutic in the United States. We are also eligible to receive up to approximately $338 million in preclinical, clinical, regulatory and sales-based milestone payments from Zai Lab Limited for any product candidate developed under the collaboration, and we are entitled to receive tiered royalties on net sales outside the United States.

The following is a summary of our 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.

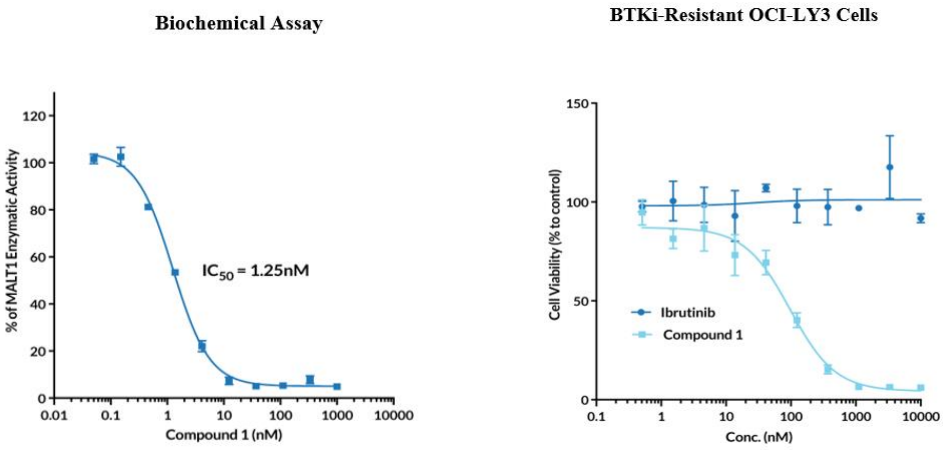
MALT1 Inhibitor Program

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 key mediator of the NF-κB signaling pathway, the main driver of a subset of B-cell lymphomas and functions by forming a complex with CARMA1 (Caspase recruitment domain-containing protein 11 also known as CARD-containing MAGUK protein 1) and BCL10 (B-cell lymphoma/leukemia 10) to mediate antigen receptor-induced lymphocyte activation. MALT1 is considered a potential therapeutic target for several subtypes of non-Hodgkin's lymphomas.

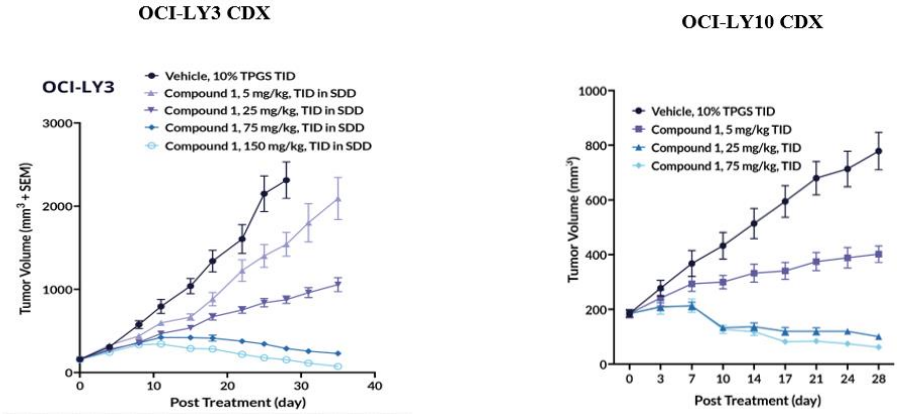
Activated B-cell, or ABC, a subtype of diffuse large B-cell lymphoma, or ABC-DLBCL, is the most common type of aggressive non-Hodgkin's B-cell lymphoma. ABC-DLBCL is associated with a number of mutations that trigger a constitutively active NF-κB signaling pathway, which often is mediated by increased 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.

Our program utilizes our physics-based software platform to enable the identification and advancement of multiple novel series from hit finding to lead optimization. Combining multi-parameter optimization, FEP+, and machine learning, we were able to prioritize tight-binding compounds with drug-like properties, and identify multiple novel and distinct chemical series which showed strong anti-tumor activity, ultimately enabling development candidate selections in our MALT1 inhibitor program in under two years.

As shown in the figures below, in preclinical studies, one of our MALT1 inhibitors, Compound 1, showed anti-tumor activity in a MALT1 enzymatic assay and strong anti-proliferative effect in cell viability in a BTK inhibitor resistant OCI-LY3 B-cell non-Hodgkin's lymphoma cell line, when compared to ibrutinib, a covalent BTK inhibitor.



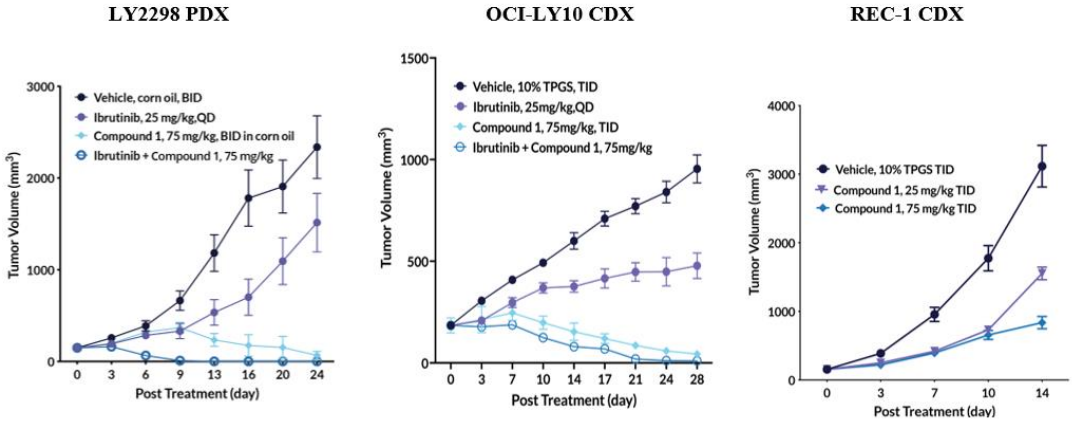
As shown in the figures below, in preclinical studies, Compound 1 also demonstrated strong anti-tumor activities as a single agent in BTK inhibitor resistant OCI-LY3 cells and in BTK sensitive OCI-LY10 B-cell non-Hodgkin's lymphoma in vivo cell-line derived xenograft (CDX) models.



TPGS = D-alpha-tocopheryl polyethylene glycol succinate, a solvent used in co-administration for drug dosing in animals; TID = three times a day dosing; SDD = spray dried dispersion

In addition, Compound 1 demonstrated strong anti-tumor activities in combination with ibrutinib in the BTK inhibitor sensitive *in viv*o models, such as the ABC-DLBCL patient-derived xenograft (PDX) model LY2298 and the OCI-LY10 CDX model.

Beyond ABC-DLBCL disease models, Compound 1 also demonstrated single agent anti-tumor activity in an *in vivo* mantle cell lymphoma REC-1 CDX model. Compound 1 also showed strong combination effects with venetoclax (an inhibitor of the anti-apoptotic protein B-cell lymphoma 2 (BCL2)) on inhibition of cancer cell viability in the OCI-LY10 CDX model.



QD = once per day dosing; BID = twice a day dosing

These data suggest that targeting MALT1 may expand therapeutic options for patients with selected B-cell lymphomas, such as ABC-DLBCL, with the possibility of expanding into other B-cell lymphomas such as mantle cell lymphoma. Furthermore, these small molecule MALT1 inhibitors demonstrated potential in combination with BTK inhibitors to overcome drug-induced resistance to BTK inhibitors in patients with relapsed/refractory B-cell lymphomas. Taken together, we believe the data present an opportunity to move a potential best-in-class MALT1 inhibitor into clinical trials, subject to the submission of our IND application and clearance from the FDA, and strongly underscore the therapeutic potential of our MALT1 inhibitors. We expect to submit an IND application to the FDA for our MALT1 program in the first half of 2022, and subject to receiving regulatory clearance, we expect to initiate a Phase 1 clinical trial of our MALT1 inhibitor in patients with relapsed and resistant lymphoma in the second half of 2022.

CDC7 Kinase Inhibitor Program

We are developing tight-binding, selective, novel small molecule inhibitors of CDC7 for the treatment of advanced solid and liquid tumors. CDC7 is a serine/threonine protein kinase that has been shown to play important roles in DNA replication initiation and in response to replication stress and DNA damage. CDC7 levels are high in certain tumors, and are thought to be linked to these cancer cells' proliferative capacity and ability to bypass normal DNA damage responses.

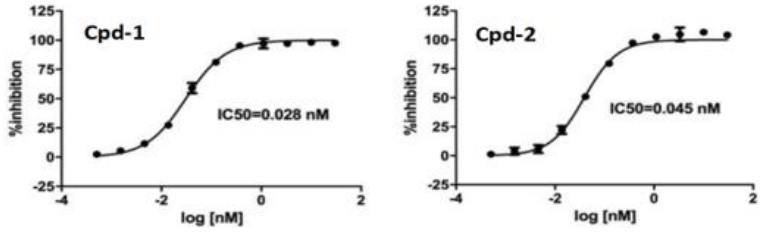
CDC7 phosphorylates and activates the enzymes responsible for DNA replication initiation and proteins involved in replication stress response. Disruption of CDC7 activity in cancer cells leads to delayed DNA replication, increased replication stress, cell cycle abnormalities, and cell death.

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.

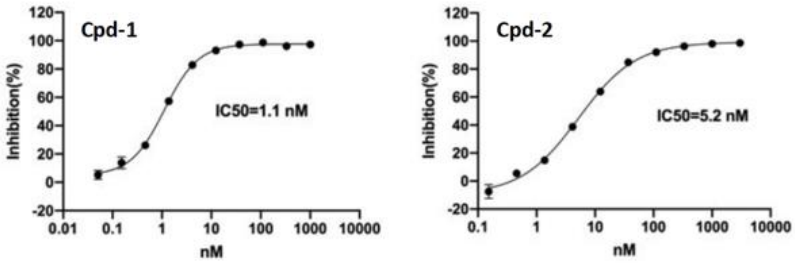
In order to maximize the anti-cancer activities of CDC7 inhibitors, very tight-binding inhibitors are required to achieve durable clinical impact as monotherapy or in the context of clinical combinations. Using our computational platform, we have identified multiple tight-binding, selective, and novel CDC7 inhibitor series.

As shown in the figures below, our advanced preclinical molecules, compound 1 (Cpd-1) and compound 2 (Cpd-2), demonstrated inhibition of recombinant human CDC7 in a biochemical kinase assay and inhibition of the phosphorylation of the serine in position 53, or S53, of the protein MCM2, or pMCM2, a downstream substrate of CDC7, in a Colo205 colorectal cancer cell line.

Dose-dependent inhibition of CDC7 by Compound-1 (Cpd-1) or Cpd-2 in a biochemical kinase (ADP-Glo) assay

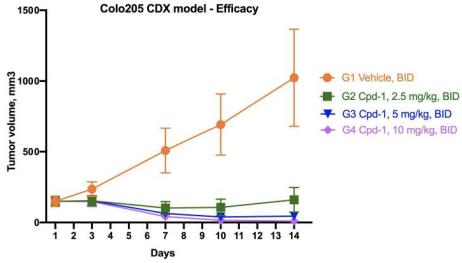


Inhibition of phosphorylation of MCM2 (CDC7 substrate) at S53 by CDC7 inhibitors in Colo205 cells measured by MSD (Meso Scale Discovery) assay

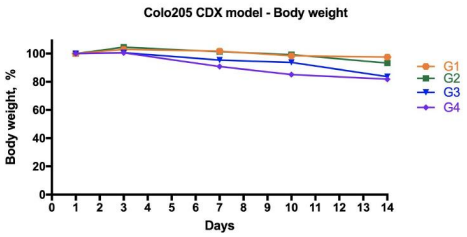


Furthermore, Cpd-1 showed tumor growth inhibition resulting in tumor regression in the Colo205 colorectal cancer CDX model at doses that did not result in significant body weight loss. Cpd-1 also showed a dose-dependent increase in plasma drug concentration and a dose-dependent decrease in intratumoral pMCM2 in the Colo205 CDX model. In mouse models of acute myeloid leukemia, Cpd-1 also showed strong anti-tumor activity at doses that did not result in significant body weight loss.

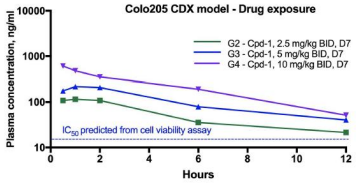
Tumor growth inhibition of Colo205 tumors after oral dosing with Cpd-1



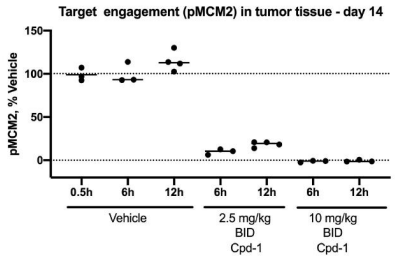
Body weight of the tumor-bearing mice



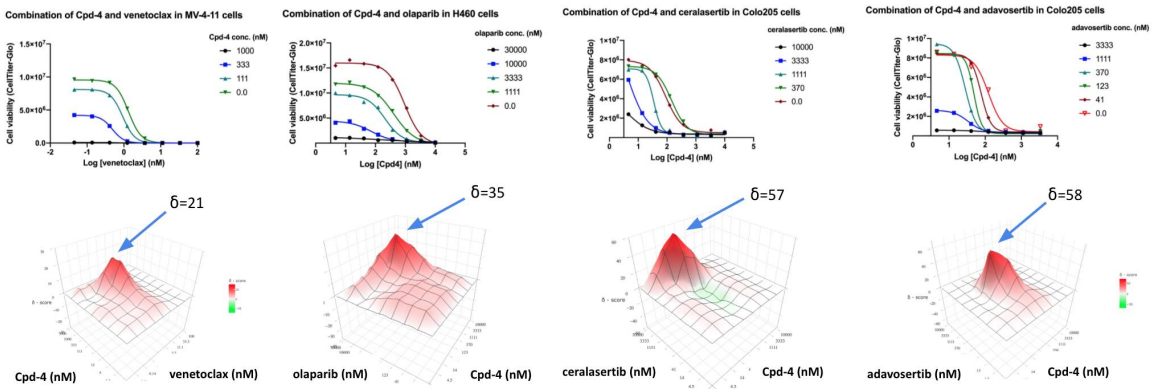
Plasma drug concentration 0.5-12 hours after dosing relative to Colo205 proliferation IC_{50}



Target engagement (pMCM2) in the tumor tissue 6 and 12 hours after dosing on day 14



As also shown in the figures below, a combination of our advanced preclinical molecule, compound 4 (Cpd-4), with venetoclax (an inhibitor of the anti-apoptotic protein B-cell lymphoma 2 (BCL2)), olaparib (an FDA-approved PARP inhibitor marketed as LYNPARZA by AstraZeneca), ceralasertib (an ataxia telangiectasia and RAD-3relate, or ATR, inhibitor), or adavosertib (a WEE1 inhibitor) showed synergistic effect on inhibition of cancer cell viability in the indicated cancer cell lines, which are the acute myeloid leukemia cell line, or MV-4-11, the lung cancer cell line, or H460, and the Colo205 colorectal cancer cell line.



All competitor data is internally generated by contract research organizations, using commercially available tools or synthesized by third-party research chemists using publicly available structure information.

WEE1 Kinase Inhibitor Program

WEE1 is a gatekeeper checkpoint kinase that prevents cellular progression through the cell cycle allowing time for DNA repair before cell division takes place. Inhibition of WEE1 allows for accumulation of DNA damage, triggering DNA breakage and

apoptosis in tumor cells. We are therefore developing tight-binding, selective WEE1 inhibitors with optimized physicochemical properties that we believe will be well suited for combinations with DNA damage response inhibitors such as PARP and ATR inhibitors and other targeted therapies for the treatment of ovarian, colorectal, breast, and other solid tumors.

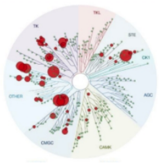
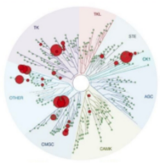
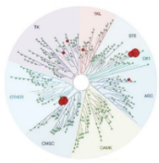
A WEE1 inhibitor currently being investigated in Phase 2 clinical trials by a third party has shown clinically meaningful tumor regression with partial responses and stable disease in ovarian and uterine cancer, and is being studied in combinations with chemotherapy, PARP inhibitors, and immunotherapy.

A prior third party WEE1 inhibitor that has advanced to clinical trials may have off-target effects resulting from inhibition of other kinases, 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.

As shown in the figure below, we have identified WEE1 inhibitor lead molecules that are tight-binding and highly selective, and have exhibited a favorable drug-like property profile, including no observable inactivation of CYP3A4. We have benchmarked our compounds against AZD-1775, a WEE1 inhibitor being advanced by AstraZeneca, and Zn-C3, a WEE1 inhibitor being advanced by Zentalis Pharmaceuticals, and our lead molecules have shown comparable binding affinity against WEE1, as measured by Kd, a measure of binding affinity.

Our compounds have also shown comparable effects on the viability of the A427 non-small cell lung cancer cell line and the OVCAR3 high grade serous ovarian cancer cell line. The selectivity of our WEE1 inhibitors was evaluated by profiling one of our lead compounds at 1 uM across a panel of over 450 kinases. Our WEE1 inhibitor showed high selectivity for WEE1 in this assay panel, binding significantly, with a greater than 90% inhibition relative to control, to only eight other kinases.

Furthermore, time-dependent inhibition, or TDI, of the enzyme CYP3A4 often results in clinically significant drug-drug interactions, or DDI. In vitro, our compound showed no measurable TDI of CYP3A4, which we believe might lead to a lower potential liability for DDI if our WEE1 inhibitors were used in combination with other agents. We are pursuing in vitro and in vivo WEE1 and PARP inhibitor combination studies and studies in patient-derived tumor mouse models and other combinations, which we believe may have implications for future clinical combination trials.

	AZD-1775	Zn-C3	SDGR WEE1 program
WEE1 Kd (nM)	3	2	4
Cell viability IC50 (nM) CTG assay in A427 and OVCAR3 cell lines	130; 290	260; 210	100; 90
Kinome Selectivity scanMAX at 1uM			
DDI Liability	CYP3A4 TDI	CYP3A4 TDI	No CYP3A4 TDI

All competitor data is internally generated by contract research organizations, using commercially available tools or synthesized by third-party research chemists using publicly available structure information.

SOS1/KRAS Inhibitor Program

In collaboration with BMS, 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.

Pursuant to our collaboration and license agreement with BMS, once we have discovered or identified a SOS1/KRAS protein-protein interaction inhibitor that meets specified, mutually-agreed criteria (or upon BMS's selection), BMS will be solely responsible for the further preclinical and clinical development, manufacturing and commercialization of such candidate at its own expense. See "—Collaboration Agreement with Bristol-Myers Squibb Company" for additional information relating to this agreement.

Other and 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. For example, as part of these efforts, in 2020 we entered into strategic partnerships with Viva Biotech to access new x-ray crystal structures as well as with Thermo Fisher Scientific to obtain structures of protein complexes leveraging cryo-EM technology. Furthermore, in January 2022, we acquired XTAL BioStructures, Inc., a company that provides structural biology services, including biophysical methods, protein production and purification, and X-ray crystallography, which we believe will augment our ability to produce high quality target structures for our drug discovery programs.

Our initial programs are focused on discovering and developing inhibitors for targets in DNA damage response pathways and genetically defined cancers. 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.

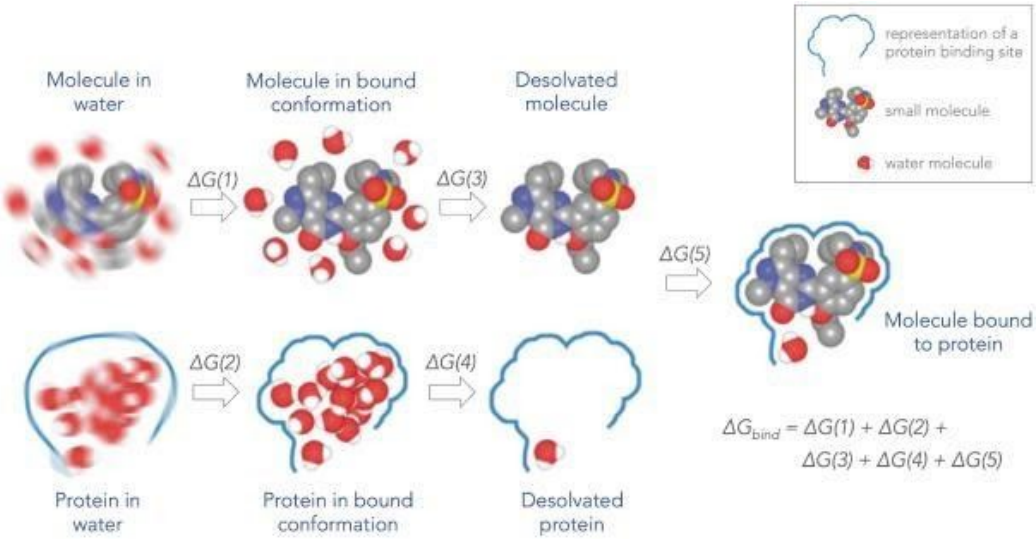
In addition to our programs highlighted above, we are also progressing a number of undisclosed programs in the areas of oncology, immunology, and neurology. We are pursuing certain of these programs on our own and certain of these programs are being advanced in collaboration with BMS pursuant to our collaboration agreement described above, as well as under a separate collaboration agreement with BMS that we entered into in August 2021 to discover, develop and commercialize bifunctional protein degraders. All of these programs are currently in the discovery stage, and we have not yet identified a development candidate for any of these programs.

Technical Details of Our Key Technologies

Calculation of key drug properties using physics-based methods

Over the past several decades 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 ($\Delta G(1)$ in the figure below) and the rigidification of the protein in the bound conformation ($\Delta G(2)$), the removal of waters surrounding the molecule ($\Delta G(3)$) and the removal of waters within the protein binding site ($\Delta G(4)$), and finally the interactions achieved between the molecule and protein when binding to form the protein-molecule complex ($\Delta G(5)$).


representation of a protein binding site
small molecule
water molecule
Molecule in water
Molecule in bound conformation
Desolvated molecule
ΔG(1)
ΔG(3)
ΔG(5)
Molecule bound to protein
ΔG(2)
ΔG(4)
Protein in water
Protein in bound conformation
Desolvated protein
$\Delta G_{bind} = \Delta G(1) + \Delta G(2) + \Delta G(3) + \Delta G(4) + \Delta G(5)$

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 graphic processing units;
- 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 notable 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 only a few hours. 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 the most commonly used chemical reactions and 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

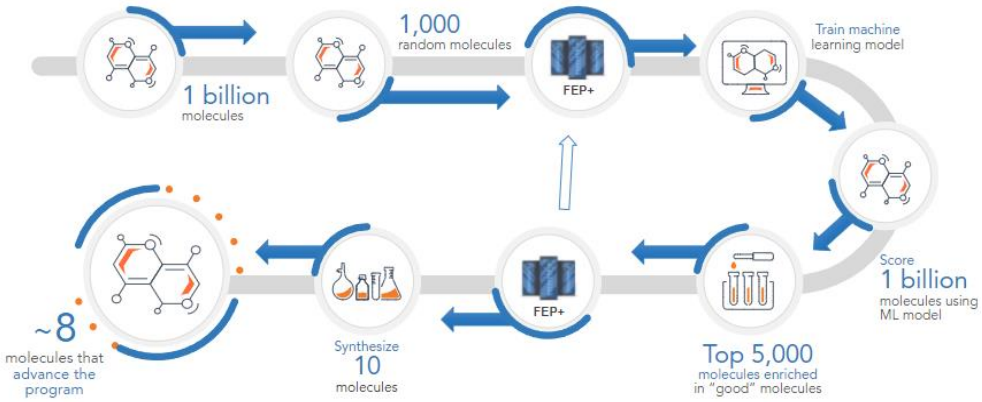
Although FEP+ calculations have been shown to be accurate, it is not possible to apply these calculations to billions of molecules given the current availability of computing resources. To address this problem, we developed an approach that leverages the accuracy of FEP+, but allows for exploration of billions of molecules rapidly 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 day. 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 we can prioritize one billion molecules in as little as a day, 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 internal 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 billions of molecules in less than one day. 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. 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, 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. Our FEP+ solution also supports the calculation of absolute binding affinities, which enables the software to evaluate and triage diverse molecules sharing no common peripheral features in a hit discovery context.

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

Software Business

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 or providing 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, Cyrus Biotechnology, Inc., Molsoft LLC, Insilico Medicine, Inc., Iktos, XtalPi Inc., 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., ChemAxon, PerkinElmer, 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.

Drug Discovery Business

The biopharmaceutical industry is characterized by rapidly advancing technologies, intense competition, and strong emphasis on proprietary and novel products and product candidates. 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.

The key competitive factors affecting the success of the product candidates we develop, if approved, are likely to be their efficacy, safety, convenience and price, the level of generic competition and the availability of coverage and adequate reimbursement from third-party payors. If any of our product candidates are approved and successfully commercialized, it is likely that we will face increased competition as a result of other companies pursuing development of products to address similar diseases.

In particular, there is intense competition in the fields of oncology we are pursuing. We have competitors both in the United States and internationally, including major multinational pharmaceutical companies, established biotechnology companies, specialty pharmaceutical companies, emerging and start-up companies, universities and other research institutions. We also compete with these organizations to recruit management, scientists and clinical development personnel, which could negatively affect our level of expertise and our ability to execute our business plan. We will also face competition in establishing clinical trial sites, enrolling subjects for clinical trials and in identifying new product candidates.

Large pharmaceutical and biotechnology companies, in particular, have extensive experience in clinical testing, obtaining regulatory approvals, recruiting patients and manufacturing biotechnology products. These companies also have significantly greater research and marketing capabilities than we do and may also have products that have been approved or are in late stages of development, and collaborative arrangements in our target markets with leading companies and research institutions. Established pharmaceutical and biotechnology companies may also invest heavily to accelerate discovery and development of novel compounds or to in-license novel compounds that could make the product candidates that we develop obsolete. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than our products. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies, as well as in acquiring technologies complementary to, or necessary for, our programs. As a result of all of these factors, our competitors may succeed in obtaining approval from the FDA or other comparable foreign regulatory authorities or in discovering, developing and commercializing products in our field before we do.

Collaboration Agreement with Bristol-Myers Squibb Company

In November 2020, we entered into an exclusive, worldwide collaboration and license agreement with BMS, pursuant to which we and BMS agreed to collaborate in the discovery, research and preclinical development of small molecule compounds (other than protein-degrader compounds) for biological targets in the oncology, neurology and immunology therapeutic areas.

Under the agreement, during a limited research term, we will be responsible, at our own cost and expense, for the discovery of small molecule compounds (other than protein-degrader compounds) directed to five specified biological targets pursuant to a mutually agreed research plan for each such target. The initial collaboration targets included HIF-2 alpha and SOS1/KRAS, which were two of our early-stage programs. In November 2021, we and BMS mutually agreed to replace the HIF-2 alpha target with another precision oncology target. Following the replacement election, all rights to the HIF-2 alpha target program reverted to us. Once we have discovered or identified a compound for a target that meets specified, mutually-agreed criteria or upon BMS selection of a compound as a development candidate, BMS will be solely responsible for the further preclinical and clinical development, manufacturing and commercialization of such candidate at its own cost and expense. The research term will end on the earlier of four years or until we have delivered a candidate for each specified target. We may elect to extend the research term for a limited period of time to deliver a candidate for a given target. In addition, the parties may mutually agree to extend the initial research term for an additional year. Under the agreement, BMS has agreed to use commercially reasonable efforts to develop, seek and obtain regulatory approval for, and commercialize at least one product that contains a licensed compound for each target in each of the United States, Japan and the European Union. The research component of the collaboration will be overseen by a joint steering committee comprised of an equal number of representatives from each of us and BMS. In addition to the initial specified targets, the parties have also agreed on a list of four reserved targets. BMS may replace one of the initial specified targets with a reserved target during a limited substitution period in the research term.

Pursuant to the agreement, for a given target, we have granted to BMS an exclusive license, with the right to grant sublicenses, under certain patent rights, know-how and materials controlled by us to clinically develop, manufacture, use, sell, offer for sale, export and import and otherwise exploit, and have others do the same, any compound, molecule or product for such target throughout the world.

Under the terms of the agreement, BMS paid us an initial upfront fee payment of $55 million. We are also entitled to receive up to $2.7 billion in total milestones across all potential targets. Such milestones consist of up to $585 million in total milestones per oncology target, including $360 million in the aggregate for certain specified research, development and regulatory milestones and $225 million in the aggregate for certain specified commercial milestones, as well as up to $482 million in total milestones per neurology and immunology target, including $257 million in the aggregate for certain specified research, development and regulatory milestones and $225 million in the aggregate for certain specified commercial milestones.

We are also entitled to a tiered percentage royalty on annual global net sales of licensed products ranging from mid-single digits to low-double digits, subject to certain specified reductions. Royalties are payable by BMS on a licensed product-by-licensed product and country-by-country basis until the later of the expiration of the last valid claim of certain specified patent rights covering the licensed product in such country, expiration of all applicable regulatory exclusivities in such country for such licensed product and the tenth anniversary of the first commercial sale of such licensed product in such country.

The agreement excludes any activities relating to protein-degrader compounds. However, under the terms of the agreement, for a limited period of time after the execution of the agreement, we and BMS agreed to negotiate a separate definitive agreement pursuant to which we will agree to license to BMS the right to conduct research, development and commercialization activities with respect to degrader compounds for the targets under the agreement. In August 2021, we and BMS entered into a definitive agreement to discover, develop and commercialize bifunctional protein degraders consistent with the terms and conditions described in the initial collaboration agreement.

On a target-by-target basis, during the term of the agreement for a given target, we are prohibited from clinically developing or commercializing, ourselves or with a third party, any nucleic acid, antibody, biologic, compound, small molecule or other molecule, or any product that contains the foregoing, that specifically modulates as its primary mechanism of action such target, or is designed to specifically modulate such target. Such prohibition encompasses both the initial specified targets listed as of the effective date of the agreement and those targets on the reserved target list for the limited substitution period.

Unless earlier terminated, the agreement will expire on a licensed product-by-licensed product and country-by-country basis on the expiration of the applicable royalty term for such licensed product in such country and in its entirety upon expiration of the last royalty term for the last licensed product. Either party may terminate the agreement earlier upon an uncured material breach of the agreement by the other party on a target-by-target basis, or upon the occurrence of certain events of insolvency of the other party.

Additionally, BMS may terminate the agreement for any or no reason, in its entirety or on a target-by-target basis, upon specified written notice to us. BMS may also terminate the agreement on a target-by-target basis for safety reasons. We may terminate the agreement on a target-by-target basis to the extent BMS commences or participates in challenging certain patents licensed by us to BMS under the agreement.

In the event that BMS terminates the Agreement at will, or if we terminate for a breach, insolvency or patent challenge by BMS, we are entitled to certain reversionary rights with respect to certain compounds and products for the applicable terminated target(s).

In the event that BMS has the right to terminate the agreement, in whole or with respect to a particular target, upon our uncured material breach or an event of insolvency with respect to us, then in lieu of so terminating, BMS has the right to elect to the have the agreement continue in full force and effect; provided that all royalties and milestones thereafter payable by BMS to us with respect to such applicable target(s) shall be reduced by 50%.

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 “—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 “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 12 published patent families. As of February 4, 2022, we owned or held exclusive license rights to approximately 55 patents and patent applications, including at least eight issued or allowed U.S. cases, five pending U.S. non-provisional patent applications, 11 issued or allowed non-U.S. cases, including six granted European patents which have been validated among multiple individual European Patent Convention nations and five non-European patents, and nine pending foreign patent 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. and non-U.S. 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 February 4, 2022, there were two published patent families related to our internal drug discovery business, and 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 February 4, 2022, there are six pending wholly-owned provisional applications, six pending international patent applications, and two pending non-U.S. patent applications related to our internal drug discovery business.

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 February 4, 2022, we had approximately 49 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 “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, India, and South Korea and we also have established distribution channels in other important markets, including China. These efforts are led by our approximately 150 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 rely and expect to continue 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 approved and regulated under the Federal Food, Drug and Cosmetic Act, or FDCA, and applicable implementing regulations and guidance. A company, institution, or organization which takes responsibility for the initiation and management of a clinical development program for such products, and for their regulatory approval, is typically referred to as a sponsor. The failure of a sponsor 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.

A sponsor 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;
- design of a clinical protocol and 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 and efficacy 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 labeling 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 a sponsor 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 and the United States Department of Agriculture's Animal Welfare Act, if applicable. 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, sponsors must submit a protocol for each clinical trial, and any subsequent protocol amendments must be submitted to the FDA as part of the 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, 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, or parts of the trial, 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, if the data from such a foreign study is to be used in support of a marketing application.

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.

Expanded Access

Expanded access, sometimes called "compassionate use," is the use of investigational new products outside of clinical trials to treat patients with serious or immediately life-threatening diseases or conditions when there are no comparable or satisfactory alternative treatment options. The rules and regulations related to expanded access are intended to improve access to investigational products for patients who may benefit from investigational therapies. FDA regulations allow access to investigational products under an IND by the company or the treating physician for treatment purposes on a case-by-case basis for: individual patients (single-patient IND applications for treatment in emergency settings and non-emergency settings); intermediate-size patient populations; and larger populations for use of the investigational product under a treatment protocol or Treatment IND Application.

When considering an IND application for expanded access to an investigational product with the purpose of treating a patient or a group of patients, the sponsor and treating physicians or investigators will determine suitability when all of the following criteria apply: patient(s) have a serious or immediately life-threatening disease or condition, and there is no comparable or satisfactory alternative therapy to diagnose, monitor, or treat the disease or condition; the potential patient benefit justifies the potential risks of the treatment and the potential risks are not unreasonable in the context or condition to be treated; and the expanded use of the investigational product for the requested treatment will not interfere with the initiation, conduct or completion of clinical investigations that could support marketing approval of the product or otherwise compromise the potential development of the product.

There is no obligation for a sponsor to make its investigational products available for expanded access; however, as required by amendments to the FDCA included in the 21st Century Cures Act passed in 2016, if a sponsor has a policy regarding how it responds to expanded access requests with respect to product candidates in development to treat serious diseases or conditions, it must make that policy publicly available. Sponsors are required to make such policies publicly available upon the earlier of initiation of a Phase 2 or Phase 3 trial for a covered investigational product; or 15 days after the investigational product receives designation from the FDA as a breakthrough therapy, fast track product, or regenerative medicine advanced therapy.

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."

A clinical trial may combine the elements of more than one phase and the FDA often requires more than one Phase 3 trial to support marketing approval of a product candidate. A company's designation of a clinical trial as being of a particular phase is not necessarily indicative that the study will be sufficient to satisfy the FDA requirements of that phase because this determination cannot be made until the protocol and data have been submitted to and reviewed by the FDA. Generally, pivotal trials are Phase 3 trials, but they may be Phase 2 trials if the design provides a well-controlled and reliable assessment of clinical benefit, particularly in an area of unmet medical need.

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. The FDA will typically inspect one or more clinical sites to assure compliance with GCP and the integrity of the clinical data submitted.

In August 2018, the FDA released a draft guidance entitled "Expansion Cohorts: Use in First-In-Human Clinical Trials to Expedite Development of Oncology Drugs and Biologics," which outlines how sponsors can utilize an adaptive trial design in the early stages of oncology product development (i.e., the first-in-human clinical trial) to compress the traditional three phases of trials into one continuous trial called an expansion cohort trial. Information to support the design of individual expansion cohorts are included in IND applications and assessed by FDA. Expansion cohort trials can potentially bring efficiency to product development and reduce developmental costs and time.

Sponsors of clinical trials are required to register and disclose certain clinical trial information on a public registry (clinicaltrials.gov) maintained by the U.S. National Institutes of Health. In particular, information related to the product, patient population, phase of investigation, study sites and investigators and other aspects of the clinical trial is made public as part of the registration of the clinical trial. The failure to submit clinical trial information to clinicaltrials.gov, as required, is a prohibited act under the FDCA with violations subject to potential civil monetary penalties of up to $10,000 for each day the violation continues.

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.

Pediatric Studies

Under the Pediatric Research Equity Act, or PREA, applications and certain types of supplements to applications must contain data that are adequate to assess the safety and effectiveness of the product for the claimed indications in all relevant pediatric subpopulations, and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective. The sponsor must submit an initial Pediatric Study Plan within 60 days of an end-of-phase 2 meeting or as may be agreed between the sponsor and the FDA. Those plans must contain an outline of the proposed pediatric study or studies the sponsor plans to conduct, including study objectives and design, age groups, relevant endpoints and statistical approach, or a justification for not including such detailed information, and any request for a deferral of pediatric assessments or a full or partial waiver of the requirement to provide data from pediatric studies along with supporting information.

The FDA may, on its own initiative or at the request of the sponsor, grant deferrals for submission of some or all pediatric data until after approval of the product for use in adults, or full or partial waivers from the pediatric data requirements. A deferral may be granted for several reasons, including a finding that the product or therapeutic candidate is ready for approval for use in adults before pediatric trials are complete or that additional safety or effectiveness data needs to be collected before the pediatric trials begin. The law now requires the FDA to send a PREA Non-Compliance letter to sponsors who have failed to submit their pediatric assessments required under PREA, have failed to seek or obtain a deferral or deferral extension or have failed to request approval for a required pediatric formulation.

Expedited Review Programs

The FDA is authorized to expedite the review of applications in several ways. None of these expedited programs changes the standards for approval but they may help expedite the development or approval process of product candidates.

- *Fast Track designation.* The sponsor of a product candidate may request the FDA to designate the product for a specific indication as a Fast Track product concurrent with or after the filing of the IND. Candidate products are eligible for Fast Track designation if they are intended to treat a serious or life-threatening condition and demonstrate the potential to address unmet medical needs for the condition. In addition to other benefits, such as the ability to have greater interactions with the FDA, the FDA may initiate review of sections of a Fast Track application before the application is complete, a process known as rolling review.
- *Breakthrough therapy designation.* To qualify for the breakthrough therapy program, product candidates must be intended to treat a serious or life-threatening disease or condition and preliminary clinical evidence must indicate that such product candidates may demonstrate substantial improvement on one or more clinically significant endpoints over existing therapies. The FDA will seek to ensure the sponsor of a breakthrough therapy product candidate receives intensive guidance on an efficient development program, intensive involvement of senior managers and experienced staff on a proactive, collaborative and cross-disciplinary review and rolling review.
- *Priority review.* A product candidate is eligible for priority review if it treats a serious condition and, if approved, it would be a significant improvement in the safety or effectiveness of the treatment, diagnosis or prevention compared to marketed products. FDA aims to complete its review of priority review applications within six months as opposed to 10 months for standard review.
- *Accelerated approval.* Drug products studied for their safety and effectiveness in treating serious or life-threatening illnesses and that provide meaningful therapeutic benefit over existing treatments may receive accelerated approval. Accelerated approval means that a product candidate may be approved on the basis of adequate and well controlled clinical trials establishing that the product candidate has an effect on a surrogate endpoint that is reasonably likely to predict a clinical benefit, or on the basis of an effect on a clinical endpoint other than survival or irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity and prevalence of the condition and the availability or lack of alternative treatments. As a condition of approval, the FDA may require that a sponsor of a drug product candidate receiving accelerated approval perform adequate and well controlled post-marketing clinical trials. In addition, the FDA currently requires as a condition for accelerated approval pre-approval of promotional materials.

- *Regenerative advanced therapy.* With passage of the 21st Century Cures Act, or the Cures Act, in December 2016, Congress authorized the FDA to accelerate review and approval of products designated as regenerative advanced therapies. A product is eligible for this designation if it is a regenerative medicine therapy that is intended to treat, modify, reverse or cure a serious or life-threatening disease or condition and preliminary clinical evidence indicates that the product candidate has the potential to address unmet medical needs for such disease or condition. The benefits of a regenerative advanced therapy designation include early interactions with the FDA to expedite development and review, benefits available to breakthrough therapies, potential eligibility for priority review and accelerated approval based on surrogate or intermediate endpoints.

Filing and Review of an NDA

In order to obtain approval to market a drug product in the United States, a NDA must be submitted to the FDA that provides sufficient data establishing the safety and efficacy 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 and efficacy of the drug product to the satisfaction of the FDA.

The NDA is a vehicle through which sponsors formally propose that the FDA approve a new product for marketing and sale in the United States for one or more indications. Every new 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 licensure of biologic products under the Public Health Service Act. 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 within 60 calendar days of its receipt, and must inform the sponsor within that period of time whether the application is sufficiently complete to permit substantive review. In the event that FDA determines that an application does not satisfy this standard, it will issue a Refuse to File, or RTF, determination to the sponsor. The FDA may request additional information rather than accept the application for filing and, the application may 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 sponsor to address an outstanding deficiency identified by the FDA following the original submission.

In connection with its review of 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 and the integrity of the data in the application.

In addition, as a condition of approval, the FDA may require a sponsor 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 also 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

The FDA reviews an application to determine, among other things, whether the product is safe and whether it is effective for its intended use(s), with the latter determination being made on the basis of substantial evidence. The FDA has interpreted this evidentiary standard to require at least two adequate and well-controlled clinical investigations to establish effectiveness of a new product. Under certain circumstances, however, the FDA has indicated that a single trial with certain characteristics and additional information may satisfy this standard. Ultimately, the FDA will determine whether the expected benefits of the drug product outweigh its potential risks to patients, and the agency will issue either a complete response letter, or CRL, or an approval letter.

A CRL indicates that the review cycle of the application is complete, and the application will not be approved in its present form. A CRL generally outlines the deficiencies in the submission and may require substantial additional testing or information in order for the FDA to reconsider the application. The CRL may require additional clinical or other data, additional pivotal Phase 3 clinical trials and/or other significant and time-consuming requirements related to clinical trials, preclinical studies or manufacturing. If a CRL is issued, the sponsor will have one year to respond to the deficiencies identified by the FDA, at which time the FDA can deem the application withdrawn or, in its discretion, grant the sponsor an additional six-month extension to respond.

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.

Post-Approval Requirements

Following approval of a new prescription product, the manufacturer, the approved product and the product's manufacturing locations are subject to pervasive and continuing regulation by the FDA, governing, among other things, monitoring and record-keeping activities, reporting of adverse experiences with the product and product problems to the FDA, product sampling and distribution, manufacturing and promotion and advertising. Although physicians may prescribe legally available products for unapproved uses or patient populations (i.e., "off-label uses"), manufacturers may not market or promote such uses. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses, and a company that is found to have improperly promoted off-label uses may be subject to significant liability. In September 2021, the FDA published final regulations which describe the types of evidence that the agency will consider in determining the intended use of a drug product.

If a company is found to have promoted off-label uses, it may become subject to administrative and judicial enforcement by the FDA, the Department of Justice, or the Office of the Inspector General of the Department of Health and Human Services, as well as state authorities. This could subject a company to a range of penalties that could have a significant commercial impact, including civil and criminal fines and agreements that materially restrict the manner in which a company promotes or distributes products, as well as adverse public relations and reputational harm. The federal government has levied large civil and criminal fines against companies for alleged improper promotion, and has also requested that companies enter into consent decrees or permanent injunctions under which specified promotional conduct is changed or curtailed.

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 the IND 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.

Healthcare Compliance

In the United States, biopharmaceutical manufacturers and their products are subject to extensive regulation at the federal and state level, such as laws intended to prevent fraud and abuse in the healthcare industry. Healthcare providers and third-party payors play a primary role in the recommendation and prescription of pharmaceutical products that are granted marketing approval. Arrangements with providers, consultants, third-party payors, and customers are subject to broadly applicable fraud and abuse, anti-kickback, false claims laws, reporting of payments to healthcare providers and patient privacy laws and regulations and other healthcare laws and regulations that may constrain our business and/or financial arrangements. Restrictions under applicable federal and state healthcare laws and regulations, including certain laws and regulations applicable only if we have marketed products, include the following:

- federal false claims, false statements and civil monetary penalties laws prohibiting, among other things, any person from knowingly presenting, or causing to be presented, a false claim for payment of government funds or knowingly making, or causing to be made, a false statement to get a false claim paid;
- federal healthcare program anti-kickback law, which prohibits, among other things, persons from offering, soliciting, receiving or providing remuneration, directly or indirectly, to induce either the referral of an individual for, or the purchasing or ordering of, a good or service for which payment may be made under federal healthcare programs such as Medicare and Medicaid;
- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which, in addition to privacy protections applicable to healthcare providers and other entities, prohibits executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters;
- federal laws that require pharmaceutical manufacturers to report certain calculated product prices to the government or provide certain discounts or rebates to government authorities or private entities, often as a condition of reimbursement under government healthcare programs;
- federal Open Payments (or federal "sunshine" law), which requires pharmaceutical and medical device companies to monitor and report certain financial interactions with certain healthcare providers to the Center for Medicare & Medicaid Services, or CMS, within the U.S. Department of Health and Human Services for re-disclosure to the public, as well as ownership and investment interests held by certain healthcare providers and their immediate family members;
- federal consumer protection and unfair competition laws, which broadly regulate marketplace activities and activities that potentially harm consumers;
- analogous state laws and regulations, including: state anti-kickback and false claims laws; state laws requiring pharmaceutical companies to comply with specific compliance standards, restrict financial interactions between pharmaceutical companies and healthcare providers or require pharmaceutical companies to report information related to payments to health care providers or marketing expenditures; and state laws governing privacy, security and breaches of health information in certain circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts; and
- laws and regulations prohibiting bribery and corruption such as the FCPA, which, among other things, prohibits U.S. companies and their employees and agents from authorizing, promising, offering, or providing, directly or indirectly, corrupt or improper payments or anything else of value to foreign government officials, employees of public international organizations or foreign government-owned or affiliated entities, candidates for foreign public office, and foreign political parties or officials thereof.

Violations of these laws are punishable by criminal and/or civil sanctions, including, in some instances, exclusion from participation in federal and state health care programs, such as Medicare and Medicaid. Ensuring compliance is time consuming and costly. Similar healthcare laws and regulations exist in the EU and other jurisdictions, including reporting requirements detailing interactions with and payments to healthcare providers and laws governing the privacy and security of personal information.]

Privacy Requirements

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 based on general consumer protection laws. 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 of 2018, or the CCPA, which became effective on January 1, 2020, requires companies that process information on California residents to make new disclosures to consumers about their data collection, use and sharing practices, allow consumers to opt out of certain data sharing with third parties and provide a new cause of action for data breaches. Many other states are considering similar legislation, and a broad range of legislative measures also have been introduced at the federal level.

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, a

sponsor 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

On January 31, 2022, the new Clinical Trials Regulation (EU) No 536/2014 became effective in the European Union and replaced the prior Clinical Trials Directive 2001/20/EC. The new regulation aims at simplifying and streamlining the authorization, conduct and transparency of clinical trials in the European Union. Under the new coordinated procedure for the approval of clinical trials, the sponsor of a clinical trial to be conducted in more than one Member State of the European Union, or EU Member State, will only be required to submit a single application for approval. The submission will be made through the Clinical Trials Information System, a new clinical trials portal overseen by the EMA and available to clinical trial sponsors, competent authorities of the EU Member States and the public.

The new regulation did not change the preexisting requirement that a sponsor must obtain prior approval from the competent national authority of the EU Member State in which the clinical trial is to be conducted. If the clinical trial is conducted in different EU Member States, the competent authorities in each of these EU Member States must provide their approval for the conduct of the clinical trial. Furthermore, the sponsor may only start a clinical trial at a specific study site after the applicable ethics committee has issued a favorable opinion.

Parties conducting certain clinical trials must, as in the United States, post clinical trial information in the EU at the EudraCT website: https://eudract.ema.europa.eu.

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, a sponsor 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 a sponsor established in the European Union. Regulation (EC) No 1901/2006 provides that prior to obtaining a marketing authorization in the European Union, sponsors 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 sponsor 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 sponsor 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 sponsor 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 sponsor 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 sponsor 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 sponsor 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.

As in the United States, information about clinical trials in support of a marketing application must be submitted within specific timeframes to the European Union (EudraCT) website: https://eudract.ema.europa.eu/ and other countries.

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 sponsors 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

The United Kingdom's withdrawal from the European Union took place on January 31, 2020. The European Union and the United Kingdom reached an agreement on their new partnership in the Trade and Cooperation Agreement, or the Agreement, which was applied provisionally beginning on January 1, 2021 and which entered into force on May 1, 2021. The Agreement focuses primarily on free trade by ensuring no tariffs or quotas on trade in goods, including healthcare products such as medicinal products.

Thereafter, the European Union and the United Kingdom will form two separate markets governed by two distinct regulatory and legal regimes. As such, the Agreement seeks to minimize barriers to trade in goods while accepting that border checks will become inevitable as a consequence that the United Kingdom is no longer part of the single market. As of January 1, 2021, the Medicines and Healthcare products Regulatory Agency, or the MHRA, became responsible for supervising medicines and medical devices in Great Britain, comprising England, Scotland and Wales under domestic law whereas Northern Ireland continues to be subject to EU rules under the Northern Ireland Protocol. The MHRA will rely on the Human Medicines Regulations 2012 (SI 2012/1916) (as amended), or the HMR, as the basis for regulating medicines. The HMR has incorporated into the domestic law the body of EU law instruments governing medicinal products that pre-existed prior to the United Kingdom's withdrawal from the European Union.

Furthermore, while the Data Protection Act of 2018 in the United Kingdom that "implements" and complements the European Union's GDPR is now effective in the United Kingdom, it is still unclear whether transfer of data from the EEA to the United Kingdom will remain lawful under GDPR. The Trade and Cooperation Agreement provides for a transitional period during which the United Kingdom will be treated like an European Union member state in relation to processing and transfers of personal data for four months from January 1, 2021. This may be extended by two further months. After such period, the United Kingdom will be a "third country" under the GDPR unless the European Commission adopts an adequacy decision in respect of transfers of personal data to the United Kingdom. The United Kingdom has already determined that it considers all of the European Union and EEA member states to be adequate for the purposes of data protection, ensuring that data flows from the United Kingdom to the European and EEA remain unaffected.

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.

General Data Protection Regulation

Many countries outside of the United States maintain rigorous laws governing the privacy and security of personal information. The collection, use, disclosure, transfer, or other processing of personal data, including personal health data, regarding individuals who are located in the EEA, and the processing of personal data that takes place in the EEA, 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, and it imposes heightened requirements on companies that process health and other sensitive data, such as requiring in many situations that a company obtain the consent of the individuals to whom the sensitive personal data relate before processing such data. Examples of obligations imposed by the GDPR on companies processing personal data that fall within the scope of the GDPR include providing information to individuals regarding data processing activities, implementing safeguards to protect the security and confidentiality of personal data, appointing a data protection officer, 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 EEA, 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 is 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. In July 2020, the Court of Justice of the European Union, or the CJEU, invalidated the EU-U.S. Privacy Shield framework, one of the mechanisms used

to legitimize the transfer of personal data from the EEA to the United States. The CJEU decision also drew into question the long-term viability of an alternative means of data transfer, the standard contractual clauses, for transfers of personal data from the EEA to the United States. Following the withdrawal of the U.K. from the EU, the U.K. Data Protection Act 2018 applies to the processing of personal data that takes place in the U.K. and includes parallel obligations to those set forth by GDPR.

Human Capital

As of February 14, 2022, we had 664 full-time employees, including a total of 289 employees with Ph.D. degrees. Of these full-time employees, 477 of these employees are located in the United States and 187 of these employees are located in our offices outside of the United States. Additionally, as of February 14, 2022, 32% of our full-time employees self-identified as female or non-binary, or chose not to disclose their gender and 38% of our executive team self-identified as female, and 37% of our new hires since January 1, 2021 self-identify as female or non-binary, or have chosen not to disclose their gender. Our employees are our greatest asset and we strive to create a work environment that is inclusive, challenging and rewarding.

We are committed to embedding a long-term, formal Environmental, Social and Governance, or ESG, strategy within our business, and we recently created a new leadership role dedicated to Corporate Sustainability and ESG. We expect to complete a formal sustainability materiality assessment in the first half of 2022, serving as the foundation of our comprehensive, long-term, Corporate Sustainability strategy.

Further, our vision for Diversity, Equity and Inclusion, or DEI, is focused on developing a culture of transparency and accountability, active inclusion, and a growth mindset. We have focused our recruiting efforts on diversifying our candidate pipeline by participating in conferences and engaging with student networks that promote racial and gender diversity in the science and technology industries. Further, we utilize a structured interviewing model when assessing candidates to provide for consistency and equity in the hiring process across candidates and to help reduce unconscious bias.

Given our DEI aspirations, in 2021 we created our first DEI Council, a cross functional learning and listening body that allows our executive leadership team, employee volunteers, and Employee Resource Group, or ERG, leaders to listen to feedback from all levels of the company. ERG membership directly engages one third of our employees, however, these forums provide an environment for community support, professional development, and educational opportunities for our entire employee population. Through our ERG leadership program, ERG leaders are paired with an executive sponsor to guide them throughout their tenure, they have the opportunity to hone skills such as negotiation, influence, and public speaking. Our commitment to offering employee programs also extends to our investments in learning and development, or L&D, and in 2022, we launched a global L&D initiative with the Neuroleadership Institute designed to build active listening and bias mitigation skills.

We consider the intellectual capital of our employees to be an essential driver of our business and key to our future prospects. Though the biotechnology industry is historically competitive for talent, we have maintained high employee retention rates. For the year ended December 31, 2021, our employee retention rate was 96.5%.

Given our financial resources, our industry-leading position in the field of physics-based computational drug discovery and materials science research and our developing internal drug discovery programs, we believe that we will continue to be able to fill positions and grow our headcount in support of our software, drug discovery and materials science businesses.

We are committed to providing our employees with compensation that meets the expectations of the market and industry norms. We monitor our compensation programs closely using comprehensive industry surveys and data to guide us, and we provide what we consider to be a competitive mix of incentives, including competitive salaries and bonuses, a 401(k) retirement plan with an employer matching contribution, health and welfare benefits and participation in our equity programs. We routinely review our compensation practices and analyze the equity of our compensation decisions for all employees. None of our employees is subject to a collective bargaining agreement or represented by a trade or labor union. We consider our relations with our employees to be good.

We believe our company culture is one that aims to support each individual fully, not just their contribution as an employee. The COVID-19 pandemic has resulted in the creation of a more fluid and flexible work environment to allow individuals to meet their needs and those of their family members while contributing to our success. In the current virtual world, we have moved from regular onsite wellness activities to those that can be enjoyed virtually, including meditation, yoga and other fitness classes, as well as art classes for employees and their families.

Our company culture also encourages engagement, both among our employees and within the communities we live and work. In the advancement of these efforts, internally, we have established a new mentorship program, updated our management training programs to include mental health and wellness trainings, and refreshed our annual review process to encourage more real-time feedback between employees and managers to set and achieve personal performance goals. In engaging with our external community, we host a student internship program, including in partnership with a non-profit educational group that supports underserved local high school students who have demonstrated the knowledge, character, and skills to achieve their aspirations. In addition, our ERGs sponsor a summer camp for a local non-profit organization dedicated to providing underserved students with hands-on science and

engineering educational and mentorship experiences. To further our community engagement efforts, each of our U.S.-based employees is provided with a paid full day each year to volunteer in their local community.

The health and safety of our onsite employees has been an even greater focus for us since the onset of the COVID-19 pandemic. In early March 2020, we issued a global work from home policy to ensure the health of our employees and local communities while continuing to advance our business objectives. Beginning in June 2020, we began limited re-openings of certain of our offices in the United States and abroad. Our office re-openings are being conducted on a limited basis and are voluntary for all of our employees. We believe we are well-equipped to work remotely, engage with our customers and continue to advance our business

Our Corporate Information

Our principal executive offices are located at 1540 Broadway, 24th 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 SEC. 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 for the years ended December 31, 2021, 2020, and 2019 was $101.2 million, $26.6 million, and $25.7 million, respectively. As of December 31, 2021, we had an accumulated deficit of $230.0 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 programs. We continue to advance multiple internal programs through investigational new drug, or IND, -enabling studies, and we expect to submit an IND application to the U.S. Food and Drug Administration, or FDA, for our MALT1 program in the first half of 2022, and subject to receiving regulatory clearance, we expect to initiate a Phase 1 clinical trial of our MALT1 inhibitor in patients with relapsed and resistant lymphoma in the second half of 2022. We also plan to submit IND applications to the FDA for our CDC7 program in early 2023 and our WEE1 program in 2023, subject to favorable data from IND-enabling studies. In addition, we plan to initiate a Phase 1 clinical trial of our CDC7 inhibitor in 2023, subject to receipt of regulatory clearance. 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 income or loss 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 initiate and conduct clinical trials for any of our 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 and sustain 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 and sustain 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 $108.1 million in the fiscal year ended December 31, 2020 to $137.9 million in the fiscal year ended December 31, 2021, and by 26% from $85.5 million in the fiscal year ended December 31, 2019 to $108.1 million in the fiscal year ended December 31, 2020. 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 and fourth 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 Holding, Inc.;
- 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, such as under our collaboration agreement with Bristol-Myers Squibb Company, or BMS; 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. 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 or progress preclinical and IND-enabling studies, submit IND applications, initiate and progress clinical trials and invest in the further

development of our platform. In addition, if we determine to complete clinical development and seek regulatory approval on our own, we expect to incur significant additional expenses. Furthermore, we incur additional costs associated with operating as a public company, as compared to when we were a private 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, 2021, we had cash, cash equivalents, restricted cash, and marketable securities of $579.5 million. We believe that our existing cash, cash equivalents, and marketable securities will be sufficient to fund our operating expenses and capital expenditure requirements through at least the next 24 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 drug discovery collaborators and partners.

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.

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. 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 determining the allocation of the transaction price and

measurement of progress, including (1) the constraint on variable consideration, (2) the allocation of the transaction price to the performance obligations using their standalone selling price basis, and (3) the appropriate input or output based method to recognize collaboration revenue and the extent of progress to date, and the expected stock price volatility and the calculation of expected term of the award estimates used in the calculation of stock-based compensation.

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 or acquire 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 on their own hardware without taking control of the licenses. 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 or providing 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, Cyrus Biotechnology, Inc., Molsoft LLC, Insilico Medicine, Inc., Iktos; XtalPi Inc., 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., ChemAxon; PerkinElmer, 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 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, the GNU Lesser General Public License, the Affero General Public License, 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 a 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, 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, except for the upfront payment of $55.0 million we received from BMS upon entry into our collaboration agreement with BMS. However, we have received equity consideration in certain of our collaborators 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;
- drug discovery collaborators could suffer from operational delays as a result of global health impacts, such as the COVID-19 pandemic; 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 also rely on 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. For example, under our collaboration agreement with BMS, after mutual agreement on the targets(s) of interest, our drug discovery group will be responsible for the discovery of development candidates. Once a development candidate meeting specified criteria for a target has been identified, BMS will be solely responsible for the development, manufacturing and commercialization of such development candidate. Even if we successfully identify one or more development candidates for BMS to develop and commercialize under our collaboration agreement, BMS may not achieve the research, development, regulatory and sales milestones for those development candidates that result in additional payments to us.

We may never realize a 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, discover or develop 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 selected our first development candidates, which are for our MALT1 and CDC7 inhibitor programs, and advanced the programs into IND-enabling studies. We have not yet advanced any other programs into IND-enabling studies, 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. The focus of our initial internal drug discovery programs was in the area of oncology, and we have only recently begun expanding into other therapeutic areas, including neurology and immunology. 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.

Our research programs may show initial promise in identifying potential product candidates internally or with collaborators, yet fail to yield product candidates for clinical development for a number of reasons, including:

- our research methodology or that of any collaborator may be unsuccessful in identifying potential product candidates that are successful in clinical development;
- potential product candidates may be shown to have harmful side effects or may have other characteristics that may make the product candidates unmarketable or unlikely to receive marketing approval;
- our current or future collaborators may change their development profiles for potential product candidates or abandon a therapeutic area; or
- new competitive developments may render our product candidates obsolete or noncompetitive.

If any of these events occur, we may be forced to abandon our development efforts for a program or programs, which would have a material adverse effect on our business.

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, or if such organizations do not otherwise perform satisfactorily, development of any product candidate we may develop may be delayed.

We rely and expect to continue 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. Our reliance on these third parties will reduce our control over these activities but will not relieve us of our responsibilities. 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, and we may not be able to complete, or may be delayed in completing, the necessary preclinical studies to enable us to progress viable product candidates for IND, submissions and we will not be able to, or may be delayed in our efforts to, successfully develop and commercialize such product candidates. These facilities may also be affected by natural disasters, such as floods or fire, or geopolitical developments or public health pandemics, such as COVID-19, 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 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 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. We have selected our first development candidates, which are for our MALT1 and CDC7 inhibitor programs, and advanced the programs into IND-enabling studies. As a company, we do not have any experience in clinical development and have not advanced any product candidates into clinical development. We expect to submit an investigational new drug, or IND, application to the FDA, for our MALT1 program in the first half of 2022, and subject to receiving regulatory clearance, we expect to initiate our first clinical trial in the second half of 2022. We also plan to submit IND applications to the FDA for our CDC7 program in early 2023 and our WEE1 program in 2023, subject to favorable data from IND-enabling studies. In addition, we plan to initiate a Phase 1 clinical trial of our CDC7 inhibitor in 2023, subject to receipt of regulatory clearance. 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.

Conducting successful clinical trials requires the enrollment of a sufficient number of patients, and suitable patients may be difficult to identify and recruit.

Conducting successful clinical trials requires the enrollment of a sufficient number of patients, and suitable patients may be difficult to identify and recruit. Identifying and qualifying patients to participate in future clinical trials for any other product candidate we develop is critical to our success. Patient enrollment in clinical trials and completion of patient participation and follow-up depends on many factors, including the severity of disease; size of the patient population; the nature of the trial protocol; the attractiveness of, or the discomforts and risks associated with, the treatments received by enrolled subjects; the availability of clinical trial investigators with appropriate competencies and experience; support staff; the number of ongoing clinical trials in the same indication that compete for the same patients; proximity of patients to clinical sites; availability of trial sites; ability to comply with the eligibility and exclusion criteria for participation in the clinical trial; ability to obtain and maintain patient consents; patient compliance; the ability to monitor patients during and after treatment; and the impact of the ongoing COVID-19 pandemic. For example, patients may be discouraged from enrolling in our clinical trials if the trial protocol requires them to undergo extensive post-treatment procedures or follow-up to assess the safety and effectiveness of our product candidates. Patients may also not participate in our clinical trials if they choose to participate in contemporaneous clinical trials of competitive products.

Our inability to locate and enroll a sufficient number of patients for our clinical trials would result in significant delays, could require us to abandon one or more clinical trials altogether and could delay or prevent our receipt of necessary regulatory approvals. Enrollment delays in our clinical trials may result in increased development costs for our product candidates, which would cause the value of our company to decline and limit our ability to obtain additional financing.

We plan to rely on third parties to conduct our clinical trials, and those third parties may not perform satisfactorily, including failing to meet deadlines for the completion of such trials, which may prevent or delay our ability to seek or obtain marketing approval for or commercialize our product candidates or otherwise harm our business.

We plan to rely on third-party clinical research organizations, in addition to other third parties such as research collaboratives, clinical data management organizations, medical institutions and clinical investigators, to conduct our future clinical trials. These contract research organizations and other third parties will play a significant role in the conduct and timing of these trials and subsequent collection and analysis of data. These third-party arrangements might terminate for a variety of reasons, including a failure to perform by the third parties. If we need to enter into alternative arrangements, our product development activities might be delayed.

Our reliance on third parties for research and development activities reduces our control over these activities but does not relieve us of our responsibilities. For example, we are responsible for ensuring that each of our studies is conducted in accordance with the applicable protocol, and legal, regulatory and scientific standards, and our reliance on third parties does not relieve us of our responsibility to comply with any such standards. We and these third parties are required to comply with current good clinical practices, or cGCP, which are regulations and guidelines enforced by the FDA for all of our products in clinical development. Regulatory authorities in Europe and other jurisdictions have similar requirements. Regulatory authorities enforce these cGCPs through periodic inspections of trial sponsors, principal investigators and trial sites. If we or any of these third parties fail to comply

with applicable cGCPs, the clinical data generated in our clinical trials may be deemed unreliable and the FDA or comparable foreign regulatory authorities may require us to perform additional clinical trials before approving our marketing applications. We cannot assure you a given regulatory authority will determine that any of our clinical trials comply with cGCP regulations. We also are required to register ongoing clinical trials and post the results of completed clinical trials on a U.S. government-sponsored database, clinicaltrials.gov, within certain timeframes. Failure to do so can result in fines, adverse publicity and civil and criminal sanctions.

Furthermore, third parties on whom we rely may also have relationships with other entities, some of which may be our competitors. In addition, these third parties are not our employees, and except for remedies available to us under our agreements with such third parties, we cannot control whether or not they devote sufficient time and resources to our on-going clinical, nonclinical and preclinical programs. If these third parties do not successfully carry out their contractual duties or obligations or meet expected deadlines, if they need to be replaced or if the quality or accuracy of the clinical data they obtain is compromised, our clinical trials may be extended, delayed or terminated and we may not be able to obtain, or may be delayed in obtaining, marketing approvals for our product candidates and will not be able to, or may be delayed in our efforts to, successfully commercialize our medicines.

If we and any current or 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.

We are early in our development efforts. Our most advanced development candidates are in IND-enabling studies, and we have not advanced any product candidate into clinical development. Our ability to generate product revenues, which we do not expect will occur for many years, if ever, will depend heavily on the successful development and eventual commercialization of our product candidates. The success of our and any current or 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 current or 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 current or 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 current or 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;
- ongoing or future restrictions resulting from the COVID-19 pandemic and its collateral consequences may result in internal and external operational delays and limitations; 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 current or future collaborator. Clinical drug development involves a lengthy and expensive process, with an uncertain outcome. If we or our current or 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.

We face substantial competition, which may result in others discovering, developing or commercializing products before or more successfully than we do, thus rendering our products non-competitive, obsolete or reducing the size of our market.

We face competition with respect to our and our collaborators' product candidates from biopharmaceutical and biotechnology companies. The biotechnology and pharmaceutical industries are characterized by rapidly advancing technologies, intense competition and a strong emphasis on proprietary and novel products and product candidates. Our competitors have developed, are developing or may develop products, product candidates and processes competitive with our product candidates. Any product candidates that we successfully develop and commercialize, internally or with our collaborators, will compete with existing therapies and new therapies that may become available in the future.

In particular, there is intense competition in the fields of oncology we are pursuing. We have competitors both in the United States and internationally, including major multinational pharmaceutical companies, established biotechnology companies, specialty pharmaceutical companies, emerging and start-up companies, universities and other research institutions. We also compete with these organizations to recruit management, scientists and clinical development personnel, which could negatively affect our level of expertise and our ability to execute our business plan. We will also face competition in establishing clinical trial sites, enrolling subjects for clinical trials and in identifying new product candidates.

Large pharmaceutical and biotechnology companies, in particular, have extensive experience in clinical testing, obtaining regulatory approvals, recruiting patients and manufacturing biotechnology products. These companies also have significantly greater research and marketing capabilities than we do and may also have products that have been approved or are in late stages of development, and collaborative arrangements in our target markets with leading companies and research institutions. Established pharmaceutical and biotechnology companies may also invest heavily to accelerate discovery and development of novel compounds or to in-license novel compounds that could make the product candidates that we develop obsolete. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than our products. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies, as well as in acquiring technologies complementary to, or necessary for, our programs. As a result of all of these factors, our competitors may succeed in obtaining approval from the FDA or other comparable foreign regulatory authorities or in discovering, developing and commercializing products in our field before we do.

Risks Related to Our Operations

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

For the fiscal year ended December 31, 2021, sales to customers outside of the United States accounted for approximately 34% 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;
- global health pandemics, such as COVID-19; and
- unstable regional, economic and 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, commonly referred to as Brexit. Since the regulatory framework for pharmaceutical products in the United Kingdom covering quality, safety and efficacy of pharmaceutical products, clinical trials, marketing authorization, commercial sales and distribution of pharmaceutical products is derived from European Union directives and regulations, the consequences of Brexit and the future regulatory regime that applies to products and the approval of product candidates in the United Kingdom remains unclear.

A widespread outbreak of an illness or other health issue, such as the COVID-19 pandemic, could negatively affect various aspects of our business and make it more difficult to meet our obligations to our customers, and could result in reduced demand from our customers as well as delays in our drug discovery and development programs.

Our business and operations could be adversely affected by health epidemics, including the ongoing COVID-19 pandemic, impacting the markets and industries in which we and our customers and collaborators operate.

The COVID-19 pandemic has been declared a national emergency. In response to the COVID-19 pandemic, state, local, federal, and foreign governments have put in place, and others in the future may put in place, quarantines, executive orders, shelter-in-place orders, and similar government orders and restrictions in order to control the spread of the disease. Such orders or restrictions, or the perception that such orders or restrictions could occur, have resulted in business closures, work stoppages, slowdowns and delays, work-from-home policies, travel restrictions, and cancellation or postponement of events, among other effects that could negatively impact productivity and disrupt our operations and those of our customers and collaborators. In early March 2020, we implemented a work-from-home policy for all of our employees. Beginning in June 2020, we began limited re-openings of certain of our offices in the United States and abroad. Our re-openings are being conducted on a limited basis and are voluntary for all of our employees. We have continued to phase-in the re-opening of our offices as our management and federal, state, or local authorities advise, and we may take further actions that alter our operations as may be required by federal, state, or local authorities, or which we determine are in our best interests. While most of our operations can be performed remotely, there is no guarantee that we will continue to be as effective while working remotely because our team is dispersed, many employees may have additional personal needs to attend to (such as looking after children as a result of school closures or family who become sick), and employees may become sick themselves and be unable to work. Decreased effectiveness of our team could adversely affect our results due to our inability to meet in person with potential or current customers and collaborators, or other decreases in productivity that could seriously harm our business.

The full extent of the future impact will depend on many factors outside of our control, including, without limitation, the extent, trajectory and duration of the pandemic, the development, availability and distribution of effective treatments and vaccines, the imposition of protective public safety measures, the emergence of new strains and variants of COVID-19 and the effectiveness of vaccines against such strains and variants, and the impact of the pandemic on the global economy. For instance, if certain of our customers experience downturns or uncertainty in their own business operations and revenue because of the economic effects resulting from the spread of COVID-19, they may decrease their spending, which may result in decreased software revenue. Furthermore, as a result of the restrictions related to COVID-19, our sales force has limited in-person interactions, and their ability to attend events that promote and expand knowledge of our company and platform, including industry conferences and events has been hampered.

In addition, as a result of the COVID-19 pandemic, we may experience delays in the progress of certain of our and our collaborators' drug discovery and development programs, particularly those that are in preclinical studies and clinical trials or that are preparing to enter clinical trials. Such delays may result in disruptions in current and future IND-enabling studies and clinical trials, manufacturing disruptions, trial site disruptions and impact the ability to obtain necessary institutional review board, or IRB, institutional biosafety committee, or IBC, or other necessary site approvals. For example, our contract manufacturing organizations, or CMOs, and our contract research organizations, or CROs, have experienced reductions in the capacity to undertake research-scale production and have experienced delays in executing preclinical studies, including our IND-enabling studies for our CDC7 program. We now expect to submit the IND application to the FDA for our CDC7 program in early 2023 and to initiate a Phase 1 clinical trial in 2023. These reductions and delays may persist in the future, and we, together with our CMOs and CROs, are closely monitoring the impact of the COVID-19 pandemic on these operations. Furthermore, if our collaborators experience similar delays with their drug discovery and development programs, that could delay our achievement of milestones and related revenue.

Inadequate funding or disruptions at the FDA and other agencies may also slow the time necessary for new product candidates to be reviewed and/or approved by necessary government agencies, which would adversely affect our business. For example, over the last several years the U.S. government has shut down several times and certain regulatory agencies, such as the FDA and the SEC, have had to furlough critical FDA, SEC and other government employees and stop critical activities. If a prolonged government shutdown occurs, it could significantly impact the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business. Further, future government shutdowns could impact our ability to access the public markets and obtain necessary capital in order to properly capitalize and continue our operations.

The global impact of COVID-19 continues to rapidly evolve, and we will continue to monitor the situation closely. The ultimate impact of the COVID-19 pandemic or a similar health epidemic is highly uncertain and subject to change. We do not yet know the full extent of potential delays or impacts on our business, operations, or the global economy as a whole. While the spread of COVID-19 may eventually be contained or mitigated, there is no guarantee that a future outbreak of this or any other widespread epidemics will not occur, or that the global economy will recover, either of which could seriously harm our business.

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.

Changes in tax laws or in their implementation or interpretation could adversely affect our business and financial condition.

Changes in tax law may adversely affect our business or financial condition. The Tax Cuts and Jobs Act, or the 2017 Tax Act, as amended by the Coronavirus Aid, Relief, and Economic Security Act, or CARES Act, significantly revises the Internal Revenue Code of 1986, as amended, or the Code. The 2017 Tax Act, among other things, contains significant changes to corporate taxation, including a reduction of the corporate tax rate from a top marginal rate of 35% to a flat rate of 21%, the limitation of the tax deduction for net interest expense to 30% of adjusted taxable income (except for certain small businesses), the limitation of the deduction for net operating losses, or NOLs, to 80% of current-year taxable income and elimination of NOL carrybacks, in each case, for losses arising in taxable years beginning after December 31, 2017 (though any such NOLs may be carried forward indefinitely and such NOLs arising in taxable years beginning before January 1, 2021 are generally eligible to be carried back up to five years), the imposition of a one-time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, the elimination of U.S. tax on foreign earnings (subject to certain important exceptions), the allowance of immediate deductions for certain new investments instead of deductions for depreciation expense over time, and the modification or repeal of many business deductions and credits.

In addition to the CARES Act, as part of Congress's response to the COVID-19 pandemic, economic relief legislation has been enacted in 2020 and 2021 containing tax provisions. Regulatory guidance under the 2017 Tax Act and such additional legislation is and continues to be forthcoming, and such guidance could ultimately increase or lessen the impact of these laws on our business and financial condition. Also, as a result of the changes in the U.S. presidential administration and control of the U.S. Senate in 2021, additional tax legislation may be enacted; any such additional legislation could have an impact on our company. In addition, it is uncertain if and to what extent various states will conform to the 2017 Tax Act and additional tax legislation.

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, 2021, we had federal NOLs of approximately $283.3 million and state NOLs of approximately $148.1 million, which, if not utilized, generally begin to expire in 2022. As of December 31, 2021, we also had federal research and development tax credit carryforwards of approximately $15.5 million and state research and development tax credit carryforwards of approximately $1.0 million. Unused credits began to expire in 2021 and generally expire over time if they remain unused. These NOLs and research and development tax credit carryforwards could expire unused and be unavailable to offset future income tax liabilities.

In addition, under Section 382 of 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 March 31, 2021 and determined that such an ownership change has occurred. As a result of such ownership change or future ownership changes, our ability to use our NOLs and research and development tax credit carryforwards may be materially limited.

There is also a risk that due to regulatory changes, such as suspension of the use of NOLs, or other unforeseen reasons, our existing NOLs could expire or otherwise become unavailable to offset future income tax liabilities. As described above in "Changes in tax laws or in their implementation or interpretation could adversely affect our business and financial condition," the 2017 Tax Act as amended by the CARES Act, includes changes to U.S. federal tax rates and rules governing NOL carryforwards that may significantly impact our ability to utilize NOLs to offset taxable income in the future. In addition, state NOLs generated in one state cannot be used to offset income generated in another state. For these reasons, we may be unable to use a material portion of our NOLs and other tax attributes.

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, India and South Korea. 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 have recently acquired, and we may again in the future acquire, 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 have recently acquired, and we may again 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. For example, in January 2022, we acquired XTAL BioStructures, Inc., or XTAL, a company that provides structural biology services, including biophysical methods, protein production and purification, and X-ray crystallography, which will augment our ability to produce high quality target structures for our drug discovery programs. 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, other than our acquisition of XTAL, 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.

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 "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 are also party to a collaboration agreement with BMS for the development and potential commercialization of product candidates we discover internally, which also provides for co-ownership rights to certain intellectual property generated through the collaboration in certain scenarios. 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. Existing or future collaboration agreements may also impose diligence obligations on us. For example, existing or future collaboration agreements may impose 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. Under our collaboration with BMS, for example, we are prohibited from developing and commercializing product candidates anywhere in the world that are directed at the targets specified under the agreement, until the earlier of such target ceasing to be included under the agreement or the expiration of the last to expire royalty term for the program related to the target. 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, our collaborators, 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 pending 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, our collaborators, 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 collaborators or 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 and licensor to develop, manufacture, market and sell any product candidates we may develop and for our collaborators, licensor, 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, licensor, 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

Even if we complete the necessary preclinical studies and clinical trials, the regulatory approval process is expensive, time consuming and uncertain and may prevent us from obtaining approvals for the commercialization of some or all of our product candidates. As a result, we cannot predict when or if, and in which territories, we will obtain marketing approval to commercialize a product candidate.

The research, testing, manufacturing, labeling, approval, selling, marketing, promotion and distribution of products are subject to extensive regulation by the FDA and comparable foreign regulatory authorities. We are not permitted to market our product candidates in the United States or in other countries until we receive approval of an NDA from the FDA or marketing approval from applicable regulatory authorities outside the United States. Our product candidates are in various stages of development and are subject to the risks of failure inherent in development. We have not submitted an application for or received marketing approval for any of our product candidates in the United States or in any other jurisdiction. We have no experience as a company in filing and supporting the applications necessary to gain marketing approvals and expect to rely on third-party CROs to assist us in this process.

The process of obtaining marketing approvals, both in the United States and abroad, is lengthy, expensive and uncertain. It may take many years, if approval is obtained at all, and can vary substantially based upon a variety of factors, including the type, complexity and novelty of the product candidates involved. Securing marketing approval requires the submission of extensive preclinical and clinical data and supporting information, including manufacturing information, to regulatory authorities for each therapeutic indication to establish the product candidate’s safety and efficacy. The FDA or other regulatory authorities may determine that our product candidates are not safe and effective, only moderately effective or have undesirable or unintended side effects, toxicities or other characteristics that preclude our obtaining marketing approval or prevent or limit commercial use.

In addition, changes in marketing approval policies during the development period, changes in or the enactment or promulgation of additional statutes, regulations or guidance or changes in regulatory review for each submitted product application, may cause delays in the approval or rejection of an application. Regulatory authorities have substantial discretion in the approval process and varying interpretations of the data obtained from preclinical and clinical testing could delay, limit or prevent marketing approval of a product candidate. Any marketing approval we ultimately obtain may be limited or subject to restrictions or post-approval commitments that render the approved product not commercially viable.

In order to market and sell our products in the European Union and other foreign jurisdictions, we must obtain separate marketing approvals and comply with numerous and varying regulatory requirements. The approval procedure varies among countries and can involve additional testing. The time required to obtain approval may differ substantially from that required to obtain FDA approval. The marketing approval process outside the United States generally includes all of the risks associated with obtaining FDA approval. We may not obtain approvals from regulatory authorities outside the United States on a timely basis, if at all. Approval by the FDA does not ensure approval by regulatory authorities in other countries or jurisdictions, and approval by one regulatory authority outside the United States does not ensure approval by regulatory authorities in other countries or jurisdictions or by the FDA. We may file for marketing approvals but not receive necessary approvals to commercialize our products in any market.

We may seek certain designations for our product candidates, including Breakthrough Therapy, Fast Track and Priority Review designations in the US, and PRIME Designation in the European Union, but we might not receive such designations, and even if we do, such designations may not lead to a faster development or regulatory review or approval process.

We may seek certain designations for one or more of our product candidates that could expedite review and approval by the FDA. A Breakthrough Therapy product is defined as a product that is intended, alone or in combination with one or more other products, to treat a serious condition, and preliminary clinical evidence indicates that the product may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. For products that have been designated as Breakthrough Therapies, interaction and communication between the FDA and the sponsor of the trial can help to identify the most efficient path for clinical development while minimizing the number of patients placed in ineffective control regimens.

The FDA may also designate a product for Fast Track review if it is intended, whether alone or in combination with one or more other products, for the treatment of a serious or life threatening disease or condition, and it demonstrates the potential to address unmet medical needs for such a disease or condition. For Fast Track products, sponsors may have greater interactions with the FDA and the FDA may initiate review of sections of a Fast Track product's application before the application is complete. This rolling review may be available if the FDA determines, after preliminary evaluation of clinical data submitted by the sponsor, that a Fast Track product may be effective.

We may also seek a priority review designation for one or more of our product candidates. If the FDA determines that a product candidate offers major advances in treatment or provides a treatment where no adequate therapy exists, the FDA may designate the product candidate for priority review. A priority review designation means that the goal for the FDA to review an application is six months, rather than the standard review period of ten months.

These designations are within the discretion of the FDA. Accordingly, even if we believe that one of our product candidates meets the criteria for these designations, the FDA may disagree and instead determine not to make such designation. Further, even if we receive a designation, the receipt of such designation for a product candidate may not result in a faster development or regulatory review or approval process compared to products considered for approval under conventional FDA procedures and does not assure ultimate approval by the FDA. In addition, even if one or more of our product candidates qualifies for these designations, the FDA may later decide that the product candidates no longer meet the conditions for qualification or decide that the time period for FDA review or approval will not be shortened.

In the EU, we may seek PRIME designation for our product candidates in the future. PRIME is a voluntary program aimed at enhancing the EMA's role to reinforce scientific and regulatory support in order to optimize development and enable accelerated assessment of new medicines that are of major public health interest with the potential to address unmet medical needs. The program focuses on medicines that target conditions for which there exists no satisfactory method of treatment in the EU or even if such a method exists, it may offer a major therapeutic advantage over existing treatments. PRIME is limited to medicines under development and not authorized in the EU and the applicant intends to apply for an initial marketing authorization application through the centralized procedure. To be accepted for PRIME, a product candidate must meet the eligibility criteria in respect of its major public health interest and therapeutic innovation based on information that is capable of substantiating the claims. The benefits of a PRIME designation include the appointment of a CHMP rapporteur to provide continued support and help to build knowledge ahead of a marketing authorization application, early dialogue and scientific advice at key development milestones, and the potential to qualify products for accelerated review, meaning reduction in the review time for an opinion on approvability to be issued earlier in the application process. PRIME enables an applicant to request parallel EMA scientific advice and health technology assessment advice to facilitate timely market access. Even if we receive PRIME designation for any of our product candidates, the designation may not result in a materially faster development process, review or approval compared to conventional EMA procedures. Further, obtaining PRIME designation does not assure or increase the likelihood of EMA's grant of a marketing authorization.

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; 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 the 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 significant 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 have recently experienced, and we expect to continue 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 our ongoing 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 ongoing and 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 has led to and may continue to 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 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 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 influence all matters submitted to stockholders for approval.

As of February 18, 2022, 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 19.8% of our common stock and all of our limited common stock, or, if the holder of our limited common stock exercised its right to convert each share of its limited common stock for one share of our common stock, approximately 30.1% of our common stock. As a result, if these stockholders were to choose to act together, they would be able to influence 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 influence 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 is volatile and fluctuates substantially, which could result in substantial losses for our stockholders.

Our stock price has been, and is likely to continue to be volatile. Since our initial public offering in February 2020 and through February 18, 2022, the intraday price of our common stock has fluctuated from a low of $24.37 to a high of $117.00. 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;
- guidance or announcements by us with respect to our anticipated financial or operational performance;
- 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;
- the societal and economic impact of public health epidemics, such as the ongoing COVID-19 pandemic; 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.

We have released, and may in the future release, guidance in our annual or quarterly earnings conference calls, annual or quarterly earnings releases, or otherwise, regarding our future performance that represents our management's estimates as of the date of such guidance. Our guidance, which includes forward-looking statements, is based on projections prepared by our management. Neither our registered public accountants nor any other independent expert or outside party compiles or examines the projections. Accordingly, no such person expresses 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 have released, and would continue to 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 is 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, including as a result of COVID-19, 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.

Sales of a substantial number of shares of our common stock in the public market 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 18, 2022, we had outstanding 61,873,343 shares of common stock and 9,164,193 shares of limited common stock. All of our outstanding shares of common stock, including shares of common stock issuable upon the conversion of shares of our limited common stock, are available for sale in the public market, subject only to the restrictions of Rule 144 under the Securities Act in the case of our affiliates. In addition, certain of our executive officers, directors and affiliated stockholders have entered or may enter into Rule 10b5-1 plans providing for sales of shares of our common stock from time to time. Under a Rule 10b5-1 plan, a broker executes trades pursuant to parameters established by the executive officer, director or affiliated stockholder when entering into the plan, without further direction from the executive officer, director or affiliated stockholder. A Rule 10b5-1 plan may be amended or terminated in some circumstances. Our executive officers, directors and affiliated stockholders also may buy or sell additional shares outside of a Rule 10b5-1 plan when they are not in possession of material, nonpublic information.

We have also filed a universal shelf registration statement on Form S-3 which allows us to offer and sell an indeterminate number of shares of common stock, preferred stock, depositary shares or warrants, or an indeterminate principal amount of debt securities, from time to time pursuant to one or more offerings at prices and terms to be determined at the time of the sale. Moreover, certain holders of our common stock and our limited common stock have rights, subject to specified conditions, to include their shares in registration statements that we may file for ourselves or other stockholders and may require us to file Form S-3 registration statements covering their shares.

We also have filed registration statements on Forms S-8 to register shares of common stock that we may issue under our equity compensation plans. Shares registered under the 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.

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 now that we are no longer an emerging growth company. 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.

As a result of becoming a public company, we are obligated to develop and maintain proper and effective internal control 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 are required to furnish a report by our management on our internal control over financial reporting on an annual basis. This assessment will need to include disclosure of any material weaknesses identified by our management in our internal control over financial reporting. Pursuant to Section 404, we are also required to have our independent registered public accounting firm issue an opinion on the effectiveness of our internal control over financial reporting on an annual basis beginning with this Annual Report.

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. In addition, if we have an unremediated material weakness, we would receive an adverse opinion regarding our internal control over financial reporting from our independent registered public accounting firm. 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 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;
- 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 109,000 square feet of office space in New York, New York under a lease that currently expires in December 2037. We also occupy approximately 35,000 square feet of office space in Portland, Oregon under a lease that currently expires in September 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

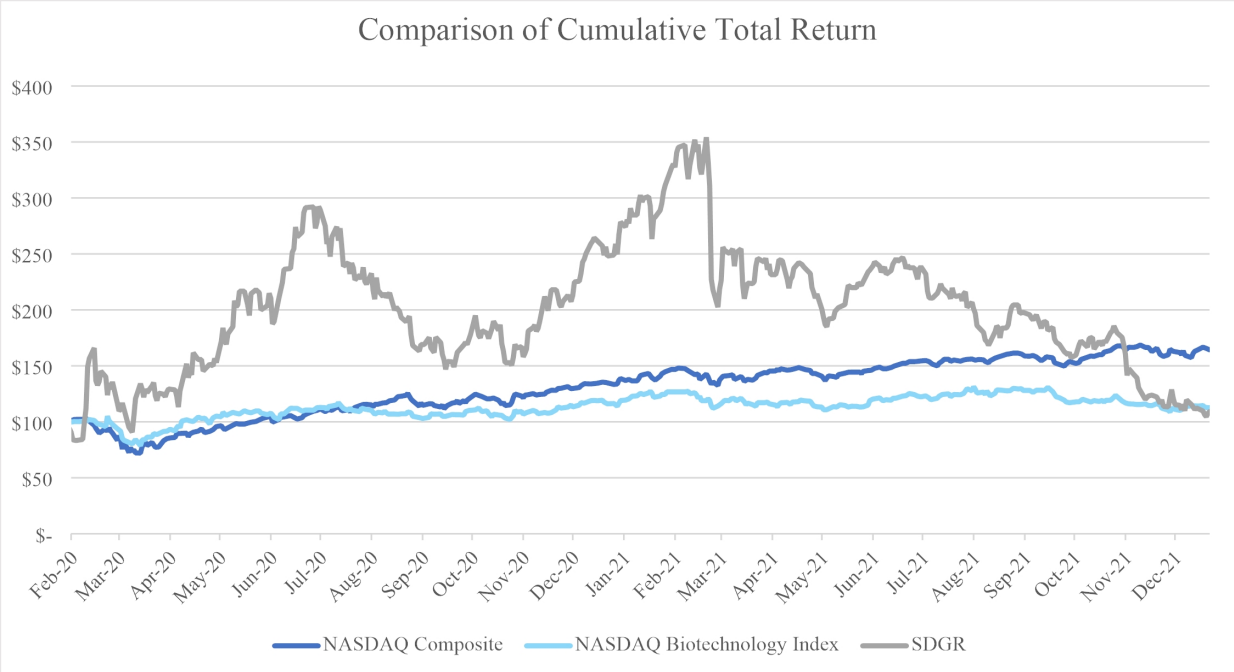
Market Information

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.

Performance Graph

The following performance graph related information shall not be deemed to be "soliciting material" or to be "filed" with the Securities and Exchange Commission for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or otherwise subject to the liabilities under that Section, nor shall such information be incorporated by reference into any future filing under the Exchange Act or the Securities Act of 1933, as amended, or the Securities Act, except to the extent that we specifically incorporate it by reference into such filing.

The following graph compares the cumulative total return on our common stock with the cumulative total return of the Nasdaq composite and the Nasdaq Biotechnology Index from February 6, 2020 (the first date that shares of our common stock were publicly traded on the Nasdaq Global Select Market) through December 31, 2021. The graph assumes an investment of $100 on February 6, 2020, in each of the foregoing indices and in our common stock. Data for each of the indices and our common stock assumes that all dividends were reinvested on the day of issuance, if any. The comparisons are not intended to forecast or be indicative of future performance of our common stock.



Holders of Record

As of February 18, 2022, there were approximately 120 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.

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 $209.6 million, after deducting $16.3 million in underwriting discounts and commissions and $6.4 million in estimated offering expenses borne by us.

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

Not applicable.

Issuer Purchases of Equity Securities

Not applicable.

Item 6. [Reserved.]

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and 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 "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. For further information regarding our forward-looking statements, see "Cautionary Note Regarding Forward-Looking Statements" in this Annual Report.

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 platform is used by biopharmaceutical and industrial companies, academic institutions, and government laboratories around the world. Our multidisciplinary drug discovery team also leverages our software platform to advance collaborative drug discovery and development programs and our own pipeline of novel therapeutics to address unmet medical needs.

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, as well as advancing drug discovery programs both with our collaborators and internally. 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 for both collaborative and internal 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, in mid-2018, we launched a pipeline of internal, wholly-owned programs. We continue to advance multiple internal programs through investigational new drug, or IND, -enabling studies. We expect to submit an IND application to the U.S. Food and Drug Administration, or FDA, for our MALT1 program in the first half of 2022, subject to receiving regulatory clearance, we expect to initiate a Phase 1 clinical trial of our MALT1 inhibitor in patients with relapsed and resistant lymphoma in the second half of 2022. We also plan to submit IND applications to the FDA for our CDC7 program in early 2023 and our WEE1 program in 2023, subject to favorable data from IND-enabling studies. In addition, we plan to initiate a Phase 1 clinical trial of our CDC7 inhibitor in 2023, subject to receipt of regulatory clearance.

We have funded our operations to date principally from the sale of our equity securities, including our initial public offering and our follow-on public offering, and to a lesser extent, from sales of our software solutions and from upfront payments, research funding and milestone payments from our drug discovery collaborations, and from distributions on account of, or proceeds from the sale of, our equity stakes in our collaborators.

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, professional services, and contributions. 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 our cloud-based software solution on their own hardware without taking control of licenses.

We currently generate drug discovery revenue from our collaborations, including upfront payments, 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, we may also derive drug discovery revenue from collaborating on or out-licensing our internal drug discovery programs when we believe it will help maximize the commercial potential of the program. In November 2020, we entered into an exclusive, worldwide collaboration and license agreement with Bristol-Myers Squibb Company, or BMS, pursuant to which we and BMS agreed to collaborate in the discovery, research and development of small molecule compounds for biological targets in the oncology, neurology and immunology therapeutic areas. The initial collaboration targets included HIF-2 alpha and SOS1/KRAS, which were two of our internal pipeline programs. In November 2021, we and BMS mutually agreed to replace the HIF-2 alpha target with another precision oncology target. Following the replacement election, all rights to the HIF-2 alpha target program reverted to us. Under the terms of the agreement, we received an upfront payment of $55.0 million, and we are eligible to receive up to $2.7 billion in total milestone payments across all potential targets, as well as a tiered percentage royalty on net sales of each product commercialized by BMS ranging from mid-single digits to low-double digits, subject to certain specified reductions. See “Business—Collaboration Agreement with Bristol-Myers Squibb Company” for additional information relating to this agreement.

In August 2021, we entered into a global discovery, development and commercialization collaboration with Zai Lab Limited focused on a novel program in oncology targeting DNA damage response. Under the terms of the agreement, we are entitled to receive an upfront payment to help fund our share of research costs, and if we elect to co-fund clinical development of a product candidate under the collaboration, we will be entitled to receive 50% of any profits from the commercialization of an approved therapeutic in the United States. We are also eligible to receive up to approximately $338 million in preclinical, clinical, regulatory and sales-based milestone payments from Zai Lab Limited for any product candidate developed under the collaboration, and we are entitled to receive tiered royalties on net sales outside the United States.

We generated revenue of $137.9 million, $108.1 million, and $85.5 million in 2021, 2020, and 2019, respectively, representing year-over-year growth of 28% and 26%, respectively. Our net loss was $101.2 million, $26.6 million, and $25.7 million for the years ended December 31, 2021, 2020, and 2019, respectively.

Business Impact of COVID-19 Pandemic

In order to safeguard the health of our employees in light of the COVID-19 pandemic, in early March 2020 we implemented a company-wide work-from-home policy. Beginning in June 2020, we began limited re-openings of certain of our offices in the United States and abroad. Our re-openings are being conducted on a limited basis and are voluntary for all of our employees. We have continued to phase-in the re-opening of our offices as our management and federal, state, or local authorities advise, and we may take further actions that alter our operations as may be required by federal, state, or local authorities, or which we determine are in our best interests.

We did not see material impacts to our business from the COVID-19 pandemic during 2021. While we do not expect the COVID-19 pandemic to have future material impacts on our business, the full extent of the future impact will depend on many factors outside of our control, including, without limitation, the extent, trajectory and duration of the COVID-19 pandemic, the development, availability and distribution of effective treatments and vaccines, the imposition of protective public safety measures, the emergence of new strains and variants of COVID-19 and the effectiveness of vaccines against such strains and variants, and the impact of the COVID-19 pandemic on the global economy. For instance, with respect to our software business, some of our customers may experience increasing budgetary pressures as a result of downturns or uncertainty in their respective businesses, which may cause them to delay or reduce purchases. In addition, due to the restrictions related to COVID-19, our sales force has limited in-person interactions, and their ability to attend events that promote and expand knowledge of our company and platform, including industry conferences and events, has been hampered. Relative to our and our collaborators’ drug discovery programs, the COVID-19 pandemic could delay the progress of certain programs, particularly ones that are in preclinical studies and clinical trials. Such COVID-19-related delays may result in disruptions in current and future IND-enabling studies and clinical trials, manufacturing disruptions, trial site disruptions and impact the ability to obtain necessary institutional review board, or IRB, institutional biosafety committee, or IBC, or other necessary site approvals. For example, our contract manufacturing organizations, or CMOs, and our contract research organizations, or CROs, have experienced reductions in the capacity to undertake research-scale production and delays in executing some preclinical studies, including our IND-enabling studies for our CDC7 program. We now expect to submit the IND application to the FDA for our CDC7 program in early 2023 and to initiate a Phase 1 clinical trial in 2023. Such reductions could cause disruptions related to our current and future IND-enabling studies and clinical trials arising from delays in preclinical studies, manufacturing disruptions, and the ability to obtain necessary institutional review board, or IRB, institutional biosafety committee, or IBC, or other necessary site approvals, as well as other delays at clinical trial sites. We, together with our CMOs and CROs, are closely monitoring the impact of the COVID-19 pandemic on these operations. Furthermore, if our collaborators experience similar delays with their drug discovery and development programs, that could delay our achievement of milestones and related revenue. While there remains uncertainty about the extent of the effect of the COVID-19 pandemic, we do not envision a long-term impact from the COVID-19 pandemic on our ability to execute on our strategy.

Management is actively monitoring the COVID-19 pandemic and its possible effects on our financial condition, liquidity, operations, customers, contractors, and workforce. For additional information on risks posed by the COVID-19 pandemic, please see "Risk Factors – Risks Related to Our Operations – A widespread outbreak of an illness or other health issue, such as the COVID-19 pandemic, could negatively affect various aspects of our business and make it more difficult to meet our obligations to our customers, and could result in reduced demand from our customers as well as delays in our drug discovery and development programs," included elsewhere in this Annual Report.

In response to the COVID-19 pandemic, we have joined a multi-company philanthropic effort to discover and develop novel small-molecule antiviral therapeutics to address COVID-19. The intent of the alliance, which to date also includes Takeda Pharmaceutical Company Limited, Novartis AG, Alphabet, Inc., Gilead Sciences, Inc., and WuXi AppTec, Inc., is to make any discoveries from this alliance available to the public. There is no expectation that this effort will generate revenue for any of the companies involved in the alliance, including us.

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 demonstrated by the increasing number of our customers with an annual contract value, or ACV, of over $100,000. We had 190, 153, and 131 of these customers for the years ended December 31, 2021, 2020, and 2019, respectively. This subset of customers represented approximately 80%, 79%, and 78% of our total ACV for the years ended December 31, 2021, 2020, and 2019, respectively. In addition, we had 15, 16, and 10 customers with an ACV of over $1.0 million for the years ended December 31, 2021, 2020, 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. Our ACV was $112.1 million, $92.1 million, and $75.6 million for the years ended December 31, 2021, 2020, and 2019, respectively.

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, 2021, our year-over-year customer retention rate for such customers was 98% and was 96% or higher for each of the previous eight fiscal years. 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 1,647, 1,463, and 1,266 active customers for the years ended December 31, 2021, 2020, 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 2020 revenue, licensing our software in 2021, 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 materials science industries are 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 1,714 academic institutions across the world using our software in 2021. 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 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, preclinical, 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. Our initial programs are focused on discovering and developing inhibitors for targets in DNA damage response pathways and genetically defined cancers. Since then, we have expanded into other therapeutic areas, including in the areas of immunology and neurology. We continue to advance multiple internal programs through investigational new drug, or IND, -enabling studies. We expect to submit an IND application for our MALT1 program in the first half of 2022, and subject to receiving regulatory clearance, we expect to initiate a Phase 1 clinical trial of our MALT1 inhibitor in patients with relapsed and resistant lymphoma in the second half of 2022. We also plan to submit IND applications to the FDA for our CDC7 program in early 2023 and our WEE1 program in 2023, subject to favorable data from IND-enabling studies. In addition, we plan to initiate a Phase 1 clinical trial of our CDC7 inhibitor in 2023, subject to receipt of regulatory clearance. As we progress these programs, we will strategically evaluate on a program-by-program basis entering into preclinical and clinical development ourselves, entering into collaborations, or out-licensing programs to maximize commercial opportunities. As part of this strategy, in November 2020, we entered into an exclusive, worldwide collaboration and license agreement with BMS pursuant to which we and BMS agreed to collaborate in the discovery, research and development of small molecule compounds for biological targets in the oncology, neurology and immunology therapeutic areas. Furthermore, in August 2021, we entered into a global discovery, development and commercialization collaboration with Zai Lab Limited focused on a novel program in oncology targeting DNA damage response. We will need to continue 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 five sources: (i) on-premise software license fees, (ii) hosted software subscription fees, (iii) software maintenance fees, (iv) professional services fees, and (v) contributions.

On-premise software. Our on-premise software license arrangements grant customers the right to use our software on their own in-house servers or their own cloud instances 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 hosted licenses, which allows these customers to access our cloud-based software solution on their own hardware without taking control of the licenses, 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 training, technical setup, 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 core 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.

Software contribution revenue. Contribution revenue consists of funds received under a non-reciprocal agreement with Gates Ventures, LLC entered into June 2020. The agreement is an unconditional non-exchange contribution without restrictions and the initial contribution was invoiced upon execution of the agreement. Revenue was recognized upon execution of the agreement and on the first anniversary of the agreement when invoiced, in accordance with Accounting Standard Codification, or ASC Topic 958, Not-for-Profit Entities as the agreement is not an exchange transaction. Additional revenue is expected to be recognized on the second anniversary of the agreement.

Drug Discovery Revenue

Drug discovery services. 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 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, we may also derive drug discovery revenue from entering into collaborations or out-licensing our internal drug discovery programs when we believe it will help maximize the commercial potential of the program. For example, in November 2020, we entered into an exclusive, worldwide collaboration and license agreement with BMS, pursuant to which we received an upfront payment of $55.0 million from BMS, of which approximately $13.7 million and $1.0 million were included in our drug discovery revenue for the years ended December 31, 2021 and 2020, respectively. 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.

Drug discovery contribution revenue. Contribution revenue consists of funds received under an agreement with the Bill and Melinda Gates Foundation on a cost reimbursement basis, to perform services aimed at accelerating drug discovery in women's health. Revenue is recognized as conditions are met in accordance with ASC Topic 958, *Not-for-Profit Entities*.

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 7.1%, 6.3%, and 6.7% of software revenues in the years ended December 31, 2021, 2020, 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. While we have incurred costs associated with discovery efforts 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 4.6%, 11.2%, and 6.7% of drug discovery revenues in the years ended December 31, 2021, 2020, and 2019, respectively. We expect our drug discovery costs of revenue to trend higher over time as our discovery collaborations advance.

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 expense as incurred. Research and development expense consists of internal drug discovery and development 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 and development programs; and
- allocated compute capacity on our internal discovery and development programs 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 drug discovery programs, 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 in the early stages, 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. 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 make focused investments 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 continue 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 continue 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.

(Loss) Gain on Equity Investments

(Loss) gain on equity investments consists of realized gains in the form of cash distributions received from our equity investments offset by realized losses on the sale of equity.

Change in Fair Value

Fair value gains and losses consist of adjustments to the fair value of our equity investments, including Nimbus Therapeutics, Inc., or Nimbus, ShouTi Inc., or ShouTi, Relay Therapeutics, Inc., or Relay, and Morphic Holding, Inc., or Morphic. We remeasure our investments at each period end.

In January 2021, we disposed of our equity stake in Relay for aggregate consideration of $15.7 million.

We expect that fair value gains and losses will 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, 2021, 2020, and 2019

The following table summarizes our results of operations data for the years ended December 31, 2021, 2020, and 2019:

	Year Ended December 31,						
			2021 vs. 2020			2020 vs. 2019	
	2021	2020	Change	%	2019	Change	%
	(in thousands)						
Revenues:							
Software products and services	$ 113,236	$ 92,530	$ 20,706	22%	$ 66,735	$ 25,795	39%
Drug discovery	24,695	15,565	9,130	59%	18,808	(3,243)	-17%
Total revenues	137,931	108,095	29,836	28%	85,543	22,552	26%
Cost of revenues:							
Software products and services	26,495	18,003	8,492	47%	13,646	4,357	32%
Drug discovery	45,816	26,620	19,196	72%	22,804	3,816	17%
Total cost of revenues	72,311	44,623	27,688	62%	36,450	8,173	22%
Gross profit	65,620	63,472	2,148	3%	49,093	14,379	29%
Operating expenses:							
Research and development	90,904	64,695	26,209	41%	39,404	25,291	64%
Sales and marketing	22,150	17,795	4,355	24%	21,364	(3,569)	-17%
General and administrative	64,009	41,898	22,111	53%	27,040	14,858	55%
Total operating expenses	177,063	124,388	52,675	42%	87,808	36,580	42%
Loss from operations	(111,443)	(60,916)	(50,527)	83%	(38,715)	(22,201)	57%
Other income:							
(Loss) gain on equity investments	(1,781)	4,108	(5,889)		943	3,165	
Change in fair value	11,359	28,263	(16,904)		9,922	18,341	
Interest income	1,057	2,253	(1,196)		1,878	375	
Total other income	10,635	34,624	(23,989)		12,743	21,881	
Loss before income taxes	(100,808)	(26,292)	(74,516)		(25,972)	(320)	
Income tax expense (benefit)	411	345	66		(291)	636	
Net loss	(101,219)	(26,637)	(74,582)		(25,681)	(956)	
Net loss attributable to noncontrolling interest	(826)	(2,174)	1,348		(1,110)	(1,064)	
Net loss attributable to Schrödinger stockholders	$ (100,393)	$ (24,463)	$ (75,930)		$ (24,571)	$ 108	

Revenues

	Year Ended December 31,						
			2021 vs. 2020			2020 vs. 2019	
	2021	2020	Change	%	2019	Change	%
	(in thousands)						
Revenues:							
Software							
On-premise software	$ 74,598	$ 58,311	$ 16,287	28%	$ 42,647	$ 15,664	37%
Hosted software	11,076	9,192	1,884	20%	7,418	1,774	24%
Software maintenance	17,294	14,465	2,829	20%	11,643	2,822	24%
Professional services	9,268	9,562	(294)	-3%	5,027	4,535	90%
Software contribution	1,000	1,000	—	0%	—	1,000	—
Total software products and services	113,236	92,530	20,706	22%	66,735	25,795	39%
Drug Discovery							
Drug discovery services	24,584	15,565	9,019	58%	18,808	(3,243)	-17%
Drug discovery contribution	111	-	111	—	—	—	—
Total drug discovery	24,695	15,565	9,130	59%	18,808	(3,243)	-17%
Total revenues	$ 137,931	$ 108,095	$ 29,836	28%	$ 85,543	$ 22,552	26%

Software Products and Services Revenue

On-premise software. The increase in revenues for on-premise software was primarily attributable to existing and new customer growth, and an increase in multi-year arrangements during the year ended December 31, 2021 as compared to the year ended December 31, 2020 and during the year ended December 31, 2020 as compared to the year ended December 31, 2019.

Hosted software. The increase in revenues for hosted software was primarily due to increased spend from existing hosted customers, as well as new customers purchasing hosted software subscriptions, for which revenue is recognized ratably over time.

Software maintenance. The increase in revenues for software maintenance was primarily due to the increase in on-premise software sales in current and previous years. Software maintenance revenue is recognized over time.

Professional services. The decrease in revenues from professional services during the year ended December 31, 2021 as compared to the year ended December 31, 2020 was primarily due to the completion of a significant technology service project in 2020 that resulted in an increase to recurring on-premise software revenue upon renewal, as well as the timing of technology and modeling service projects.

The increase in revenues from professional services during the year ended December 31, 2020 as compared to the year ended December 31, 2019 was primarily due to revenue from significant technology service projects that began in late 2019, as well as an increased number of modeling service contracts.

Software contribution revenue. Contribution revenue during the year ended December 31, 2021 and the year ended December 31, 2020 was due to funds received under an agreement with Gates Ventures, LLC, which began in June 2020.

Drug Discovery Revenue

Drug discovery services. The increase in revenues for drug discovery services during the year ended December 31, 2021 as compared to the year ended December 31, 2020 was primarily due to the BMS collaboration services that began in November 2020, the timing and amount of collaboration milestones achieved, as well as research funding received during 2021 as compared to 2020. 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.

The decrease in revenues for drug discovery services during the year ended December 31, 2020 as compared to the year ended December 31, 2019 was primarily due to the timing and amount of collaboration milestones achieved during 2020 as compared to 2019.

Drug discovery contribution revenue. Contribution revenue during the year ended December 31, 2021 was due to services performed under an agreement with the Bill and Melinda Gates Foundation, aimed at accelerating drug discovery in women's health, which began in November 2021.

Cost of Revenues

	Year Ended December 31,						
			2021 vs. 2020			2020 vs. 2019	
	2021	2020	Change	%	2019	Change	%
	(in thousands)						
Cost of revenues:							
Software products and services	$ 26,495	$ 18,003	$ 8,492	47%	$ 13,646	$ 4,357	32%
Gross margin	77%	81%			80%		
Drug discovery	45,816	26,620	19,196	72%	22,804	3,816	17%

Software products and services. The increase in cost of revenues for software products and services during the year ended December 31, 2021 as compared to the year ended December 31, 2020 was attributable to increases of approximately $5.5 million in personnel-related expense, approximately $2.3 million in royalty expense due to higher sales levels, and approximately $0.7 million in other expenses.

The increase in cost of revenues for software products and services during the year ended December 31, 2020 as compared to the year ended December 31, 2019 was attributable to increases of approximately $2.6 million in personnel-related expense, approximately $1.5 million in royalty expense due to higher sales levels, and approximately $0.4 million in other expenses, offset by a decrease of approximately $0.2 million in travel and entertainment expense due to COVID-19.

Software products and services gross margin. The decrease in software gross margin during the year ended December 31, 2021 as compared to the year ended December 31, 2020 reflects our investment to support the rollout of large-scale deployments of our platform, as well as an increase in royalty fees. The increase in software gross margin during the year ended December 31, 2020 as compared to the year ended December 31, 2019 was primarily attributable to sales mix.

Drug discovery. The increase in cost of revenues for drug discovery during the year ended December 31, 2021 as compared to the year ended December 31, 2020 was attributable to increases of approximately $12.6 million in third-party CRO costs associated with the expansion and progression of collaboration drug discovery programs, including the BMS collaboration, approximately $6.7 million in personnel-related expense, and approximately $0.3 million in royalty expense, offset by a decrease of approximately $0.3 million in cloud computing expenses and approximately $0.1 million in other expenses.

The increase in cost of revenues for drug discovery during the year ended December 31, 2020 as compared to the year ended December 31, 2019 was attributable to increases of approximately $3.3 million in personnel-related expense, approximately $0.7 million in cloud computing expenses, and approximately $0.4 million in royalty expense, offset by a decrease of approximately $0.6 million in third-party CRO costs to support collaborations.

Research and Development Expense

	Year Ended December 31,						
			2021 vs. 2020			2020 vs. 2019	
	2021	2020	Change	%	2019	Change	%
	(in thousands)						
Research and development	$ 90,904	$ 64,695	$ 26,209	41%	$ 39,404	$ 25,291	64%

The increase in research and development expense during the year ended December 31, 2021 as compared to the year ended December 31, 2020 was attributable to increases of approximately $16.3 million in personnel-related expense, approximately $6.0 million in CRO costs associated with the expansion and progression of internal drug discovery programs, approximately $3.0 million in cloud computing expenses, and approximately $0.9 million in other expenses.

The increase in research and development expense during the year ended December 31, 2020 as compared to the year ended December 31, 2019 was attributable to increases of approximately $11.7 million in personnel-related expense, approximately $10.1 million in CRO costs associated with the expansion and progression of internal drug discovery programs, approximately $2.3 million in cloud computing expenses, and approximately $1.1 million in other expenses.

Sales and Marketing Expense

	Year Ended December 31,						
			2021 vs. 2020			2020 vs. 2019	
	2021	2020	Change	%	2019	Change	%
	(in thousands)						
Sales and marketing	$ 22,150	$ 17,795	$ 4,355	24%	$ 21,364	$ (3,569)	-17%

The increase in sales and marketing expense during the year ended December 31, 2021 as compared to the year ended December 31, 2020 was attributable to increases of approximately $3.6 million in personnel-related expense, approximately $0.4 million in travel and entertainment expenses, and approximately $0.4 million in other expenses.

The decrease in sales and marketing expense during the year ended December 31, 2020 as compared to the year ended December 31, 2019 was attributable to a decrease of approximately $2.7 million in personnel-related expense and a decrease of approximately $1.2 million in travel and entertainment expenses due to COVID-19, partially offset by an increase of $0.3 million in other expenses.

General and Administrative Expense

	Year Ended December 31,						
			2021 vs. 2020			2020 vs. 2019	
	2021	2020	Change	%	2019	Change	%
	(in thousands)						
General and administrative	$ 64,009	$ 41,898	$ 22,111	53%	$ 27,040	$ 14,858	55%

The increase in general and administrative expense during the year ended December 31, 2021 as compared to the year ended December 31, 2020 was attributable to increases of approximately $16.5 million of personnel-related expense, approximately $5.1 million in other expenses, primarily reflecting costs necessary to build and maintain a public company infrastructure, and approximately $0.5 million in non-comparable costs related to the disposal of our equity stake in Relay.

The increase in general and administrative expense during the year ended December 31, 2020 as compared to the year ended December 31, 2019 was attributable to an increase of approximately $10.5 million of personnel-related expense, and an increase of approximately $7.5 million in other expenses, primarily reflecting costs necessary to build a public company infrastructure, partially offset by a $3.3 million reduction for non-comparable items recognized during 2019.

(Loss) Gain on Equity Investments

	Year Ended December 31,				
			2021 vs. 2020		2020 vs. 2019
	2021	2020	Change	2019	Change
	(in thousands)				
(Loss) gain on equity investments	$ (1,781)	$ 4,108	$ (5,889)	$ 943	$ 3,165

The loss on equity investments during the year ended December 31, 2021 was primarily due to the realized loss on the disposal of our equity stake in Relay. The gain on equity investments during the year ended December 31, 2020 represents realized gains in the form of a cash distribution received from the Petra Pharma Corporation, or Petra, merger in May 2020 on account of our equity stake in Petra. The gain on equity investments during the year ended December 31, 2019 represents realized gains in the form of a cash distribution received from our Nimbus investment.

Change in Fair Value

	Year Ended December 31,				
			2021 vs. 2020		2020 vs. 2019
	2021	2020	Change	2019	Change
	(in thousands)				
Change in fair value	$ 11,359	$ 28,263	$ (16,904)	$ 9,922	$ 18,341

The change in fair value during the year ended December 31, 2021 was primarily due to a gain on our investment in Morphic. The change in fair value during the year ended December 31, 2020 was due to a gain on our investment in Relay of $17.6 million and a gain on our investment in Morphic of $13.7 million, offset by a loss on our investment in Nimbus of $3.0 million. The change in fair value during the year ended December 31, 2019 was due to a $14.1 million gain on our investment in Morphic, offset by a $4.2 million loss on our investment in Nimbus.

Interest Income

	Year Ended December 31,				
			2021 vs. 2020		2020 vs. 2019
	2021	2020	Change	2019	Change
	(in thousands)				
Interest income	$ 1,057	$ 2,253	$ (1,196)	$ 1,878	$ 375

The decrease in interest income during the year ended December 31, 2021 as compared to the year ended December 31, 2020 was attributable to an overall decline in interest rates on our investment portfolio.

The increase in interest income during the year ended December 31, 2020 as compared to the year ended December 31, 2019 was attributable to increased earnings on our investment portfolio balance, which increased significantly year-over-year due to the investment of proceeds from our initial public offering in February 2020 and our follow-on public offering in August 2020, partially offset by a significant reduction in interest rates year-over-year.

Income Tax Expense (Benefit)

	Year Ended December 31,				
			2021 vs. 2020		2020 vs. 2019
	2021	2020	Change	2019	Change
	(in thousands)				
Income tax expense (benefit)	$ 411	$ 345	$ 66	$ (291)	$ 636

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 states and taxes in foreign jurisdictions in which we conduct business. The income tax benefit during the year ended December 31, 2019 is due to alternative minimum tax credits previously utilized that are refundable under the Tax Cuts and Jobs Act of 2017.

At December 31, 2021, we had federal and state net operating loss carryforwards of approximately $283.3 million and $148.1 million, respectively. These carryforwards, with the exception of federal net operating losses generated post 2017, will expire between 2022 and 2041 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, 2021, we had federal and state research and development tax credit carryforwards of approximately $15.5 million and $1.0 million, respectively. These carryforwards will expire between 2022 and 2041 if not used by us to reduce income taxes payable in future periods.

As required by 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 net operating loss 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 $95.3 million, $58.2 million, and $35.3 million has been established at December 31, 2021, 2020, and 2019, respectively. The change in the valuation allowance for the years ended December 31, 2021, 2020, and 2019 was $37.1 million, $22.9 million, and $7.7 million, respectively. We recorded income tax

expense of $0.4 million and $0.3 million for the years ended December 31, 2021 and 2020, respectively. We recorded an income tax benefit of $0.3 million for the year ended December 31, 2019.

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, 2021. 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							
	December 31, 2021	September 30, 2021	June 30, 2021	March 31, 2021	December 31, 2020	September 30, 2020	June 30, 2020	March 31, 2020
	(in thousands)							
Revenues:								
Software products and services	$ 38,564	$ 24,280	$ 24,052	$ 26,340	$ 24,957	$ 22,861	$ 20,900	$ 23,812
Drug discovery	7,606	5,570	5,732	5,787	8,075	2,936	2,192	2,362
Total revenues	46,170	29,850	29,784	32,127	33,032	25,797	23,092	26,174
Cost of revenues:								
Software products and services(1)	8,337	6,611	5,641	5,906	5,806	4,334	3,862	4,001
Drug discovery(1)	11,472	12,124	12,163	10,057	8,234	6,191	5,647	6,548
Total cost of revenues	19,809	18,735	17,804	15,963	14,040	10,525	9,509	10,549
Gross profit	26,361	11,115	11,980	16,164	18,992	15,272	13,583	15,625
Operating expenses:								
Research and development(1)	25,145	23,219	21,092	21,448	17,319	17,019	16,657	13,700
Sales and marketing(1)	5,975	5,556	5,380	5,239	4,675	3,969	4,362	4,789
General and administrative(1)	17,756	17,014	15,850	13,389	13,582	9,729	9,651	8,936
Total operating expenses	48,876	45,789	42,322	40,076	35,576	30,717	30,670	27,425
Loss from operations	(22,515)	(34,674)	(30,342)	(23,912)	(16,584)	(15,445)	(17,087)	(11,800)
Other (expense) income:								
(Loss) gain on equity investment	—	—	—	(1,781)	(48)	—	4,156	—
Change in fair value	(7,920)	(627)	(4,918)	24,824	4,750	18,233	8,359	(3,079)
Interest (expense) income	(6)	286	357	420	521	463	570	699
Total other (expense) income	(7,926)	(341)	(4,561)	23,463	5,223	18,696	13,085	(2,380)
(Loss) income before income taxes	(30,441)	(35,015)	(34,903)	(449)	(11,361)	3,251	(4,002)	(14,180)
Income tax expense (benefit)	274	(4)	67	74	225	(35)	64	91
Net (loss) income	(30,715)	(35,011)	(34,970)	(523)	(11,586)	3,286	(4,066)	(14,271)
Net loss attributable to noncontrolling interest	(2)	(4)	(326)	(494)	(447)	(566)	(716)	(445)
Net (loss) income attributable to Schrodinger stockholders	$ (30,713)	$ (35,007)	$ (34,644)	$ (29)	$ (11,139)	$ 3,852	$ (3,350)	$ (13,826)

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

Revenues:

	Three Months Ended							
	December 31, 2021	September 30, 2021	June 30, 2021	March 31, 2021	December 31, 2020	September 30, 2020	June 30, 2020	March 31, 2020
	(in thousands)							
Revenues:								
Software								
On-premise software	$ 27,295	$ 15,496	$ 14,452	$ 17,355	$ 16,542	$ 15,064	$ 11,105	$ 15,600
Hosted software	3,088	2,684	2,704	2,600	2,373	2,374	2,312	2,133
Software maintenance	4,612	4,401	4,176	4,105	3,841	3,536	3,551	3,537
Professional services	3,569	1,699	1,720	2,280	2,201	1,887	2,932	2,542
Revenue from contracts with customers	38,564	24,280	23,052	26,340	24,957	22,861	19,900	23,812
Software contribution	-	-	1,000	-	-	-	1,000	-
Total software products and services revenue	38,564	24,280	24,052	26,340	24,957	22,861	20,900	23,812
Drug discovery								
Drug discovery services	7,495	5,570	5,732	5,787	8,075	2,936	2,192	2,362
Drug discovery contribution	111	-	-	-	-	-	-	-
Total drug discovery	7,606	5,570	5,732	5,787	8,075	2,936	2,192	2,362
Total revenues	$ 46,170	$ 29,850	$ 29,784	$ 32,127	$ 33,032	$ 25,797	$ 23,092	$ 26,174

Deferred Revenue:

	As of							
	December 31, 2021	September 30, 2021	June 30, 2021	March 31, 2021	December 31, 2020	September 30, 2020	June 30, 2020	March 31, 2020
	(in thousands)							
Deferred revenue	$ 85,432	$ 76,318	$ 78,526	$ 78,115	$ 86,567	$ 21,659	$ 25,117	$ 23,835

Gross Margin:

	Three Months Ended							
	December 31, 2021	September 30, 2021	June 30, 2021	March 31, 2021	December 31, 2020	September 30, 2020	June 30, 2020	March 31, 2020
Software products and services gross margin	78%	73%	77%	78%	77%	81%	82%	83%

Stock-Based Compensation:

	Three Months Ended							
	December 31, 2021	September 30, 2021	June 30, 2021	March 31, 2021	December 31, 2020	September 30, 2020	June 30, 2020	March 31, 2020
	(in thousands)							
Stock-based compensation:								
Cost of revenues:								
Software products and services	$ 389	$ 396	$ 382	$ 229	$ 152	$ 169	$ 124	$ 85
Drug discovery	626	669	738	428	276	230	181	168
Research and development	2,157	2,130	1,925	1,228	863	857	822	508
Sales and marketing	331	370	362	218	141	165	116	93
General and administrative	3,953	4,087	3,609	2,263	1,571	1,617	1,486	921
Total stock-based compensation expense	$ 7,456	$ 7,652	$ 7,016	$ 4,366	$ 3,003	$ 3,038	$ 2,729	$ 1,775

Depreciation:

	Three Months Ended							
	December 31, 2021	September 30, 2021	June 30, 2021	March 31, 2021	December 31, 2020	September 30, 2020	June 30, 2020	March 31, 2020
	(in thousands)							
Depreciation:								
Cost of revenues:								
Software products and services	$ 61	$ 56	$ 68	$ 86	$ 67	$ 62	$ 48	$ 43
Drug discovery	82	106	167	232	226	213	205	193
Research and development	212	163	195	247	222	212	200	176
Sales and marketing	65	59	57	66	39	30	39	34
General and administrative	232	197	240	256	457	372	388	432
Total depreciation expense	$ 652	$ 581	$ 727	$ 887	$ 1,011	$ 889	$ 880	$ 878

Quarterly Revenue Trends

On-premise software revenue is subject to seasonality that generally favors the first and fourth quarter of each year, primarily due to the timing of customer renewals for on-premise software arrangements, for which revenue is recognized at a single point in time. Hosted software revenue grew more steadily in the periods presented, as existing customers and new customers increased their spend on hosted solutions, for which revenue is recognized over time. As a result, a 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, including advancement of BMS collaborative services. 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 fluctuated based on the timing of sales, shifts in product mix, fluctuations to the number and size of milestones that were deemed probable in advance of actual achievement, and the measurement of progress toward completion for service projects.

Quarterly Gross Margin Trends

Our software products and services gross margin experienced fluctuations over the periods presented due to increased headcount and the product mix for software and services, as 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. 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 and personnel-related expenses 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 expansion and progression of our internal drug discovery programs.

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, Morphic, ShouTi and Relay, a loss on the disposal of our equity stake in Relay, a gain from the Petra merger, and, to a lesser degree, interest income.

Segment Information

The following tables summarize segment information for the years ended December 31, 2021, 2020, 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,		
	2021	2020	2019
	(in thousands)		
Segment revenues:			
Software	$ 113,236	$ 92,530	$ 66,735
Drug discovery	24,695	15,565	18,808
Total segment revenues	$ 137,931	$ 108,095	$ 85,543
Segment gross profit:			
Software	$ 86,741	$ 74,527	$ 53,089
Drug discovery	(21,121)	(11,055)	(3,996)
Total segment gross profit	65,620	63,472	49,093
Unallocated (expense) income:			
Research and development	(90,904)	(64,695)	(39,404)
Sales and marketing	(22,150)	(17,795)	(21,364)
General and administrative	(64,009)	(41,898)	(27,040)
(Loss) gain on equity investment	(1,781)	4,108	943
Change in fair value	11,359	28,263	9,922
Interest	1,057	2,253	1,878
Income taxes	(411)	(345)	291
Consolidated net loss	$ (101,219)	$ (26,637)	$ (25,681)

Liquidity, Capital Resources and Funding Requirements

We have a history of significant operating losses, and incurred negative cash flows from operations since inception through December 31, 2019, and again in the year ended December 31, 2021. As of December 31, 2021, we had an accumulated deficit of $230.0 million.

We have funded our operations to date principally from the sale our equity securities, including our initial public offering and our follow-on public offering, and to a lesser extent, from sales of our software solutions and from upfront payments, research funding and milestone payments from our drug discovery collaborations, and from distributions on account of, or proceeds from the sale of, our equity stakes in our collaborators. Our operating cash flows are impacted by the magnitude and timing of our software sales and by the magnitude and timing of our drug discovery milestone achievements and research funding fees.

As of December 31, 2021, we had cash, cash equivalents and marketable securities of $579.5 million.

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 $209.6 million, after deducting underwriting discounts and commissions and offering expenses borne by us.

On August 17, 2020, we closed a follow-on public offering, in which we sold 5,250,000 shares of common stock at a public offering price of $66.00 per share, resulting in net proceeds to us of $325.6 million, after deducting underwriting discounts and commissions and offering expenses borne by us.

On March 4, 2021, we filed a universal shelf registration statement on Form S-3 which allows us to offer and sell an indeterminate number of shares of common stock, preferred stock, depositary shares or warrants, or an indeterminate principal amount of debt securities, from time to time pursuant to one or more offerings at prices and terms to be determined at the time of the sale. As of December 31, 2021, no securities had been sold under the Form S-3.

We believe our existing cash, cash equivalents and marketable securities will be sufficient to fund our operating expenses and capital expenditure requirements through at least the next 24 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 software 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 drug discovery collaborators and partners. 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.

We plan to utilize the existing cash, cash equivalents and marketable securities on hand primarily to fund our software and drug discovery activities. With respect to our internal programs, as part of our strategy we may choose to enter into collaborations or pursue out-licensing arrangements when we believe it will help maximize the commercial value of any such program.

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. 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.

Our contractual obligations as of December 31, 2021 include operating lease obligations of $132.2 million, consisting of our continuing rent obligations through December 2037, primarily for our principal offices located in New York, New York and Portland, Oregon, which expire in December 2037 and September 2026, respectively. In addition, see Note 6 – Commitments and Contingencies to our consolidated financial statements appearing in Item 8 of this Annual Report for information relating to executed leases that have not yet commenced.

In December 2020, we entered into a five-year agreement with a third-party cloud provider for compute power. The agreement contains a minimum payment obligation, which totals $60 million over the five years after the date we entered into the agreement. There is no 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. These 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.

Cash Flows

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

	Year Ended December 31,		
	2021	2020	2019
	(in thousands)		
Net cash (used in) provided by operating activities	$ (70,669)	$ 16,757	$ (26,059)
Net cash used in investing activities	(16,812)	(381,721)	(53,855)
Net cash provided by financing activities	7,952	541,274	28,684
Net (decrease) increase in cash and cash equivalents and restricted cash	$ (79,529)	$ 176,310	$ (51,230)

Operating activities

During the year ended December 31, 2021, operating activities used approximately $70.7 million in cash primarily resulting from net loss of $101.2 million, which included an $11.4 million non-cash gain from changes in fair value, $26.5 million in stock-based compensation costs and $9.0 million of other non-cash operating expenses included in net loss, including depreciation and investment accretion costs, and a $1.8 million loss on equity investment that is classified as an investing activity. Changes in our operating assets and liabilities provided cash of approximately $4.7 million.

During the year ended December 31, 2020, operating activities provided approximately $16.8 million of cash. Cash provided by operating activities increased primarily from changes in our operating assets and liabilities, which provided cash of approximately $59.2 million primarily due to an increase of $59.7 million in deferred revenue, of which approximately $54.0 million is related to our agreement with BMS, and $12.5 million of non-cash operating expenses included in net loss, including depreciation and stock-based compensation costs. These increases are partially offset by our net loss of $26.6 million and $28.3 million non-cash gain from changes in fair value.

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, 2021, investing activities used approximately $16.8 million of cash, consisting of $22.1 million used for purchases of marketable securities, net of maturities, $7.2 million used for purchases of property and equipment and $3.7 million used to make equity investments in Ajax Therapeutics, Inc. and ShouTi, partially offset by $15.7 million provided by the sale of our equity stake in Relay and $0.4 million provided by the distribution of funds from Petra in connection with the Petra merger.

During the year ended December 31, 2020, investing activities used approximately $381.7 million of cash, primarily for purchases of marketable securities.

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, 2021, financing activities provided approximately $8.0 million of cash, primarily attributable to proceeds from stock option exercises.

During the year ended December 31, 2020, financing activities provided approximately $541.3 million of cash, primarily attributable to proceeds from issuances of our common stock in our initial public and follow-on offerings.

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.

Seasonality

Generally, the first and fourth quarter of each year have typically been our largest quarters 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.

Critical Accounting Policies and Significant Judgments and Critical Accounting Estimates

Critical accounting policies are those that are both most important to the portrayal of a company's financial condition and results, and that require management's most difficult, subjective, and complex judgments, often as a result of the need to make estimates about the effect of matters that are inherently uncertain. 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 and the accompanying notes. We base our estimates on historical experience, known trends and events, and our beliefs of what could occur in the future considering available information. 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 Note 2 – Significant Accounting Policies to our consolidated financial statements appearing in Item 8 of this Annual Report, we believe the following critical accounting estimates used in the preparation of our consolidated financial statements require the most difficult, subjective and complex judgments and estimates and have had, or are reasonably likely to have a material impact on our financial condition or results of operations.

Revenue

We recognize revenue in accordance with ASC 606, Revenue from Contracts with Customers, except for contracts that are within the scope of other standards, such as contribution grants and collaboration arrangements. 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.

Significant management judgment is applied to determine the allocation of the transaction price and measurement of progress, including (1) the constraint on variable consideration, (2) the allocation of the transaction price to the performance obligations using their standalone selling price, or SSP, basis, and (3) the appropriate input or output based method to recognize collaboration revenue and the extent of progress to date.

Variable consideration: Our revenue may include upfront payments for the performance of services in the future, which have both fixed and variable consideration. 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 and development, regulatory or commercial 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;
- commercial milestones and/or commercial royalties; 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 an SSP 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, adjust 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. We recognized $6.3 million, $11.9 million, and $12.1 million from drug discovery milestones for the years ended December 31, 2021, 2020, and 2019, respectively.

Software performance obligations and transaction price allocation: 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, which requires significant judgment based on the nature of each transaction. We allocate the transaction price to each distinct performance obligation on an SSP basis. We determine the SSP using information that includes historical discounting practices, market conditions, cost-plus analysis, and other observable inputs. We typically have more than one SSP for individual performance obligations due to the stratification of those items by classes of customers and circumstances. In these instances, we may use information such as the size and geographic region of the customer in determining the SSP. We may also estimate SSP based on management judgment by considering available data such as internal cost and margin objectives, pricing strategies, market/competitive conditions, historical profitability data, as well as other observable inputs. We establish SSP ranges for our products and services and reassesses them periodically. The determination of SSP required significant management judgment.

Collaboration agreement transaction price allocation and measurement of progress: At the inception of each arrangement, we utilize judgment to assess the nature of the performance obligations to determine whether they are distinct or a single combined performance obligation. We allocate the transaction price to each performance obligation based on the relative SSP of each performance obligation at inception, which will be determined based on each performance obligation's estimated SSP. We determine the SSP at contract inception of the research activities based on internal estimates of the costs to perform the services, inclusive of a reasonable profit margin. Significant judgment is used to determine the inputs for total costs to perform the research activities, which may include the length of time required, the internal hours expected to be incurred on the services and the number and costs of various studies that will be performed by third-parties to complete the research plan. Revenue is recognized on a proportional performance basis over the period of service, using input-based measurements to estimate the performance. Changes to these assumptions may have a material effect on the amount and timing of revenue recognized. We recognized revenue of $14.6 million, $1.0 million, and zero related to collaboration agreements with proportional performance measurement for the years ended December 31, 2021, 2020, and 2019, respectively.

Stock-Based Compensation

Compensation expense related to stock-based transactions, including employee, consultant, and non-employee director stock option awards, is measured and recognized in the consolidated financial statements based on fair value. The fair value of each option award is estimated on the grant date using the Black Scholes option-pricing model. Expense is recognized on a straight-line basis over the vesting period of the award. Forfeitures are accounted for in the period in which the awards are forfeited.

We estimate the fair value of our option awards to employees, directors and non-employees using the Black-Scholes option pricing model, which requires the input of subjective assumptions, including the expected stock price volatility and the calculation of expected term of the award. Due to the lack of complete company-specific historical and implied volatility data for the full expected term of the stock-based awards, we base our estimate of expected volatility on a representative group of publicly traded companies. For these analyses, we selected companies with comparable characteristics to our own, including enterprise value, risk profiles, position within the industry and with historical share price information sufficient to meet the expected life of the stock-based awards. We compute historical volatility data using the daily closing prices for the selected companies' shares during the equivalent period of the calculated expected term of the stock-based awards. We will continue to apply this process until a sufficient amount of historical information regarding the volatility of our own stock price becomes available. We have estimated the expected term of our employee stock option using historical exercise data.

Our weighted average volatility was, 59%, 60% and 57% for the years ended December 31, 2021, 2020, and 2019, respectively, and our expected term was 4.66, 4.49 and 6.05 for the years ended December 31, 2021, 2020, and 2019, respectively.

We will continue to use judgment in evaluating the assumptions related to our stock-based compensation on a prospective basis. As we continue to accumulate additional data related to our common stock, we may have refinements to our estimates, which could materially impact our future stock-based compensation expense.

Recent Accounting Pronouncements

See Note 2 to our consolidated financial statements appearing elsewhere in this Annual Report for a discussion of recently issued 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 bonds and a money market fund that is invested in U.S. Treasury and corporate bonds. 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 bank accounts denominated in Japanese yen, British pound sterling, Indian rupee, and Korean Republic won 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, 2021, 2020, and 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, 2021, 2020, and 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, 2021 and 2020, the related consolidated statements of operations, comprehensive loss, convertible preferred stock and stockholders' equity (deficit), and cash flows for each of the years in the three-year period ended December 31, 2021, 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, 2021 and 2020, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2021, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated February 24, 2022 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

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 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.

Critical Audit Matters

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

Estimation of total costs to perform for Bristol-Myers Squibb Company collaboration and license agreement

As discussed in Note 3(c) to the consolidated financial statements, the Company recorded revenue of $13.7 million during the year ended December 31, 2021 related to the Bristol-Myers Squibb Company ("BMS") collaboration and license agreement on a proportional performance basis. The Company measures progress towards completion at the end of each reporting period based on measuring proportional performance. The proportional performance is determined using input-based measurements of total costs of research activities incurred for the agreement relative to the total estimate of costs of research activities for the agreement.

We identified the estimation of total costs to perform research activities for the BMS collaboration and license agreement as a critical audit matter. There was subjective auditor judgment in evaluating the Company's estimate of total costs to perform research activities.

The following are the primary procedures we performed to address this critical audit matter. We evaluated the design and tested the operating effectiveness of certain internal controls related to the Company's process to account for the BMS collaboration and license agreement, including controls related to the determination of total costs to perform research activities. We evaluated the Company's estimate of costs to be incurred by:

— Comparing the estimated length of time required to complete the research plan to both industry publications and actual time incurred to complete the various phases for a selection of the Company's other research programs

— Comparing the estimated internal employee hours and external contract research organizations costs to be incurred by phase to other research programs completed by the Company

—Attending the quarterly forecast review meetings to evaluate factors impacting total costs to perform research activities

— Inspecting minutes of Joint Steering Committee meetings between the Company and BMS to evaluate factors impacting total costs to perform research activities and compared it with the outcome of the inquiries stated above

Identification of performance obligations in complex or unusual software revenue arrangements

As discussed in Note 3(a) to the consolidated financial statements, the Company reported on-premise software revenue of $74.6 million and hosted software revenue of $11.1 million for the year ended December 31, 2021. As discussed in Note 3(d), the Company's contracts with customers often include promises to transfer multiple software products and services, including training, professional services, technical support services, and rights to unspecified updates. At contract inception, the Company assesses the products and services promised within each contract to identify distinct performance obligations that should be accounted for separately.

We identified the determination of distinct performance obligations in complex or unusual software revenue arrangements as a critical audit matter. There was subjective auditor judgment in evaluating whether promised products and services in complex or unusual software revenue arrangements are separate performance obligations or inputs into a combined performance obligation.

The following are the primary procedures we performed to address this critical audit matter. We evaluated the design and tested the operating effectiveness of certain internal controls related to the software revenue process, including controls related to the determination of distinct performance obligations. For a selection of complex or unusual software revenue arrangements, we evaluated whether the performance obligations identified by the Company were capable of being distinct in the context of the contract by obtaining an understanding of the Company's product and service offerings, obtaining and inspecting contracts, and evaluating the application of the revenue recognition accounting guidance for the selected contract.

/s/ KPMG LLP

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

Portland, Oregon
February 24, 2022

Report of Independent Registered Public Accounting Firm

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

Opinion on Internal Control Over Financial Reporting

We have audited Schrödinger, Inc. and subsidiaries' (the Company) internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2021 and 2020, the related consolidated statements of operations, comprehensive loss, convertible preferred stock and stockholders' equity (deficit), and cash flows for each of the years in the three-year period ended December 31, 2021, and the related notes (collectively, the consolidated financial statements), and our report dated February 24, 2022 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Annual Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ KPMG LLP

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

Portland, Oregon
February 24, 2022

SCHRÖDINGER, INC. AND SUBSIDIARIES

Consolidated Balance Sheets

(in thousands, except for share and per share amounts)

Assets	December 31, 2021	December 31, 2020
Current assets:		
Cash and cash equivalents	$ 120,267	$ 202,296
Restricted cash	3,000	500
Marketable securities	456,212	440,395
Accounts receivable, net of allowance for doubtful accounts of $108 and $60	31,744	31,423
Unbilled and other receivables, net for allowance for unbilled receivables of $30 and $0	8,807	3,955
Prepaid expenses	5,030	4,409
Total current assets	625,060	682,978
Property and equipment, net	10,025	5,140
Equity investments	43,167	45,664
Right of use assets	75,384	10,129
Other assets	2,851	2,352
Total assets	$ 756,487	$ 746,263
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 8,079	$ 8,398
Accrued payroll, taxes, and benefits	18,405	12,000
Deferred revenue	55,368	45,403
Lease liabilities	2,042	4,543
Other accrued liabilities	7,317	2,861
Total current liabilities	91,211	73,205
Deferred revenue, long-term	30,064	41,164
Lease liabilities, long-term	77,827	7,221
Other liabilities, long-term	300	654
Total liabilities	199,402	122,244
Commitments and contingencies (Note 6)		
Stockholders' equity:		
Preferred stock, $0.01 par value. Authorized 10,000,000 shares; zero shares issued and outstanding at December 31, 2021 and December 31, 2020, respectively	—	—
Common stock, $0.01 par value. Authorized 500,000,000 shares; 61,834,515 and 60,713,534 shares issued and outstanding at December 31, 2021 and December 31, 2020, respectively	618	607
Limited common stock, $0.01 par value. Authorized 100,000,000 shares; 9,164,193 shares issued and outstanding at December 31, 2021 and December 31, 2020, respectively	92	92
Additional paid-in capital	786,964	752,558
Accumulated deficit	(229,952)	(129,559)
Accumulated other comprehensive (loss) income	(651)	317
Total stockholders' equity of Schrödinger stockholders	557,071	624,015
Noncontrolling interest	14	4
Total stockholders' equity	557,085	624,019
Total liabilities and stockholders' equity	$ 756,487	$ 746,263

See accompanying notes to consolidated financial statements.

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

	Year Ended December 31,		
	2021	2020	2019
Revenues:			
Software products and services	$ 113,236	$ 92,530	$ 66,735
Drug discovery	24,695	15,565	18,808
Total revenues	137,931	108,095	85,543
Cost of revenues:			
Software products and services	26,495	18,003	13,646
Drug discovery	45,816	26,620	22,804
Total cost of revenues	72,311	44,623	36,450
Gross profit	65,620	63,472	49,093
Operating expenses:			
Research and development	90,904	64,695	39,404
Sales and marketing	22,150	17,795	21,364
General and administrative	64,009	41,898	27,040
Total operating expenses	177,063	124,388	87,808
Loss from operations	(111,443)	(60,916)	(38,715)
Other income:			
(Loss) gain on equity investments	(1,781)	4,108	943
Change in fair value	11,359	28,263	9,922
Interest income	1,057	2,253	1,878
Total other income	10,635	34,624	12,743
Loss before income taxes	(100,808)	(26,292)	(25,972)
Income tax expense (benefit)	411	345	(291)
Net loss	(101,219)	(26,637)	(25,681)
Net loss attributable to noncontrolling interest	(826)	(2,174)	(1,110)
Net loss attributable to Schrödinger common and limited common stockholders	$ (100,393)	$ (24,463)	$ (24,571)
Net loss per share attributable to Schrödinger common and limited common stockholders, basic and diluted:	$ (1.42)	$ (0.41)	$ (4.09)
Weighted average shares used to compute net loss per share attributable to Schrödinger common and limited common stockholders, basic and diluted:	70,594,950	60,024,658	6,004,500

See accompanying notes to consolidated financial statements.

SCHRÖDINGER, INC. AND SUBSIDIARIES
Consolidated Statements of Comprehensive Loss
(in thousands)

	Year Ended December 31,		
	2021	2020	2019
Net loss attributable to Schrödinger common and limited common stockholders	$ (100,393)	$ (24,463)	$ (24,571)
Changes in market value of investments, net of tax:			
Unrealized (loss) gain on marketable securities	(968)	301	25
Comprehensive loss	$ (101,361)	$ (24,162)	$ (24,546)

See accompanying notes to consolidated financial statements.

SCHRÖDINGER, INC. AND SUBSIDIARIES

Consolidated Statements of Convertible Preferred Stock and Stockholders' Equity (Deficit)

(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		Limited common stock		Additional paid-in	Accumulated	Accumulated other comprehensive	Non controlling	Total stockholders'
	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	capital	deficit	loss (income)	interest	equity (deficit)
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 upon stock option exercise	—	—	—	—	—	—	—	—	—	—	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)
Change in unrealized loss on marketable securities	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	301	—	301
Issuances of common stock upon stock option exercise	—	—	—	—	—	—	—	—	—	—	1,398,177	14	—	—	4,169	—	—	—	4,183
Stock-based compensation	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10,545	—	—	—	10,545
Issuances of common stock upon initial public offering, net of issuance costs of $22,667	—	—	—	—	—	—	—	—	—	—	13,664,704	136	—	—	209,497	—	—	—	209,633
Issuances of common stock upon follow-on offering, net of issuance costs of $20,901	—	—	—	—	—	—	—	—	—	—	5,250,000	53	—	—	325,547	—	—	—	325,600
Conversion of convertible preferred stock into common stock	(73,795,777)	(109,270)	(17,844,124)	(9,928)	—	—	—	—	(134,704,785)	(30,626)	30,278,832	303	—	—	149,521	—	—	—	149,824
Exchange of convertible preferred stock into limited common stock	—	—	(21,696,487)	(12,072)	(47,242,235)	(19,844)	(29,468,101)	(9,840)	—	—	—	—	13,164,193	132	41,624	—	—	—	41,756
Conversion of limited common stock into common stock	—	—	—	—	—	—	—	—	—	—	4,000,000	40	(4,000,000)	(40)	—	—	—	—	—
Contributions by non-controlling interest	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	2,137	2,137
Net loss	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(24,463)	—	(2,174)	(26,637)
Balance at December 31, 2020	—	—	—	—	—	—	—	—	—	—	60,713,534	607	9,164,193	92	752,558	(129,559)	317	4	624,019

Change in unrealized loss on marketable securities	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(968)	—	(968)
Issuances of common stock upon stock option exercise	—	—	—	—	—	—	—	—	—	—	1,120,981	11	—	—	7,916	—	—	—	7,927
Stock-based compensation	—	—	—	—	—	—	—	—	—	—	—	—	—	—	26,490	—	—	—	26,490
Contributions by non-controlling interest	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	—	836	836
Net loss	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(100,393)	—	(826)	(101,219)
Balance at December 31, 2021	—	$ —	—	$ —	—	$ —	—	$ —	—	$ —	61,834,515	$ 618	9,164,193	$ 92	$ 786,964	$ (229,952)	$ (651)	$ 14	$ 557,085

See accompanying notes to consolidated financial statements.

SCHRÖDINGER, INC. AND SUBSIDIARIES

Consolidated Statements of Cash Flows

(in thousands)

	Year Ended December 31,		
	2021	2020	2019
Cash flows from operating activities:			
Net loss	$ (101,219)	$ (26,637)	$ (25,681)
Adjustments to reconcile net loss to net cash (used in) provided by operating activities:			
Loss (gain) on equity investments	1,781	(4,108)	(943)
Noncash revenue from equity investments	(107)	(397)	(186)
Fair value adjustments	(11,359)	(28,263)	(9,922)
Depreciation	2,847	3,658	3,640
Stock-based compensation	26,490	10,545	2,193
Noncash research and development expenses	811	2,137	1,051
Noncash investment accretion	5,270	646	(506)
Loss on disposal of property and equipment	140	—	—
Decrease (increase) in assets:			
Accounts receivable, net	(321)	(12,747)	(5,038)
Unbilled and other receivables	(5,187)	3,468	(1,556)
Reduction in the carrying amount of right of use assets	5,799	5,342	4,177
Prepaid expenses and other assets	(1,121)	187	410
(Decrease) increase in liabilities:			
Accounts payable	(411)	4,882	(294)
Accrued payroll, taxes, and benefits	6,405	4,966	2,948
Deferred revenue	(1,028)	59,705	6,715
Lease liabilities	(2,949)	(5,417)	(4,025)
Other accrued liabilities	3,490	(1,210)	958
Net cash (used in) provided by operating activities	(70,669)	16,757	(26,059)
Cash flows from investing activities:			
Purchases of property and equipment	(7,167)	(2,538)	(1,836)
Purchases of equity investments	(3,700)	(2,869)	—
Distribution from equity investment	375	4,582	943
Proceeds from sale of equity investments	15,735	—	—
Purchases of marketable securities	(414,802)	(519,668)	(110,187)
Proceeds from sale and maturity of marketable securities	392,747	138,772	57,225
Net cash used in investing activities	(16,812)	(381,721)	(53,855)
Cash flows from financing activities:			
Issuances of common stock upon initial public offering, net	—	211,491	—
Issuances of common stock upon follow-on public offering, net	—	325,600	—
Issuances of Series E preferred stock, net	—	—	29,893
Issuances of common stock upon stock option exercise	7,927	4,183	549
Contribution by noncontrolling interest	25	—	100
Deferred offering costs	—	—	(1,858)
Net cash provided by financing activities	7,952	541,274	28,684
Net (decrease) increase in cash and cash equivalents and restricted cash	(79,529)	176,310	(51,230)
Cash and cash equivalents and restricted cash, beginning of year	202,796	26,486	77,716
Cash and cash equivalents and restricted cash, end of year	$ 123,267	$ 202,796	$ 26,486
Supplemental disclosure of cash flow and noncash information			
Cash paid for income taxes	$ 448	$ 381	$ 139
Supplemental disclosure of non-cash investing and financing activities			
Accrued deferred offering costs	—	—	2,142
Purchases of property and equipment in accounts payable	705	8	90
Acquisitions of right of use assets in exchange for lease obligations	71,054	2,709	464
Right of use assets recognized on adoption	—	—	16,475
Reclassification of deferred financing costs to additional paid-in capital	—	1,858	—

See accompanying notes to consolidated financial statements.

SCHRÖDINGER, INC. AND SUBSIDIARIES

Notes to Consolidated Financial Statements

For the years ended December 31, 2021, 2020, and 2019

(in thousands, except for share and per share amounts)

(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 and development programs in collaboration with biopharmaceutical companies. In addition, the Company uses its platform to advance a pipeline of internal drug discovery programs.

On February 10, 2020, the Company completed an initial public offering ("IPO"), in which the Company issued and sold 11,882,352 shares of its common stock at a public offering price of $17.00 per share. The underwriters fully exercised their option to purchase an additional 1,782,352 shares of the Company's common stock at the public offering price less underwriting discounts. The Company raised $209.6 million in net proceeds after deducting underwriting discounts and commissions and offering expenses payable by the Company.

Immediately prior to the closing of the IPO, preferred stockholders voluntarily exchanged 98,406,823 shares of preferred stock for an aggregate of 13,164,193 shares of limited common stock. In addition, upon the closing of the IPO, the remaining 226,344,686 shares of preferred stock automatically converted into an aggregate of 30,278,832 shares of common stock.

On August 17, 2020, the Company completed a follow-on public offering, in which the Company issued and sold 4,500,000 shares of its common stock at a public offering price of $66.00 per share. The underwriters fully exercised their option to purchase an additional 750,000 shares of the Company's common stock at the public offering price less underwriting discounts. The Company raised $325.6 million in net proceeds after deducting underwriting discounts and commissions and offering expenses payable by the Company. In addition, a stockholder of the Company sold 500,000 shares of common stock. The Company did not receive any proceeds from the sale of shares of common stock by the selling stockholder.

(2) Significant Accounting Policies

(a) Recently Issued Accounting Pronouncements

In January 2020, the Financial Accounting Standards Board ("FASB") issued Accounting Standard Update ("ASU") No. 2020-01, *Investments—Equity Securities* (Topic 321), *Investments—Equity Method and Joint Ventures* (Topic 323), *and Derivatives and Hedging* (Topic 815) *—Clarifying the Interactions between Topic 321, Topic 323, and Topic 815*, which clarifies the accounting related to equity investments and derivatives. This guidance was effective for the Company in the first quarter of 2021 on a prospective basis, and early adoption was permitted. The Company adopted this new standard effective January 1, 2021 with no material impact on its consolidated financial statements.

In August 2018, the FASB issued ASU No. 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 adopted this new standard effective January 1, 2021 with no material impact on its consolidated financial statements.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments-Credit Losses* (Topic 326) – *Measurement of Credit Losses on Financial Instruments*, which requires the measurement and recognition of expected credit losses for financial assets held at amortized cost. ASU No. 2016-13 replaces the existing incurred loss impairment model with an expected loss model which requires the use of forward-looking information to calculate credit loss estimates. It also eliminates the concept of other-than-temporary impairment and requires credit losses related to certain available-for-sale debt securities to be recorded through an allowance for credit losses rather than as a reduction in the amortized cost basis of the securities. These changes generally result in earlier recognition of credit losses. The Company adopted this new standard effective January 1, 2021 with no material impact on its consolidated financial statements.

In October 2021, the FASB issues ASU No. 2021-08, *Business Combinations* (Topic 805) – *Accounting for Contract Assets and Contract Liabilities from Contracts with Customers*, which requires the measurement and recognition of contract assets and contract liabilities acquired in a business combination in accordance with Accounting Standard Codification ("ASC") 606, *Revenue from Contracts with Customers* (Topic 606). This update replaces the existing guidance requiring contract assets and contract liabilities to be measured and recognized at fair value. The standard is effective on a prospective basis for annual periods beginning after December 15, 2022, including interim periods within the fiscal year, with early adoption permitted. The Company plans to early adopt this new standard effective January 1, 2022 and does not expect a material impact on its consolidated financial statements.

(b) 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 reported amounts of assets and liabilities, disclosure of contingent assets and liabilities at the date of the consolidated financial statements, and the reported amounts of revenues and expenses during the reporting period. Significant estimates include the assumptions used in the allocation of revenue, estimates regarding the progress of completing performance obligations under collaboration agreements, and the valuation of stock-based compensation. Actual results could differ from those estimates, and such differences may be material to the consolidated financial statements.

(c) Principles of Consolidation

The Company's consolidated financial statements include the accounts of Schrödinger, Inc., its wholly owned subsidiaries, and its variable interest entity. 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.

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

Included in cash and cash equivalents were cash equivalents of $90,477 and $185,614 as of December 31, 2021 and 2020, 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 90 days 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 cash with high-credit quality financial institutions.

Restricted cash consists of letters 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 letters of credit.

(e) 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, 2021 and 2020. Interest is not charged on accounts receivable.

(f) 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.

(g) Property and Equipment

Property and equipment are stated at cost. The Company did not capitalize any interest during 2021 and 2020. 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.

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

Long-lived assets, such as property and equipment 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, 2021, 2020, and 2019.

(i) 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.

(j) 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 new 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 flows, and results of operations.

As of December 31, 2021, three customers accounted for 17%, 15%, and 11% of total accounts receivable, respectively. As of December 31, 2020, two customers accounted for 17% and 14% of total accounts receivable, respectively. For the year ended December 31, 2021, one customer accounted for 14% of total revenues. For the year ended December 31, 2020, 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.

(k) 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 $9,826, $7,663, and $7,352 for the years ended December 31, 2021, 2020, and 2019, respectively.

(l) 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.

(m) 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 2021, 2020, or 2019.

(n) 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.

(o) Commissions

Commissions represent a component of sales and marketing expense and consist of the variable compensation paid to the Company's sales representatives. 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 representatives are recoverable only in the case that the Company cannot collect against any invoiced fee associated with a sales order. Commission expense was $1,829, $1,362, and $754 in 2021, 2020, and 2019, respectively.

(p) 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 of being sustained. Interest and penalties accrued on unrecognized tax benefits are included within income tax expense in the consolidated financial statements.

(q) Comprehensive Loss

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

(r) Equity Investments

In the normal course of business, the Company has entered, and may continue to enter, into collaboration agreements with private companies to perform drug design services for such companies in exchange for equity ownership stakes in such companies. If it is determined that the Company has control over the investee, the investee is consolidated in the financial statements. If the investee is consolidated with the Company and less than 100% of the equity is owned by the Company, the Company will present non-controlling interest to represent the portion of the investee owned by other investors. If it is determined that the Company does not have control over the investee, the Company evaluates the investment for the ability to exercise significant influence.

Equity investments over which the Company has significant influence may be accounted for under equity method accounting in accordance with ASC Topic 323, Equity Method and Joint Ventures. If it is determined that the Company does not have significant influence over the investee, and there is no readily determinable fair value for the investment, the equity investment may be accounted for at cost minus impairment in accordance with ASC Topic 321, Equity Securities.

For further information regarding the Company's equity investments, see Note 5, Fair Value Measurements, Note 10, Noncontrolling Interest, and Note 12, Equity Investments.

(s) Net (Loss) Income per Share Attributable to Common and Limited Common Stockholders

The outstanding equity of the Company consists of common stock and limited common stock. Under the Company's certificate of incorporation, the rights of the holders of common stock and limited common stock are identical, except with respect to voting and conversion. Holders of limited common stock are precluded from voting such shares in any election of directors or on the removal of directors. Limited common stock may be converted into common stock at any time at the option of the stockholder.

Undistributed earnings allocated to the participating securities are subtracted from net income in determining net (loss) income attributable to common and limited common stockholders. Basic net (loss) income per share is computed by dividing net (loss) income attributable to common and limited common stockholders by the weighted-average number of shares of common and limited common stock outstanding during the period.

For the calculation of diluted net income, net income attributable to common and limited common stockholders for basic net income is adjusted by the effect of dilutive securities, including awards under the Company's equity compensation plans. Diluted net income per share attributable to common and limited common stockholders is computed by dividing the resulting net income attributable to common and limited common stockholders by the weighted-average number of fully diluted shares of common and limited common stock outstanding.

(3) 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:

	Year Ended December 31,		
	2021	2020	2019
Software products and services – point in time	55.5%	55.0%	49.9%
Software products and services – over time	26.6	30.6	28.1
Drug Discovery – point in time	3.3	6.7	8.6
Drug Discovery – over time	14.6	7.7	13.4

(a) Software

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 ("SSP") 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 five sources: (i) on-premise software license fees, (ii) hosted software subscription fees, (iii) software maintenance fees, (iv) professional services fees, and (v) contributions.

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 or their own cloud instances 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 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 or annually.

Hosted software. Hosted software revenue consists primarily of fees to provide the Company's customers with hosted licenses, which allows these customers to access the Company's cloud-based software solution on their own hardware without taking control of licenses. Hosted software 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 training, technical support, installation, or assisting customers with modeling, generally are not related to the core functionality of the Company's software and are recognized as revenue when resources are consumed. The Company has historically estimated project status with relative accuracy, although 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.

Software contribution revenue. Software contribution revenue consists of funds received under a non-reciprocal agreement with Gates Ventures, LLC. The agreement is an unconditional non-exchange contribution without restrictions and the initial contribution was invoiced upon execution of the agreement. Revenue was recognized upon execution of the agreement and on the first anniversary of the agreement when invoiced in accordance with ASC Topic 958, *Not-for-Profit Entities* as the agreement is not an exchange transaction.

The agreement with Gates Ventures, LLC covers the period from June 23, 2020 through June 22, 2023 for total consideration of up to $3,000. The Company received $1,000 in connection with its entry into the agreement in the second quarter of 2020, and $1,000 in the second quarter of 2021 on the first anniversary of its entry into the agreement. The Company is also entitled to receive an additional $1,000 payment on or around the second anniversary of the agreement, subject to the Company providing certain progress reports to the Trustees of Columbia University in the City of New York. As of December 31, 2021, the Company had no deferred revenue balance related to this agreement.

The following table presents the revenue recognized from the sources of software products and services revenue:

	Year Ended December 31,		
	2021	2020	2019
On-premise software	$ 74,598	$ 58,311	$ 42,647
Hosted software	11,076	9,192	7,418
Software maintenance	17,294	14,465	11,643
Professional services	9,268	9,562	5,027
Revenue from contracts with customers	112,236	91,530	66,735
Software contribution	1,000	1,000	—
Total software revenue	$ 113,236	$ 92,530	$ 66,735

(b) Drug Discovery

Drug discovery services. 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, 2021, 2020, and 2019, milestones not yet achieved that were determined to be probable of achievement totaled $2,250, $250, and $1,500, respectively, and $2,250, $85, and $1,500 of those milestones were recognized as revenue for the years ended December 31, 2021, 2020, and 2019.

Drug discovery contribution revenue. Drug discovery contribution revenue consists of funds received under an agreement with Bill and Melinda Gates Foundation on a cost reimbursement basis, to perform services aimed at accelerating drug discovery in women's health, which began in November 2021. Revenue is recognized as conditions are met in accordance with ASC Topic 958, *Not-for-Profit Entities.* As of December 31, 2021, there was a $1,129 deferred revenue balance related to this agreement.

	Year Ended December 31,		
	2021	2020	2019
Drug discovery services revenue from contracts with customers	$ 24,584	$ 15,565	$ 18,808
Drug discovery contribution	111	—	—
Total drug discovery revenue	$ 24,695	$ 15,565	$ 18,808

(c) Collaboration and License Agreement

On November 22, 2020, the Company entered into an exclusive, worldwide collaboration and license agreement with Bristol-Myers Squibb Company ("BMS"), pursuant to which the Company and BMS have agreed to collaborate in the discovery, research and preclinical development of new small molecule compounds for disease indications in oncology, neurology, and immunology therapeutics areas. The Company will be responsible, at its own cost and expense, for the discovery of small molecule compounds directed to five specified biological targets pursuant to a mutually agreed research plan for each such target. The initial targets included HIF-2 alpha and SOS1/KRAS, which were two of the Company's internal programs. In November 2021, the Company and BMS mutually agreed to replace the HIF-2 alpha target with another precision oncology target. Following the replacement election, all rights to the HIF-2 alpha target program reverted to us. Once a development candidate meeting specified criteria for a target under the agreement has been identified by the Company, BMS will be solely responsible for the further development, manufacturing and commercialization of such development candidate at its own cost and expense.

Under the terms of the agreement, BMS paid the Company an initial upfront fee payment of $55,000. The Company also is entitled to receive up to $2,700,000 in total milestone payments across all potential targets, consisting of: a) up to $585,000 in milestone payments per oncology target, including $360,000 in the aggregate for the achievement of certain specified research, development, and regulatory milestones and $225,000 in the aggregate for the achievement of certain specified commercial milestones; and b) up to $482,000 in milestone payments per neurology and immunology target, including $257,000 in the aggregate for the achievement of certain specified research, development, and regulatory milestones and $225,000 in the aggregate for the achievement of certain specified commercial milestones.

The Company is also entitled to a tiered percentage royalty on annual net sales ranging from mid-single digits to low-double digits, subject to certain specified reductions. Royalties are payable by BMS on a licensed product-by-licensed product and country-by-country basis until the later of the expiration of the last valid claim covering the licensed product in such country, expiration of all applicable regulatory exclusivities in such country for such licensed product and the tenth anniversary of the first commercial sale of such licensed product in such country.

The Company assessed the collaboration and license agreement in accordance with ASC 606 and concluded that BMS is a customer based on the agreement structure. At inception, the Company identified one performance obligation for each of the five programs under the agreement, which includes research activities for each program and a license grant for the underlying intellectual property. The Company determined that the license grant for intellectual property is not separable from the research activities, as the research activities are expected to significantly modify or enhance the license grant over the period of service, and therefore are not distinct in the context of the contract.

The Company determined that the transaction price at the onset of the agreement is $55,000. Additional consideration to be paid to the Company upon the achievement of future milestone payments were excluded from the transaction price as they represent milestone payments that are not considered probable as of the inception date such that there is not a significant risk of revenue reversal.

The Company has allocated the transaction price of $55,000 to each performance obligation based on the SSP of each performance obligation at inception, which was determined based on each performance obligation's estimated standalone selling price. The Company determined the estimated standalone selling price at contract inception of the research activities based on internal estimates of the costs to perform the services, inclusive of a reasonable profit margin. Significant inputs used to determine the total costs to perform the research activities included the length of time required, the internal hours expected to be incurred on the services and the number and costs of various studies that will be performed to complete the research plan.

Revenue associated with the research activities is recognized on a proportional performance basis over the period of service for research activities, using input-based measurements of total costs of research incurred to estimate the proportion performed. Progress towards completion is remeasured at the end of each reporting period.

During the years ended December 31, 2021 and 2020, the Company recognized $13,749 and $988, respectively, associated with the agreement based on the research activities performed. As of December 31, 2021 and 2020, there was $40,263 and $54,012 of deferred revenue related to the agreement, which was classified as either current or non-current in the consolidated balance sheet based on the period the services are expected to be performed. There was no outstanding receivable for this collaboration as of December 31, 2021.

(d) Significant Judgments

Significant judgments and estimates are required under ASC 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 services, including training, 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 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 both the 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.

Judgment is required to determine the total costs to perform research activities, which include the length of time required, the internal hours expected to be incurred on the services, and the number and costs of various studies that may be performed by third-parties to complete the research plan.

Generally, the Company has not experienced significant returns or refunds to customers.

The Company's estimates related to revenue recognition require significant judgment and a change in these estimates could have an effect on the Company's results of operations during the periods involved.

(e) 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. A deferred revenue liability is recorded 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 where the milestones are deemed probable in a period prior to when the milestone is achieved, the Company records a contract asset for the full value of the milestone.

Contract assets are included in unbilled and other receivables within the consolidated balance sheets and are transferred to receivables when the Company invoices the customer.

Contract balances were as follows:

	As of December 31, 2021	As of December 31, 2020
Contract assets	$ 8,271	$ 3,589
Deferred revenue, short-term:		
Software products and services	32,945	28,218
Drug discovery	22,423	17,185
Deferred revenue, long-term:		
Software products and services	3,938	1,976
Drug discovery	26,126	39,188

For the years ended December 31, 2021 and 2020, respectively, the Company recognized $42,127 and $24,921 of revenue that was included in deferred revenue at the end of the preceding period. 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 65% of its December 31, 2021 deferred revenue balance in the next 12 months 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 $26,694 as of December 31, 2021.

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.

(f) Deferred Sales Commissions

The Company has applied the practical expedient for sales commission expense, as any material compensation paid to sales 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.

(4) Property and Equipment

Property and equipment consisted of the following:

	As of December 31,	
	2021	2020
Computers and equipment	$ 16,059	$ 12,718
Leasehold improvements	2,276	4,385
Furniture and fixtures	4,045	1,839
	22,380	18,942
Less accumulated depreciation	(12,355)	(13,802)
	$ 10,025	$ 5,140

Depreciation expense for 2021, 2020, and 2019 was $2,847, $3,658, 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.

(5) Fair Value Measurements

Various inputs are used in determining the fair value of the Company's financial assets and liabilities. These inputs 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 consist 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, 2021 and 2020. The following table presents information about the Company's assets and liabilities measured at fair value as of December 31, 2021:

	Level 1	Level 2	Level 3	Total
Assets:				
Marketable securities	$ —	$ 456,212	$ —	$ 456,212
Equity investments	39,561	—	1,887	41,448
Total	$ 39,561	$ 456,212	$ 1,887	$ 497,660

The following table presents information about the Company's assets and liabilities measured at fair value as of December 31, 2020:

	Level 1	Level 2	Level 3	Total
Assets:				
Marketable securities	$ —	$ 440,395	$ —	$ 440,395
Equity investments	45,570	—	—	45,570
Total	$ 45,570	$ 440,395	$ —	$ 485,965

Fair value of the Company's investments in Nimbus Therapeutics, LLC ("Nimbus") and ShouTi Inc. ("ShouTi"), classified as Level 3 in the fair value hierarchy, was determined under the hypothetical liquidated book value method ("HLBV method"), as further described in Note 12, Equity Investments. Significant unobservable inputs used under the HLBV method include Nimbus' and ShouTi's annual financial statements and the Company's respective liquidation priorities. The following table sets forth changes in fair value of the Company's Level 3 investments:

	Amount
As of December 31, 2019	$ 108
Cash contributions	2,869
Unrealized loss	(2,977)
As of December 31, 2020	-
Cash contributions	2,000
Unrealized loss	(113)
As of December 31, 2021	$ 1,887

Unrealized gains and 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. During the years ended December 31, 2021 and 2020, there were no transfers between Level 1, Level 2 and Level 3 investments. 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 2037. The Company has elected the package of practical expedients under the transition guidance of ASC Topic 842, *Leases*, to exclude short-term leases from the balance sheet and to combine lease and non-lease components.

Upon inception of a lease, 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.

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. Upon execution of a new lease, the Company performs an analysis to determine its incremental borrowing rate using its current borrowing rate, adjusted for various factors including level of collateralization and lease term. As of December 31, 2021, the remaining weighted average lease term was 15 years.

During the year ended December 31, 2021, the accounting commencement began for two new leases, which increased the right-of-use ("ROU") assets and lease liabilities by $71,054. ROU assets and lease liabilities were equal as no lease costs or incentives were associated with acquiring the leases.

On November 1, 2021, the Company entered into an office lease agreement for 16,727 square feet of office space located at One Main Street, Cambridge, Massachusetts. Under the terms of the agreement, the Company will pay base rent of approximately $135 per month with a 3% annual rental escalation. The Company estimates that the lease commencement date will occur during the three months ending June 30, 2022 and continue to the end of the lease, which is 10 years after commencement.

On November 30, 2021, the Company entered into an office lease agreement for 19,753 square feet of office space located at Salarpuria Sattva, Knowledge City, Hyderabad, India. Under the terms of the agreement, the Company will pay base rent of approximately $20 per month from commencement to handover date and $29 per month from handover date to termination of the lease. The Company estimates that the lease handover and commencement dates will occur during the three months ending March 31, 2022 and continue to the end of the lease in June 2023.

Variable and short-term lease costs were immaterial for the year ended December 31, 2021. Additional details of the Company's operating leases are presented in the following table:

	Year Ended December 31,		
	2021	2020	2019
Operating lease costs	$ 7,627	$ 5,895	$ 5,181
Cash paid for operating leases	4,561	6,050	5,108

Maturities of operating lease liabilities as of December 31, 2021 under noncancelable operating leases were as follows:

Year ending December 31:	
2022	$ 2,087
2023	8,809
2024	9,632
2025	9,241
2026	8,758
Thereafter	93,656
Total future minimum lease payments	132,183
Less: imputed interest	(52,314)
Present value of future minimum lease payments	79,869
Less: current portion of operating leases payments	(2,042)
Lease liabilities, long-term	$ 77,827

(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,		
	2021	2020	2019
Current:			
Federal	$ —	$ —	$ 583
State	67	178	(95)
Foreign	344	167	(779)
Current income tax expense (benefit)	411	345	(291)
Deferred:			
Federal	—	—	—
State	—	—	—
Deferred income tax expense (benefit)	—	—	—
	$ 411	$ 345	$ (291)

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

	Year ended December 31,		
	2021	2020	2019
United States	$ (101,341)	$ (24,567)	$ (25,385)
Foreign	1,359	449	523
Loss before income taxes	$ (99,982)	$ (24,118)	$ (24,862)

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

	Year ended December 31,		
	2021	2020	2019
Statutory federal income tax rate	21.0%	21.0%	21.0%
State taxes, net of federal benefits	4.9	14.2	4.2
Withholding tax	—	—	(2.3)
Section 162(m) limitation	(5.2)	(12.8)	—
Stock compensation	12.4	68.5	0.2
Return-to-provision adjustments	(1.7)	(1.3)	3.2
Research and development credit	6.3	6.2	5.2
Tax contingencies, net of reversals	(0.7)	(0.6)	(0.5)
Change in valuation allowance	(37.2)	(95.0)	(31.3)
Other	(0.2)	(1.6)	(0.6)
Effective income tax rate	(0.4)%	(1.4)%	(0.9)%

The income tax expense for the years ended December 31, 2021 and December 31, 2020 primarily related to state taxes and taxes in foreign jurisdictions. Income tax benefit for the year ended December 31, 2019 primarily related to alternative minimum tax credits previously utilized that are refundable under the Tax Cuts and Jobs Act of 2017 (the "2017 Tax Act").

The total change in valuation allowance for the year ended December 31, 2021 was $37,149, 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,		
	2021	2020	2019
Deferred income tax assets:			
Net operating loss carryforwards	$ 67,985	$ 51,498	$ 26,119
Accrued expenses	10,309	7,918	6,164
Deferred Revenue	10,632	394	500
Lease Liabilities	18,773	2,165	433
Credits	14,559	8,752	7,468
Gross deferred tax assets	122,258	70,727	40,684
Less valuation allowance	(95,304)	(58,155)	(35,251)
Net deferred tax assets	26,954	12,572	5,433
Deferred income tax liabilities:			
Unrealized gain on equity investments	(8,545)	(10,185)	(1,984)
Prepaid expenses	(969)	(889)	(441)
Depreciation and amortization	(17,440)	(1,498)	(3,008)
Net deferred income tax assets	$ —	$ —	$ —

As of December 31, 2021, the Company had federal and state net operating loss ("NOL") carryforwards of $283,314 and $148,130, respectively. These carryforwards, with the exception of federal NOLs generated post 2017, will expire between 2022 and 2041 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, 2021, the Company had federal and state research and development tax credit carryforwards of $15,459 and $977, respectively. These carryforwards will expire between 2022 and 2041 if not used by the Company to reduce income taxes payable in future periods.

Pursuant to Internal Revenue Code Sections 382 and 383, the utilization of NOLs and other tax attributes may be substantially limited due to cumulative changes in ownership greater than 50% that may have occurred or could occur during applicable testing periods. The Company has performed an analysis through March 31, 2021 and

determined that such an ownership change has occurred. There was no material impact to the financial statements due to this ownership change.

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.

In response to the COVID-19 pandemic, the Coronavirus Aid, Relief and Economic Security Act (the "CARES Act") was signed into law in March 2020. The CARES Act lifts certain deduction limitations originally imposed by the 2017 Tax Act. With the enactment of the CARES Act, the Company has not recognized a quantitative or qualitative impact for the years ended December 31, 2021, 2020, and 2019.

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,		
	2021	2020	2019
Balance, January 1	$ 1,046	$ 902	$ 781
Additions for tax positions taken in prior years	282	25	24
Reductions for tax positions taken in prior years	(20)	(16)	(12)
Additions for tax positions related to the current year	394	135	109
Balance, December 31	$ 1,702	$ 1,046	$ 902

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

The Company and its subsidiaries file U.S. federal income tax returns and various state, local and foreign income tax returns. As of December 31, 2021, the Company's statutes of limitations are open for all federal and state years tax returns filed after the years ended December 31, 2016 and 2015, 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 under Internal Revenue Service or state examination.

(8) Stockholders' Equity (Deficit)

(a) Common Stock

As of December 31, 2021, the Company had authorized 500,000,000 shares of common stock with a par value of $0.01 per share. Holders of common stock are entitled to one vote per share, to receive dividends, if and when declared by the board of directors, and upon liquidation or dissolution, to receive a portion of the assets available for distributions to stockholders, subject to preferential amounts owed to holders of the Company's preferred stock, if any.

Common stockholders have no preemptive or other subscription rights and there are no redemption or sinking fund provisions with respect to such shares. The rights, preferences and privileges of holders of the common stock are subject to and may be adversely affected by the right of the holders of shares of any series of preferred stock that the Company may designate and issue in the future.

(b) Limited Common Stock

As of December 31, 2021, the Company had authorized 100,000,000 shares of limited common stock with a par value of $0.01 per share.

Holders of limited common stock are entitled to one vote per share, however, the holders of limited common stock shall not be entitled to vote such shares in any election of directors or on the removal of directors. Holders of limited common stock are entitled to receive dividends, if and when declared by the board of directors, and upon liquidation or dissolution, to receive a portion of the assets available for distributions to stockholders, subject to preferential amounts owed to holders of the Company's preferred stock, if any. Holders of the Company's limited common stock have the right to convert each share of limited common stock into one share of the Company's common stock.

Limited common stockholders have no preemptive or other subscription rights and there are no redemption or sinking fund provisions with respect to such shares. The rights, preferences and privileges of holders of the limited common stock are subject to and may be adversely affected by the right of the holders of shares of any series of preferred stock that the Company may designate and issue in the future.

(c) Preferred Stock

As of December 31, 2021, the Company had authorized 10,000,000 shares of undesignated preferred stock with a par value of $0.01 per share. The Company's 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.

(9) Stock-Based Compensation

Stock Incentive Plans

As of December 31, 2021, the Company's stock incentive plans included the 2010 Stock Plan (the "2010 Plan"), the 2020 Equity Incentive Plan (the "2020 Plan"), and the 2021 Inducement Equity Incentive Plan (the "2021 Plan") (together, the "Plans"). The 2020 Plan provides for the award of incentive stock options, nonstatutory stock options, stock appreciation rights, restricted stock awards, restricted stock units, and other stock-based awards to employees, directors, consultants or advisors.

The 2021 Plan provides for the award of incentive stock options, nonstatutory stock options, stock appreciation rights, restricted stock awards, restricted stock units, and other stock-based awards to persons who were not previously an employee or director of the Company or who are commencing employment with the Company following a bona fide period of non-employment, in either case, as an inducement material to such person's entry into employment with the Company and in accordance with the requirements of the Nasdaq Stock Market Rule 5635(c)(4). Neither consultants nor advisors are eligible to participate in the 2021 Plan.

The 2010 Plan provided for the granting of incentive stock options and nonstatutory stock options to employees, directors, consultants, or advisors. As of the effective date of the 2020 Plan, no further awards will be made under the 2010 Plan. Any options or awards outstanding under the 2010 Plan remain outstanding and effective. 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 are available for issuance under the 2020 Plan.

Stock Options

Stock options must be granted at an exercise price not less than 100% of the fair market value per share at the grant date. The board of directors or compensation committee determines the exercise price of the Company's stock options based on the closing price of the common stock as reported on the Nasdaq Global Select Market on the day of the grant. The maximum contractual term of options granted under the Plans is typically 10 years, options generally vest over four years with 25% of the shares underlying the option vesting at the end of the first year and the remaining vesting monthly over the following three years.

During 2021, 2020, and 2019, 1,120,981, 1,398,177, and 214,845 options under the Plans were exercised for total proceeds of $7,927, $4,183, 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 2021, 2020, and 2019 were calculated using an average of historical exercises. Estimated volatility for 2021, 2020, 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.

As of December 31, 2021, there were 2,283,037 shares available for grant under the Plans. Following are the weighted average valuation assumptions used for options:

	Year Ended December 31,		
	2021	2020	2019
Valuation assumptions			
Expected dividend yield	—%	—%	—%
Expected volatility	59%	60%	57%
Expected term (years)	4.66	4.49	6.05
Risk-free interest rate	0.71%	1.46%	2.33%

The following table presents classification of stock-based compensation expense within the consolidated statements of operations:

	Year Ended December 31,		
	2021	2020	2019
Cost of sales	$ 3,858	$ 1,384	$ 376
Research and development	7,440	3,050	460
Sales and marketing	1,281	516	311
General and administrative	13,911	5,595	1,046
Total stock-based compensation	$ 26,490	$ 10,545	$ 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, 2021	7,257,460	$ 12.14		
Granted	1,696,327	93.13		
Exercised	(1,120,981)	7.00		
Forfeited	(149,346)	41.47		
Expired	(3,119)	1.70		
Balance, December 31, 2021	7,680,341	30.19	7.67	$ 35,584
Exercisable, December 31, 2021	3,473,716	10.83	6.75	$ 83,306

The weighted average grant date fair value per share of options granted during 2021, 2020, and 2019 was $45.07, $9.55, and $2.93, respectively. The intrinsic value of options exercised during 2021, 2020, and 2019 was $71,308, $87,946, and $546, respectively.

As of December 31, 2021, there was $78,355 of unrecognized compensation cost related to unvested stock options granted under the Plans, which is expected to be recognized over a weighted average period of 2.87 years. The fair value of shares vested during 2021, 2020, and 2019 was $19,080, $3,153, and $1,734, respectively.

(10) Noncontrolling Interest

The Company reviews each legal entity formed by parties related to the Company to determine whether or not the Company has a variable interest in the entity and whether or not the entity would meet the definition of a variable interest entity (“VIE”) in accordance with ASC Topic 810, *Consolidation*. If the entity is a VIE, the

Company assesses whether or not the Company is the primary beneficiary of that VIE based on a number of factors, including (i) which party has the power to direct the activities that most significantly affect the VIE's economic performance, (ii) the parties' contractual rights and responsibilities pursuant to any contractual agreements and (iii) which party has the obligation to absorb losses or the right to receive benefits from the VIE. If the Company determines it is the primary beneficiary of a VIE, the Company consolidates the financial statements of the VIE into the Company's consolidated financial statements at the time that determination is made. The Company evaluates whether it continues to be the primary beneficiary of any consolidated VIEs on a quarterly basis. If the Company were to determine that it is no longer the primary beneficiary of a consolidated VIE, or no longer has a variable interest in the VIE, it would deconsolidate the VIE in the period that the determination is made.

If the Company determines it is the primary beneficiary of a VIE that meets the definition of a business, the Company measures the assets, liabilities and noncontrolling interests of the newly consolidated entity at fair value in accordance with ASC Topic 805, *Business Combinations* at the date the reporting entity first becomes the primary beneficiary.

In October 2018, Faxian Therapeutics, LLC ("Faxian") was formed in the United States. In April 2019, upon consummation of the joint venture, the Company and WuXi AppTech ("WuXi"), each received a 50% equity interest in the entity in exchange for their contributions to the entity. The Company determined that Faxian was a VIE and concluded that it is the primary beneficiary of the VIE. As such, the Company has consolidated Faxian's results into the consolidated financial statements, and eliminated WuXi's ownership as a non-controlling interest.

(11) Net Loss per Share Attributable to Common and Limited Common Stockholders

The following table presents the calculation of basic and diluted net loss per share attributable to common and limited common stockholders for the years presented (in thousands, except for share and per share data):

	Year Ended December 31,		
	2021	**2020**	**2019**
Numerator:			
Net loss attributable to Schrödinger common and limited common stockholders	$ (100,393)	$ (24,463)	$ (24,571)
Denominator:			
Weighted average shares used to compute net loss per share attributable to Schrödinger common and limited common stockholders, basic and diluted:	70,594,950	60,024,658	6,004,500
Net loss per share attributable to Schrödinger common and limited common stockholders, basic and diluted:	$ (1.42)	$ (0.41)	$ (4.09)

Since the Company was in a loss position for all years 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,		
	2021	**2020**	**2019**
Convertible preferred stock	—	—	42,734,884
Shares subject to outstanding common stock options	7,680,341	7,257,460	4,805,562
	7,680,341	7,257,460	47,540,446

(12) Equity Investments

(a) Nimbus

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 that resulted in equity ownership and related fees are paid in cash to the Company. As Nimbus is a limited liability company and the Company is not a passive investor due to its collaboration with Nimbus on a number of drug discovery targets, the Company's management determined that it has significant influence over the entity and therefore accounts for the investment as an equity method investment.

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 HLBV method for valuing contractual rights to substantive profits provides the best representation of its financial position in Nimbus.

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 U.S. GAAP, and distribute the resulting cash to creditors and investors in accordance with their respective priorities.

The carrying value of the Nimbus investment was zero as of December 31, 2021 and December 31, 2020. The Company has no obligation to fund Nimbus losses in excess of its initial investment. The Company reported losses of zero, $2,977, and $4,180 on the Nimbus investment during 2021, 2020, and 2019, respectively.

(b) Morphic

The Company accounts for its investment in Morphic Holding, Inc. (“Morphic”) at fair value based on the share price of Morphic’s common stock at the measurement date.

During 2021, 2020, and 2019 the Company reported gains of $11,548, $13,685, and $14,102 on the Morphic investment, respectively. As of December 31, 2021 and December 31, 2020, the carrying value of the Company’s investment in Morphic was $39,561 and $28,013, respectively.

(c) Petra

Prior to May 2020, the Company had concluded that its equity investment in Petra Pharma Corporation (“Petra”) should be valued as a non-marketable equity security as the Company did not exercise significant influence over Petra.

During May 2020, Petra entered into a merger agreement with a third party. In connection with the merger, the Company received $4,582 of merger consideration in exchange for the Company’s shares of Petra common stock and is eligible to receive potential earn-outs tied to the achievement of specified development, regulatory, and commercial milestones. The Company is also eligible to receive $361 in escrow payments. During 2021, the Company received escrow payments of $335.

(d) Ravenna

In connection with the Petra merger, the Company received 2,676,191 shares of common stock of Ravenna Pharmaceuticals, Inc. (“Ravenna”). The Company concluded that its equity investment in Ravenna should be valued as a non-marketable equity security as the Company does not exercise significant influence over Ravenna. As of each of December 31, 2021 and December 31, 2020, the carrying value of the Company’s investment in Ravenna was $19 and $94, respectively. The Company reported losses of $75, zero, and zero on the Ravenna investment during 2021, 2020, and 2019, respectively.

(e) Relay

In July 2020, Relay successfully completed an initial public offering. The Company accounts for its investment in Relay at fair value based on the share price of Relay's common stock at the measurement date. In January 2021, the Company disposed of its equity stake in Relay for aggregate consideration of $15,735, resulting in a loss of $1,821 for 2021. The Company reported a gain of $17,556 on the Relay investment for the year ended December 31, 2020. There was no gain or loss on the Relay investment for 2019, as Relay was not a public company during this period.

(f) Ajax

In May 2021, the Company purchased 631,377 shares of Series B preferred stock of Ajax Therapeutics, Inc. ("Ajax") for $1,700 in cash. The Company has concluded that its equity investment in Ajax should be valued as a non-marketable equity security as the Company does not exercise significant influence over Ajax. As of December 31, 2021 and December 31, 2020, the carrying value of the Company's investment in Ajax was $1,700 and zero, respectively.

(g) ShouTi

In July 2021, the Company purchased 494,035 shares of Series B preferred stock of ShouTi for $2,000 in cash. As ShouTi is structured as a company limited by shares, incorporated under the laws of the Cayman Islands and the Company is not a passive investor due to its collaboration with ShouTi on a number of drug discovery targets, the Company's management determined that it has significant influence over the entity and therefore accounts for the investment as an equity method investment.

The Company has determined that the HLBV method for valuing contractual rights to substantive profits provides the best representation of its financial position in ShouTi. The carrying value of ShouTi was $1,887 and zero as of December 31, 2021 and December 31, 2020, respectively. The Company has no obligation to fund ShouTi losses in excess of its initial investment. The Company recorded a loss of $113 on the ShouTi investment during the year ended December 31, 2021.

(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 4.0% of compensation contributed by employees for the years ended December 31, 2021, 2020, and 2019. Matching contributions during 2021, 2020, and 2019 were $2,592, $1,748, and $1,492, respectively.

(14) Related Party Transactions

(a) D. E. Shaw

For the years ended December 31, 2021, 2020, and 2019, the Company licensed technology and purchased services for $7,940, $7,281, and $5,190, respectively, from companies controlled by David E. Shaw and/or affiliates of companies controlled by David E. Shaw (the "D. E. Shaw entities"), stockholders of the Company. In addition, D. E. Shaw entities purchased certain products and services from, and provided cost reimbursements to, the Company totaling $318, $226, and $195 for the years ended December 31, 2021, 2020, and 2019, respectively. As of December 31, 2021 and 2020, the Company had net payables of $2,637 and $3,464, respectively, to D.E. Shaw entities.

(b) Board Member

For the years ended December 31, 2021, 2020, and 2019, the Company paid consulting fees of $390, $364, and $361, respectively, to a member of its board of directors.

(c) Bill and Melinda Gates Foundation

For the years ended December 31, 2021, 2020, and 2019, the Bill & Melinda Gates Foundation, an entity under common control with Bill and Melinda Gates Foundation Trust, a stockholder of the Company, 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 under this grant were $1,160, $2,094, and $1,065 for the years ended December 31, 2021, 2020, and 2019, respectively. As of December 31, 2021 and 2020, the Company had net receivables of $165 and $543, respectively, due from the Bill & Melinda Gates Foundation.

In the fourth quarter of 2021, the Company recognized $111 in drug discovery contribution revenue related to funds received under an agreement with the Bill & Melinda Gates Foundation, aimed at accelerating drug discovery in women's health. As of December 31, 2021, the Company had no receivables due under this agreement from the Bill & Melinda Gates Foundation.

The Company received $1,000 in contribution revenue in connection with its entry into an agreement with Gates Ventures, LLC in the second quarter of 2020, and $1,000 in contribution revenue in the second quarter of 2021 on the first anniversary of its entry into the agreement. Gates Ventures, LLC is an entity under control of William H. Gates III, who may be deemed to be the beneficial owner of more than 5% of the Company's voting securities. As of December 31, 2021 and 2020, the Company had no net receivables due from Gates Ventures, LLC.

(d) ShouTi

During the year ended December 31, 2021, the Company entered into multiple software agreements with ShouTi and its subsidiary for approximately $650. The Company recognized revenue of approximately $129 in the aggregate related to these agreements during the year ended December 31, 2021.

(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 financial information with respect to the Company's reportable segments for the periods presented:

	Year Ended December 31,		
	2021	2020	2019
Segment revenues:			
Software	$ 113,236	$ 92,530	$ 66,735
Drug discovery	24,695	15,565	18,808
Total segment revenues	$ 137,931	$ 108,095	$ 85,543
Segment gross profit:			
Software	$ 86,741	$ 74,527	$ 53,089
Drug discovery	(21,121)	(11,055)	(3,996)
Total segment gross profit	65,620	63,472	49,093
Unallocated:			
Research and development	(90,904)	(64,695)	(39,404)
Sales and marketing	(22,150)	(17,795)	(21,364)
General and administrative	(64,009)	(41,898)	(27,040)
(Loss) gain on equity investments	(1,781)	4,108	943
Change in fair value	11,359	28,263	9,922
Interest income	1,057	2,253	1,878
Income tax (expense) benefit	(411)	(345)	291
Consolidated net loss	$ (101,219)	$ (26,637)	$ (25,681)

The following table sets forth revenues by geographic area for the years ended December 31, 2021, 2020, and 2019:

	Year Ended December 31,		
	2021	2020	2019
United States	$ 90,398	$ 60,737	$ 47,622
Europe	27,810	24,370	17,504
Japan	8,565	14,558	14,367
Rest of World	11,158	8,430	6,050
	$ 137,931	$ 108,095	$ 85,543

(16) Subsequent Events

On January 14, 2022, we acquired 117,840 shares of XTAL BioStructures, Inc. for $6.5 million, a company that provides structural biology services, including biophysical methods, protein production and purification, and X-ray crystallography, which includes $6.0 million in upfront purchase price, plus an adjustment for working capital, less cash acquired.

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, 2021. 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, 2021, 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

Our management is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act). Our internal control over financial reporting is a process designed under the supervision of our principal executive officer and principal financial officer, and effected by our board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Management assessed our internal control over financial reporting as of December 31, 2021. Management based its assessment on criteria established in Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 Framework). Based on the results of its evaluation, management concluded that our internal control over financial reporting was effective as of December 31, 2021. Our independent registered public accounting firm, KPMG, LLP, has issued an attestation report on the effectiveness of our internal control over financial reporting, which is included in Item 8 of this Annual Report.

Changes in Internal Control Over Financial Reporting

There has been no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) that occurred during the fourth quarter of 2021 that has materially affected, or is 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 and procedures 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.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

Not Applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information required by this Item 10 is incorporated herein by reference from the information that will be contained in our proxy statement related to the 2022 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission within 120 days of the end of our fiscal year ended December 31, 2021 pursuant to General Instruction G(3) of Form 10-K.

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.

Item 11. Executive Compensation.

The information required by this Item 11 is incorporated herein by reference from the information that will be contained in our proxy statement related to the 2022 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission within 120 days of the end of our fiscal year ended December 31, 2021 pursuant to General Instruction G(3) of Form 10-K.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The information required by this Item 12 is incorporated herein by reference from the information that will be contained in our proxy statement related to the 2022 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission within 120 days of the end of our fiscal year ended December 31, 2021 pursuant to General Instruction G(3) of Form 10-K.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required by this Item 13 is incorporated herein by reference from the information that will be contained in our proxy statement related to the 2022 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission within 120 days of the end of our fiscal year ended December 31, 2021 pursuant to General Instruction G(3) of Form 10-K.

Item 14. Principal Accountant Fees and Services.

The information required by this Item 14 is incorporated herein by reference from the information that will be contained in our proxy statement related to the 2022 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission within 120 days of the end of our fiscal year ended December 31, 2021 pursuant to General Instruction G(3) of Form 10-K.

PART IV

Item 15. Exhibits and Financial Statement Schedules.

(1) **Financial Statements**

The following documents are included on pages F-2 through F-9 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	10-K	001-39206	4.3	3/4/2021	
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 for U.S. Participants under the 2020 Equity Incentive Plan					X
10.6+	Form of Restricted Stock Unit Agreement for Non-U.S. Participants under the 2020 Equity Incentive Plan					X
10.7+	2020 Employee Stock Purchase Plan	S-1/A	333-235890	10.6	1/27/2020	
10.8+	Second Amended and Restated Director Compensation Policy	10-K	001-39206	10.7	3/4/2021	
10.9+	Senior Executive Incentive Compensation Plan	S-1	333-235890	10.8	1/10/2020	
10.10+	Amended and Restated Executive Severance and Change in Control Benefits Plan	10-Q	001-39206	10.3	8/12/2021	
10.11+	Employment Agreement, dated May 11, 2010, by and between the Registrant and Ramy Farid	S-1	333-235890	10.10	1/10/2020	
10.12+	Employment Agreement, dated November 14, 2018, by and between the Registrant and Joel Lebowitz	S-1	333-235890	10.11	1/10/2020	
10.13+	Employment Agreement, dated May 14, 2018, by and between the Registrant and Karen Akinsanya	S-1	333-235890	10.14	1/10/2020	
10.14+	Employment Agreement, dated April 27, 2010, by and between the Registrant and Yvonne Tran	S-1	333-235890	10.16	1/10/2020	
10.15+	Employment Agreement, dated September 11, 2006, by and between the Registrant and Patrick Lorton	S-1	333-235890	10.17	1/10/2020	
10.16+	Employment Agreement, dated March 9, 2009, by and between the Registrant and Robert Abel	S-1	333-235890	10.19	1/10/2020	
10.17+	Consultant Agreement, dated July 1, 1999, between the Registrant and Richard A. Friesner, as amended	10-Q	001-39206	10.4	8/12/2021	
10.18+	Form of Indemnification Agreement between the Registrant and each of its Executive Officers and Directors	S-1	333-235890	10.21	1/10/2020	
10.19	Office Lease Agreement, dated April 5, 2021, by and between the Registrant and SPUSV5 1540 Broadway, LLC	8-K	001-39206	10.1	4/8/2021	
10.20	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	
10.21	Office Lease Amendment, dated May 6, 2021, by and between Registrant and MADISON-OFC ONE MAIN PLACE OR LLC	10-Q	001-39206	10.2	8/12/2021	
10.22†	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	
10.23†	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	
10.24†	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	

10.25†	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	
10.26†	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	
10.27†	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	
10.28†	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	
10.29†	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	
10.30†	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	
10.31+	Global Bonus Plan	S-1/A	333-235890	10.33	1/27/2020	
10.32†	Independent Contractor Agreement, dated June 23, 2020, by and between the Registrant and Gates Ventures, LLC	10-Q	001-39206	10.2	8/10/2020	
10.33	Stock Option Agreement for Non-U.S. Participants under the 2020 Equity Incentive Plan	10-Q	001-39206	10.2	11/12/2020	
10.34†	Collaboration and License Agreement, dated November 22, 2020, by and between the Registrant and Bristol-Myers Squibb Company	10-K	001-39206	10.37	3/4/2021	
10.35+	2021 Inducement Equity Incentive Plan	10-K	001-39206	10.38	3/4/2021	
10.36+	Nonstatutory Stock Option Agreement under 2021 Inducement Equity Incentive Plan	10-K	001-39206	10.39	3/4/2021	
10.37+	Restricted Stock Unit Agreement for U.S. Participants under 2021 Inducement Equity Incentive Plan	10-K	001-39206	10.40	3/4/2021	
10.38+	Restricted Stock Unit Agreement for Non-U.S. Participants under 2021 Inducement Equity Incentive Plan	10-K	001-39206	10.41	3/4/2021	
21.1	Subsidiaries of the Registrant					X
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
101.INS	Inline XBRL Instance Document – the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.	X
101.SCH	Inline XBRL Taxonomy Extension Schema Document.	X
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document	X
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document.	X
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document.	X
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document	X
104	Cover page formatted as Inline XBRL and contained in Exhibit 101.	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: February 24, 2022

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)	February 24, 2022
/s/ Joel Lebowitz Joel Lebowitz	Chief Financial Officer (Principal Financial Officer)	February 24, 2022
/s/ Jenny Herman Jenny Herman	Senior Vice President, Finance and Corporate Controller (Principal Accounting Officer)	February 24, 2022
/s/ Michael Lynton Michael Lynton	Chairman of the Board	February 24, 2022
/s/ Jeffrey Chodakewitz Jeffrey Chodakewitz, M.D.	Director	February 24, 2022
/s/ Richard Friesner Richard Friesner, Ph.D.	Director	February 24, 2022
/s/ Gary Ginsberg Gary Ginsberg	Director	February 24, 2022
/s/ Rosana Kapeller-Libermann Rosana Kapeller-Libermann, M.D., Ph.D.	Director	February 24, 2022
/s/ Gary Sender Gary Sender	Director	February 24, 2022
/s/ Nancy Thornberry Nancy Thornberry	Director	February 24, 2022

Exhibit 10.5

Schrödinger, Inc.

STOCK OPTION AGREEMENT

Schrödinger, Inc. (the "Company") hereby grants the following stock option pursuant to its 2020 Equity Incentive Plan. The terms and conditions attached hereto are also a part hereof.

Notice of Grant

Name of optionee (the "Participant"):	
Grant Date:	
Incentive Stock Option or Nonstatutory Stock Option:	
Number of shares of the Company's Common Stock subject to this option ("Shares"):	
Option exercise price per Share:[1]	
Number, if any, of Shares that vest immediately on the grant date:	
Shares that are subject to vesting schedule:	
Vesting Start Date:	
Final Exercise Date: [2]	

Vesting Schedule:

Vesting Date:	Number of Options that Vest:
All vesting is dependent on the Participant remaining an Eligible Participant, as provided herein.	

This option satisfies in full all commitments that the Company has to the Participant with respect to the issuance of stock, stock options or other equity securities.

Signature of Participant

Street Address

City/State/Zip Code

Schrödinger, Inc.

By: _____

Name of Officer
Title:

1 This must be at least 100% of the Grant Date Fair Market Value (as defined in the Plan) of the Common Stock on the date of grant (110% in the case of a Participant that owns more than 10% of the total combined voting power of all classes of stock of the Company or its parent or subsidiary (a "10% Shareholder")) for the option to qualify as an incentive stock option (an "ISO") under Section 422 of the Code.

2 The Final Exercise Date must be no more than 10 years (5 years in the case of a 10% Shareholder) from the date of grant for the option to qualify as an ISO. The correct approach to calculate the final exercise date is to use the day immediately prior to the date ten years out from the date of the stock option award grant (5 years in the case of a 10% stockholder).

Schrödinger, Inc.

Stock Option Agreement
Incorporated Terms and Conditions

1. Grant of Option.

This agreement evidences the grant by the Company, on the grant date (the "Grant Date") set forth in the Notice of Grant that forms part of this agreement (the "Notice of Grant"), to the Participant of an option to purchase, in whole or in part, on the terms provided herein and in the Company's 2020 Equity Incentive Plan (the "Plan"), the number of Shares set forth in the Notice of Grant of common stock, $0.01 par value per share, of the Company ("Common Stock"), at the exercise price per Share set forth in the Notice of Grant. Unless earlier terminated, this option shall expire at 5:00 p.m., Eastern time, on the Final Exercise Date set forth in the Notice of Grant (the "Final Exercise Date").

The option evidenced by this agreement is intended to be an incentive stock option as defined in Section 422 of the Internal Revenue Code of 1986, as amended, and any regulations promulgated thereunder (the "Code") to the maximum extent permitted by law, solely to the extent designated as an incentive stock option in the Notice of Grant. Except as otherwise indicated by the context, the term "Participant", as used in this option, shall be deemed to include any person who acquires the right to exercise this option validly under its terms.

2. Vesting Schedule.

This option will become exercisable ("vest") in accordance with the vesting schedule set forth in the Notice of Grant.

The right of exercise shall be cumulative so that to the extent the option is not exercised in any period to the maximum extent permissible it shall continue to be exercisable, in whole or in part, with respect to all Shares for which it is vested until the earlier of the Final Exercise Date or the termination of this option under Section 3 hereof or the Plan.

3. Exercise of Option.

(a) Form of Exercise. Each election to exercise this option shall be in writing, in the form of the Stock Option Exercise Notice attached as Annex A, signed by the Participant, and received by the Company at its principal office, accompanied by this agreement, or in such other form (which may be electronic or through a third party equity plan administrator) as is approved by the Company, together with payment in full in the manner provided in the Plan. The Participant may purchase less than the number of shares covered hereby, provided that no partial exercise of this option may be for any fractional share.

(b) Continuous Relationship with the Company Required. Except as otherwise provided in this Section 3, this option may not be exercised unless the Participant, at the time he or she exercises this option, is, and has been at all times since the Grant Date, an employee, director or officer of, or consultant or advisor to, the Company or any other entity the employees, officers, directors, consultants, or advisors of which are eligible to receive option grants under the Plan (an "Eligible Participant").

(c) Termination of Relationship with the Company. If the Participant ceases to be an Eligible Participant for any reason, then, except as provided in paragraphs (d) and (e) below, the right to exercise this option shall terminate three months after such cessation (but in no event after the Final Exercise Date), provided that this option shall be exercisable only to the extent that the Participant was entitled to exercise this option on the date of such cessation. Notwithstanding the foregoing, if the Participant, prior to the Final Exercise Date, violates the restrictive covenants (including, without limitation, the non-competition, non-solicitation, or confidentiality provisions) of any employment contract, any non-competition, non-solicitation, confidentiality or assignment agreement to which the Participant is a party, or any other agreement between the Participant and the Company, the right to exercise this option shall terminate immediately upon such violation.

(d) Exercise Period Upon Death or Disability. If the Participant dies or becomes disabled (within the meaning of Section 22(e)(3) of the Code) prior to the Final Exercise Date while he or she is an Eligible Participant and the Company has not terminated such relationship for "cause" as specified in paragraph (e) below, this option shall be exercisable, within the period of one year following the date of death or disability of the Participant, by the Participant (or in the case of death by an authorized transferee), provided that this option shall be exercisable only to the extent that this option was exercisable by the Participant on the date of his or her death or disability, and further provided that this option shall not be exercisable after the Final Exercise Date.

(e) Termination for Cause. If, prior to the Final Exercise Date, the Participant's employment or other relationship with the Company is terminated by the Company for Cause (as defined in below), the right to exercise this option shall terminate immediately upon the effective date of such termination of employment or other relationship. If, prior to the Final Exercise Date, the Participant is given notice by the Company of the termination of his or her employment or other relationship by the Company for Cause, and the effective date of such employment or other relationship termination is subsequent to the date of delivery of such notice, the right to exercise this option shall be suspended from the time of the delivery of such notice until the earlier of (i) such time as it is determined or otherwise agreed that the Participant's employment or other relationship shall not be terminated for Cause as provided in such notice or (ii) the effective date of such termination of employment or other relationship (in which case the right to exercise this option shall, pursuant to the preceding sentence, terminate upon the effective date of such termination of employment or other relationship). If the Participant is party to an employment, consulting or severance agreement with the Company which agreement, plan or arrangement contains a definition of "cause" for termination of employment, "Cause" shall have the meaning ascribed to such term in such agreement, plan or arrangement. Otherwise, "Cause" shall mean willful misconduct by the Participant or willful failure by the Participant to perform his or her responsibilities to the Company (including, without limitation, breach by the Participant of any provision of any employment, consulting, advisory, nondisclosure, non-competition or other similar agreement between the Participant and the Company), as determined by the Company, which determination shall be conclusive. The Participant's employment shall be considered to have been terminated for Cause if the Company determines, within 30 days after the Participant's resignation, that termination for Cause was warranted.

4. Tax Matters.

(a) Withholding. No Shares will be issued pursuant to the exercise of this option unless and until the Participant pays to the Company, or makes provision satisfactory to the Company for payment of, any federal, state or local withholding taxes required by law to be withheld in respect of this option.

(b) Disqualifying Disposition. If this option is an incentive stock option and the Participant disposes of Shares acquired upon exercise of this option within two years from the Grant Date or one year after such Shares were acquired pursuant to exercise of this option, the Participant shall notify the Company in writing of such disposition.

5. Transfer Restrictions; Clawback.

(a) This option may not be sold, assigned, transferred, pledged or otherwise encumbered by the Participant, either voluntarily or by operation of law, except by will or the laws of descent and distribution, and, during the lifetime of the Participant, this option shall be exercisable only by the Participant.

(b) In accepting this option, the Participant agrees to be bound by any clawback policy that the Company has in place or may adopt in the future.

6. Provisions of the Plan.

This option is subject to the provisions of the Plan (including the provisions relating to amendments to the Plan), a copy of which is furnished to the Participant with this option.

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ANNEX A

Schrödinger, Inc.

Stock Option Exercise Notice

Schrödinger, Inc.
120 West 45th Street
17th Floor
New York, NY 10036-4041

Dear Sir or Madam:

I, _____(the "Participant"), hereby irrevocably exercise the right to purchase shares of the Common Stock, $0.01 par value per share (the "Shares"), of Schrödinger, Inc. (the "Company") at $_____ per share pursuant to the Company's 2020 Equity Incentive Plan and a stock option agreement with the Company dated (the "Option Agreement"). Enclosed herewith is a payment of $_____, the aggregate purchase price for the Shares. The certificate for the Shares should be registered in my name as it appears below or, if so indicated below, jointly in my name and the name of the person designated below, with right of survivorship.

Dated: _____

_____
Signature
Print Name:

Address:

_____

_____

Name and address of persons in whose name the Shares are to be jointly registered (if applicable):

_____

Schrödinger, Inc.

RESTRICTED STOCK UNIT AGREEMENT

Schrödinger, Inc. (the "Company") hereby grants the following restricted stock units pursuant to its 2020 Equity Incentive Plan. The terms and conditions attached hereto are also a part hereof.

Notice of Grant

Name of recipient (the "Participant"):	
Grant Date:	
Number of restricted stock units ("RSUs") granted:	
Number, if any, of RSUs that vest immediately on the grant date:	
RSUs that are subject to vesting schedule:	
Vesting Start Date:	

Vesting Schedule:

Vesting Date:	Number of RSUs that Vest:
All vesting is dependent on the Participant remaining an Eligible Participant, as provided herein.	

This grant of RSUs satisfies in full all commitments that the Company has to the Participant with respect to the issuance of stock, stock options or other equity securities.

Schrödinger, Inc.

Signature of Participant

By:

Street Address

Name of Officer

Title:

City/State/Zip Code

Schrödinger, Inc.

Restricted Stock Unit Agreement
Incorporated Terms and Conditions

1. Award of Restricted Stock Units. In consideration of services rendered and to be rendered to the Company, by the Participant, the Company has granted to the Participant, subject to the terms and conditions set forth in this Restricted Stock Unit Agreement (this "Agreement") and in the Company's 2020 Equity Incentive Plan (the "Plan"), an award with respect to the number of restricted stock units (the "RSUs") set forth in the Notice of Grant that forms part of this Agreement (the "Notice of Grant"). Each RSU represents the right to receive one share of common stock, $0.01 par value per share, of the Company (the "Common Stock") upon vesting of the RSU, subject to the terms and conditions set forth herein.

2. Vesting. The RSUs shall vest in accordance with the Vesting Schedule set forth in the Notice of Grant (the "Vesting Schedule"). Any fractional shares resulting from the application of any percentages used in the Vesting Schedule shall be rounded down to the nearest whole number of RSUs. As soon as practicable after the vesting of the RSU, the Company will deliver to the Participant, for each RSU that becomes vested, one share of Common Stock, subject to the payment of any taxes pursuant to Section 7. The Common Stock will be delivered to the Participant as soon as practicable following each vesting date, but in any event within 30 days of such date.

3. Forfeiture of Unvested RSUs Upon Cessation of Service. In the event that the Participant ceases to be an Eligible Participant (as defined below) for any reason or no reason, with or without cause, all of the RSUs that are unvested as of the time of such cessation shall be forfeited immediately and automatically to the Company, without the payment of any consideration to the Participant, effective as of such cessation. The Participant shall have no further rights with respect to the unvested RSUs or any Common Stock that may have been issuable with respect thereto. The Participant shall be an "Eligible Participant" if he or she is an employee, director or officer of, or consultant or advisor to, the Company or any other entity the employees, officers, directors, consultants or advisors of which are eligible to receive awards of RSUs under the Plan.

4. Restrictions on Transfer. The Participant shall not sell, assign, transfer, pledge, hypothecate, encumber or otherwise dispose of, by operation of law or otherwise (collectively "transfer") any RSUs, or any interest therein. The Company shall not be required to treat as the owner of any RSUs or issue any Common Stock to any transferee to whom such RSUs have been transferred in violation of any of the provisions of this Agreement.

5. Rights as a Stockholder. The Participant shall have no rights as a stockholder of the Company with respect to any shares of Common Stock that may be issuable with respect to the RSUs until the issuance of the shares of Common Stock to the Participant following the vesting of the RSUs.

6. Provisions of the Plan. This Agreement is subject to the provisions of the Plan, a copy of which is furnished to the Participant with this Agreement.

7. Tax Matters.

(a) Acknowledgments; No Section 83(b) Election. The Participant acknowledges that he or she is responsible for obtaining the advice of the Participant's own tax advisors with respect to the award of RSUs and the Participant is relying solely on such advisors and not on any statements or representations of the Company or any of its agents with respect to the tax consequences relating to the RSUs. The Participant understands that the Participant (and not the Company) shall be responsible for the Participant's tax liability that may arise in connection with the acquisition, vesting and/or disposition of the RSUs. The Participant acknowledges that no election under Section 83(b) of the Internal Revenue Code of 1986, as amended, (the "Code") is available with respect to RSUs.

(b) Withholding. The Participant acknowledges that, regardless of any action taken by the Company, the ultimate liability for all income tax, social insurance, payroll tax, fringe benefits tax, payment on account or other tax-related items related to the Participant's participation in the Plan and legally applicable or

deemed applicable to the Participant ("Tax-Related Items"), is and remains the Participant's responsibility and may exceed the amount actually withheld by the Company. The Participant acknowledges and agrees that prior to the relevant taxable or tax withholding event and at such time as the Participant is not aware of any material nonpublic information about the Company or the Common Stock and the Participant is not subject to any restriction on trading activities with respect to the Common Stock pursuant to any Company insider trading or other policy, the Participant shall execute the instructions set forth in Schedule A attached hereto (the "Automatic Sale Instructions") as the means of satisfying the withholding obligations for Tax-Related Items (the "Sell-to-Cover Withholding"). Further, the Participant agrees to pay to the Company, including through withholding from the Participant's wages or other cash compensation paid to the Participant by the Company, any amount of Tax-Related Items that the Company may be required to withhold or account for as a result of the Participant's participation in the Plan that cannot be satisfied by the Sell-to-Cover Withholding. If the Participant fails to comply with his or her obligations in connection with the Tax-Related Items, the Company may refuse to issue or deliver the shares or the proceeds of the sale of shares of Common Stock.

8. Miscellaneous.

(a) Section 409A. The RSUs awarded pursuant to this Agreement are intended to be exempt from or comply with the requirements of Section 409A of the Code and the Treasury Regulations issued thereunder ("Section 409A"). The delivery of shares of Common Stock on the vesting of the RSUs may not be accelerated or deferred unless permitted or required by Section 409A.

(b) Participant's Acknowledgements. The Participant acknowledges that he or she: (i) has read this Agreement; (ii) has been represented in the preparation, negotiation and execution of this Agreement by legal counsel of the Participant's own choice or has voluntarily declined to seek such counsel; (iii) understands the terms and consequences of this Agreement; (iv) is fully aware of the legal and binding effect of this Agreement; and (v) agrees that in accepting this award, he or she will be bound by any clawback policy that the Company may adopt in the future.

Schedule A

Automatic Sale Instructions

The undersigned hereby consents and agrees that any taxes due on a vesting date as a result of the vesting of RSUs on such date shall be paid through an automatic sale of shares as follows:

(a) Upon any vesting of RSUs pursuant to Section 2 hereof, the Company shall arrange for the sale of such number of shares of Common Stock issuable with respect to the RSUs that vest pursuant to Section 2 as is sufficient to generate net proceeds sufficient to satisfy the Company's minimum statutory withholding obligations with respect to the income recognized by the Participant upon the vesting of the RSUs (based on minimum statutory withholding rates for all tax purposes, including payroll and social security taxes, that are applicable to such income), and the net proceeds of such sale shall be delivered to the Company in satisfaction of such tax withholding obligations.

(b) The Participant hereby appoints the Chief Executive Officer, the Chief Financial Officer and the Chief Legal Officer (or a person holding a similar title), and any of them acting alone and with full power of substitution, to serve as his or her attorneys in fact to arrange for the sale of the Participant's Common Stock in accordance with this Schedule A. The Participant agrees to execute and deliver such documents, instruments and certificates as may reasonably be required in connection with the sale of the shares pursuant to this Schedule A.

(c) The Participant represents to the Company that, as of the date hereof, he or she is not aware of any material nonpublic information about the Company or the Common Stock and is not subject to any restriction on trading activities with respect to the Common Stock pursuant to any Company insider trading policy or other policy. The Participant and the Company have structured this Agreement, including this Schedule A, to constitute a "binding contract" relating to the sale of Common Stock, consistent with the affirmative defense to liability under Section 10(b) of the Securities Exchange Act of 1934 under Rule 10b5-1(c) promulgated under such Act.

The Company shall not deliver any shares of Common Stock to the Participant until it is satisfied that all required withholdings have been made.

_____

Participant Name: _____

Date: _____

Schrödinger, Inc.

RESTRICTED STOCK UNIT AGREEMENT FOR NON-U.S. PARTICIPANTS

Schrödinger, Inc. (the "Company") hereby grants the following restricted stock units pursuant to its 2020 Equity Incentive Plan. The terms and conditions attached hereto are also a part thereof.

Notice of Grant

Name of recipient (the "Participant"):	
Grant Date:	
Number of restricted stock units ("RSUs") granted:	
Number, if any, of RSUs that vest immediately on the grant date:	
RSUs that are subject to vesting schedule:	
Vesting Start Date:	

Vesting Schedule:

Vesting Date:	Number of RSUs that Vest:
All vesting is dependent on the Participant remaining an Eligible Participant, as provided herein.	

This grant of RSUs satisfies in full all commitments that the Company has to the Participant with respect to the issuance of stock, stock options or other equity securities.

Schrödinger, Inc.

Signature of Participant

By:

Street Address

Name of Officer

Title:

City/State/Zip Code

1. Award of Restricted Stock Units. The Company hereby grants to the Participant, subject to the terms and conditions set forth in this Restricted Stock Unit Agreement for Non-U.S. Participants, including any additional terms and conditions for the Participant's country included in the appendix attached hereto (this "Agreement") and in the Company's 2020 Equity Incentive Plan (the "Plan"), an award with respect to the number of restricted stock units (the "RSUs") set forth in the Notice of Grant that forms part of this Agreement (the "Notice of Grant"). Each RSU represents the right to receive one share of common stock, $0.01 par value per share, of the Company (the "Common Stock") upon vesting of the RSU, subject to the terms and conditions set forth herein.

2. Vesting. The RSUs shall vest in accordance with the Vesting Schedule set forth in the Notice of Grant (the "Vesting Schedule"). Any fractional shares resulting from the application of any percentages used in the Vesting Schedule shall be rounded down to the nearest whole number of RSUs. As soon as practicable after the vesting of the RSU, the Company will deliver to the Participant, for each RSU that becomes vested, one share of Common Stock, subject to the payment of any taxes pursuant to Section 7. The Common Stock will be delivered to the Participant as soon as practicable following each vesting date, but in any event within 30 days of such date.

3. Forfeiture of Unvested RSUs Upon Cessation of Service. In the event that the Participant ceases to be an Eligible Participant (as defined below) for any reason or no reason, with or without cause, all of the RSUs that are unvested as of the time of such cessation shall be forfeited immediately and automatically to the Company, without the payment of any consideration to the Participant, effective as of such cessation. The Participant shall have no further rights with respect to the unvested RSUs or any Common Stock that may have been issuable with respect thereto. The Participant shall be an "Eligible Participant" if he or she is an employee, director or officer of, or consultant or advisor to, the Company or any other entity the employees, officers, directors, consultants or advisors of which are eligible to receive awards of RSUs under the Plan.

For purposes of the RSUs, the Participant's status as an Eligible Participant will be considered terminated as of the date the Participant is no longer actively providing services to the Company, the Employer or any of the other affiliates of the Company (regardless of the reason for such termination and whether or not later found to be invalid or in breach of employment laws in the jurisdiction where the Participant is employed or engaged or the terms of the Participant's employment or service agreement, if any), and unless otherwise expressly provided in this Agreement or determined by the Company, the Participant's right to vest in the RSUs under the Plan, if any, will terminate as of such date and will not be extended by any notice period (e.g., the period of service would not include any contractual notice period or any period of "garden leave" or similar period mandated under employment laws in the jurisdiction where the participant is employed or providing services or the terms of the Participant's employment or service agreement, if any); the Committee shall have the exclusive discretion to determine when

the Participant is no longer actively providing services for purposes of the RSU grant (including whether the Participant may still be considered to be providing services while on a leave of absence).

4. Restrictions on Transfer. The Participant shall not sell, assign, transfer, pledge, hypothecate, encumber or otherwise dispose of, by operation of law or otherwise (collectively "transfer") any RSUs, or any interest therein. The Company shall not be required to treat as the owner of any RSUs or issue any Common Stock to any transferee to whom such RSUs have been transferred in violation of any of the provisions of this Agreement.

5. Rights as a Stockholder. The Participant shall have no rights as a stockholder of the Company with respect to any shares of Common Stock that may be issuable with respect to the RSUs until the issuance of the shares of Common Stock to the Participant following the vesting of the RSUs.

6. Provisions of the Plan. This Agreement is subject to the provisions of the Plan, a copy of which is furnished to the Participant with this Agreement.

7. Nature of Grant. In accepting the grant, the Participant acknowledges, understands and agrees that:

(a) the Plan is established voluntarily by the Company, it is discretionary in nature and it may be modified, amended, suspended or terminated by the Company at any time, to the extent permitted by the Plan;

(b) the grant of the RSUs is exceptional, voluntary and occasional and does not create any contractual or other right to receive future grants of RSUs, or benefits in lieu of RSUs, even if RSUs have been granted in the past;

(c) all decisions with respect to future RSUs or other grants, if any, will be at the sole discretion of the Company;

(d) the RSU grant and participation in the Plan shall not create a right to employment or other service relationship with the Company;

(e) the RSU grant and participation in the Plan shall not be interpreted as forming or amending an employment or service contract with the Company or the Employer, and shall not interfere with the ability of the Company, the Employer or any affiliate of the Company, as applicable, to terminate the Participant's employment relationship (if any);

(f) the Participant is voluntarily participating in the Plan;

(g) the RSUs and the shares of Common Stock subject to the RSUs, and the income from and value of same, are not intended to replace any pension rights or compensation;

(h) the RSUs and the shares of Common Stock subject to the RSUs, and the income and value of same, are not part of normal or expected compensation for purposes of,

including but not limited to, calculating any severance, resignation, termination, redundancy, dismissal, end-of-service payments, bonuses, holiday pay, long-service awards, pension or retirement or welfare benefits or similar payments;

(i) unless otherwise agreed with the Company in writing, the RSUs and the shares of Common Stock subject to the RSUs, and the income and value of same, are not granted as consideration for, or in connection with, the service the Participant may provide as a director of a subsidiary of the Company;

(j) the future value of the underlying shares of Common Stock is unknown, indeterminable and cannot be predicted with certainty;

(k) no claim or entitlement to compensation or damages shall arise from forfeiture of the RSUs resulting from the termination of the Participant's employment or other service relationship (for any reason whatsoever, whether or not later found to be invalid or in breach of employment laws in the jurisdiction where the Participant is employed or engaged or the terms of the Participant's employment agreement, if any); and

(l) neither the Company, the Employer nor any other subsidiary or affiliate of the Company shall be liable for any foreign exchange rate fluctuation between the Participant's local currency and the United States Dollar that may affect the value of the RSU or of any amounts due to me pursuant to the settlement of the RSU or the subsequent sale of any shares of Common Stock acquired upon settlement.

8. Tax Matters.

(a) Acknowledgments; Responsibility for Taxes. The Participant acknowledges that, regardless of any action taken by the Company or, if different, the Participant's employer (the "Employer"), the ultimate liability for all income tax, social insurance, payroll tax, fringe benefits tax, payment on account or other tax-related items related to the Participant's participation in the Plan and legally applicable or deemed applicable to the Participant ("Tax-Related Items"), is and remains the Participant's responsibility and may exceed the amount actually withheld by the Company or the Employer. The Participant further acknowledges that the Company and/or the Employer: (i) make no representations or undertakings regarding the treatment of any Tax-Related Items in connection with any aspect of this award of RSUs; and (ii) do not commit to and are under no obligation to structure the terms of the grant or any aspect of the RSUs to reduce or eliminate the Participant's liability for Tax-Related Items or achieve any particular tax result. Further, if the Participant is subject to Tax-Related Items in more than one jurisdiction, the Participant acknowledges that the Company and/or the Employer (or former employer, as applicable) may be required to withhold or account for Tax-Related Items in more than one jurisdiction.

(b) Withholding. Prior to the relevant taxable or tax withholding event and at such time as the Participant is not aware of any material nonpublic information about the Company or the Common Stock and the Participant is not subject to any restriction on trading activities with respect to the Common Stock pursuant to any Company insider trading or other policy, the Participant shall execute the instructions set forth in Schedule A attached hereto (the

"Automatic Sale Instructions") as the means of satisfying the withholding obligations for Tax-Related Items (the "Sell-to-Cover Withholding"). In the event the Sell-to-Cover Withholding results in over-withholding, the Participant may receive a refund of any over-withheld amount in cash and will have no entitlement to the stock equivalent, or if not refunded, the Participant may seek a refund from the local tax authorities. In the event of under-withholding, the Participant may be required to pay any additional Tax-Related Items directly to the applicable tax authority, to the Company or to the Employer. The Participant agrees to pay to the Company or the Employer, as applicable, including through withholding from the Participant's wages or other cash compensation paid to the Participant by the Company and/or the Employer, any amount of Tax-Related Items that the Company or the Employer may be required to withhold or account for as a result of the Participant's participation in the Plan that cannot be satisfied by the Sell-to-Cover Withholding. If the Participant fails to comply with his or her obligations in connection with the Tax-Related Items, the Company may refuse to issue or deliver the shares or the proceeds of the sale of shares of Common Stock.

9. Data Privacy. If the Participant would like to participate in the Plan, the Participant will need to review the information provided in this Section 9 and declare with its signature under this Agreement consent to processing of Participant's personal data for such processing activities requiring consent.

If the Participant is based in the EEA+ (as defined below), the Participant has the right to withdraw his or her consent for such processing activities at any time and declares that he or she has read the transparency document on the website of the Company or, if different, the Participant's Employer. The withdrawal of consent does not affect the lawfulness of processing based on consent before its withdrawal. Other processing activities (e.g., the transfer of personal data to tax authorities) are based on other legal grounds, e.g., a legal obligation to which the controller is subject, or a legitimate interest pursued by the controller or by a third party. For such processing activities consent is not needed or given by the Participant.

(a) EEA+ Controller and Representative. If the Participant is based in the European Union ("EU"), the European Economic Area, or the United Kingdom (collectively "EEA+"), the Participant should note that the Company, with its registered address at 1540 Broadway, 24th Floor, New York, New York 10036, United States of America, is the controller responsible for the processing of the Participant's personal data in connection with the Agreement and the Plan. The Company's representative in the EEA+ by means of Art. 27 GDPR is Prof. Dr. h.c. Heiko Jonny Maniero, DGD Deutsche Gesellschaft für Datenschutz GmbH, Fraunhoferring 3, 85238 Petershausen. The representative can be reached by email at heiko.maniero@dg-datenschutz.de.

(b) Data Collection and Usage. The Company collects, uses and otherwise processes certain personal data about the Participant, including, but not limited to, the Participant's name, home address and telephone number, email address, date of birth, social insurance number, passport or other identification number (e.g., resident registration number), salary, nationality, job title, any shares of stock or directorships held in the Company, details of all options or any other entitlement to shares of stock awarded, canceled, exercised, vested, unvested or outstanding in the Participant's favor, which the Company receives from the Participant, Participant's Employer or otherwise in connection with this Agreement or the Plan ("Data"), for

the purposes of implementing, administering and managing the Plan and allocating shares of Common Stock pursuant to the Plan.

If the Participant is based in the EEA+, the legal basis, where required, for the processing of Data by the Company is: (i) the consent of the Participant; or (ii) the necessity of the data processing for the Company to (1) perform its contractual obligations under this Agreement, (2) comply with legal obligations established in the EEA+, or (3) pursue the legitimate interest of complying with legal obligations established outside of the EEA+.

If the Participant is based outside of the EEA+, the legal basis, where required, for the processing of Data by the Company is the Participant's consent, as further described below.

(c) Stock Plan Administration Service Providers. The Company grants access to Data to TD Ameritrade, Inc., an independent service provider, which is assisting the Company with the implementation, administration and management of the Plan ("Broker"). In the future, the Company may select a different service provider and share Data with such other provider serving in a similar manner. Broker will open an account for the Participant to receive and trade shares of Common Stock acquired under the Plan. The Participant may be asked to agree on separate terms and data processing practices with Broker, with such agreement being a condition of participating in the Plan.

(d) International Data Transfers. In the event the Participant resides, works or is otherwise located outside of the U.S., Data will be transferred from the Participant's country to the U.S., where the Company and its service providers are based. The Participant understands and acknowledges that the U.S. might not provide a level of protection of personal data equivalent to the level of protection in the Participant's country.

If the Participant is based in the EEA+, the legal basis, where required, for the transfer of Data from the EEA+ to the Company and for the access to Data granted by the Company to Broker or, as the case may be, a different service provider of the Company in the U.S. is to satisfy the Company's contractual obligations under the terms of this Agreement and/or its use of the standard data protection clauses adopted by the EU Commission.

If the Participant is based outside of the EEA+, the Company's legal basis, where required, for the transfer of Data from the Participant's country to the Company and for the access to Data granted by the Company to Broker or, as the case may be, a different service provider of the Company is the Participant's consent, as further described below.

(e) Data Retention. The Company will hold and use the Data only as long as is necessary to implement, administer and manage the Participant's participation in the Plan, or as required to comply with legal or regulatory obligations, including under tax and security laws.

(f) Data Subject Rights. The Participant may have a number of rights under data privacy laws in his or her jurisdiction. Depending on where the Participant is based and subject to the conditions set out in applicable law, such rights may include the right to request from the Company access to and rectification, erasure or portability of Data, to restrict or object to the processing of Data, lodge a complaint with a supervisory authority and/or to receive a list with the names and addresses of any potential recipients of Data. To receive additional information

regarding these rights or to exercise these rights, the Participant can contact the Company's data privacy representative at heiko.maniero@dg-datenschutz.de.

(g) Necessary Disclosure of Personal Data. The Participant understands that providing the Company with Data is necessary for the performance of the Agreement and that the Participant's refusal to provide Data would make it impossible for the Company to perform its contractual obligations and may affect the Participant's ability to participate in the Plan.

(h) Voluntariness and Consequences of Consent Denial or Withdrawal. Participation in the Plan is voluntary and the Participant is providing any consents referred to herein on a purely voluntary basis. The Participant understands that he or she may withdraw any such consent at any time with future effect for any or no reason. If the Participant does not consent, or if the Participant later seeks to withdraw his or her consent, the Participant's salary from or employment and career with the Employer will not be affected; the only consequence of refusing or withdrawing the Participant's consent is that the Company would not be able to grant the options or other awards to the Participant or administer or maintain the options. For more information on the consequences of refusal to consent or withdrawal of consent, the Participant should contact the Company's data privacy representative at heiko.maniero@dg-datenschutz.de.

If the Participant is based outside of the EEA+, by accepting the options and indicating consent via the Company's online acceptance procedure, the Participant explicitly declares his or her consent to the entirety of the Data processing operations described in this Section 9 including, without limitation, access to Data provided by the Company to Broker or, as the case may be, a different service provider of the Company in the U.S.

10. Miscellaneous.

(a) Section 409A. The RSUs awarded pursuant to this Agreement are intended to be exempt from or comply with the requirements of Section 409A of the Code and the Treasury Regulations issued thereunder ("Section 409A"). The delivery of shares of Common Stock on the vesting of the RSUs may not be accelerated or deferred unless permitted or required by Section 409A.

(b) No Advice Regarding Grant. The Company is not providing any tax, legal or financial advice, nor is the Company making any recommendations regarding participation in the Plan, or the acquisition or sale of the underlying shares of Common Stock. The Participant understands and agrees that he or she should consult with his or her own personal tax, legal and financial advisors regarding participation in the Plan before taking any action related to the Plan.

(c) Governing Law and Venue. The provisions of this Agreement shall be governed by and interpreted in accordance with the laws of the State of Delaware, excluding choice-of-law principles of the law of such state that would require the application of the laws of a jurisdiction other than the State of Delaware. For purposes of litigating any dispute that arises directly or indirectly from the relationship of the parties evidenced by this grant or this Agreement, the parties hereby submit to the exclusive jurisdiction of the State of New York and agree that such litigation shall be conducted only in the courts of New York County, New York,

or the federal courts for the United States for the Southern District of New York, and no other courts, where this grant is made and/or to be performed.

(d) Entire Agreement; Enforcement of Rights. This Agreement, together with the Plan, sets forth the entire agreement and understanding of the parties relating to the subject matter herein and supersedes all prior discussions, agreements, commitments, or negotiations between the parties. No adverse modification or amendment of this Agreement, nor any waiver of any rights under this Agreement, will be effective unless in writing and signed by the parties to this Agreement (which may be electronic). The failure by either party to enforce any rights under this Agreement will not be construed as a waiver of any rights of such party.

(e) Severability. If one or more provisions of this Agreement are held to be unenforceable under applicable laws, the parties agree to renegotiate such provision in good faith. In the event that the parties cannot reach a mutually agreeable and enforceable replacement for such provision, then (a) such provision shall be excluded from this Agreement, (b) the balance of this Agreement shall be interpreted as if such provision were so excluded, and (c) the balance of this Agreement shall be enforceable in accordance with its terms.

(f) Consent to Electronic Delivery and Participation. The Company may, in its sole discretion, decide to deliver any documents related to current or future participation in the Plan by electronic means. The Participant hereby consents to receive such documents by electronic delivery and agrees to participate in the Plan through an on-line or electronic system established and maintained by the Company or a third party designated by the Company.

(g) Language. The Participant acknowledges that the Participant is proficient in the English language and, accordingly, understands the provisions of this Agreement and the Plan. If the Participant has received this Agreement, or any other document related to the RSUs and/or the Plan translated into a language other than English and if the meaning of the translated version is different than the English version, the English version will control.

(h) Compliance with Law. Notwithstanding any other provision of the Plan or this Agreement, unless there is an exemption from any registration, qualification or other legal requirement applicable to the shares of Common Stock, the Company shall not be required to deliver any shares issuable upon settlement of the RSU prior to the completion of any registration or qualification of the shares under any local, state, federal or foreign securities or exchange control law or under rulings or regulations of the U.S. Securities and Exchange Commission ("SEC") or of any other governmental regulatory body, or prior to obtaining any approval or other clearance from any local, state, federal or foreign governmental agency, which registration, qualification or approval the Company shall, in its absolute discretion, deem necessary or advisable. The Participant understands that the Company is under no obligation to register or qualify the shares with the SEC or any state or foreign securities commission or to seek approval or clearance from any governmental authority for the issuance or sale of the shares. Further, the Participant agrees that the Company shall have unilateral authority to amend the Agreement without the Participant's consent to the extent necessary to comply with securities or other laws applicable to issuance of shares.

(i) Country-Specific Provisions. The RSUs shall be subject to any special terms and conditions set forth in the Appendix for the Participant's country. Moreover, if the Participant relocates to one of the countries included in the Appendix, the special terms and conditions for such country will apply to the Participant to the extent the Company determines that the application of such terms and conditions is necessary or advisable for legal or administrative reasons. The Appendix constitutes part of this Agreement.

(j) Imposition of Other Requirements. The Company reserves the right to impose other requirements on Participant's participation in the Plan, on the RSUs, and on any shares of Common Stock issued upon the vesting of the RSUs, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require the Participant to accept any additional agreements or undertakings that may be necessary to accomplish the foregoing.

(k) Insider Trading/Market Abuse Laws. The Participant may be subject to insider trading restrictions and/or market abuse laws in applicable jurisdictions, including, but not limited to, the United States and the Participant's country, which may affect the Participant's ability to accept, acquire, sell, or otherwise dispose of shares of Common Stock, rights to shares of Common Stock (*e.g.*, RSUs), or rights linked to the value of shares of Common Stock under the Plan during such times as the Participant is considered to have "inside information" regarding the Company (as defined by the laws in the applicable jurisdictions). Insider trading laws and regulations may prohibit the cancellation or amendment of orders the Participant placed before the Participant possessed inside information. Furthermore, the Participant could be prohibited from (i) disclosing the inside information to any third party, which may include fellow employees and (ii) "tipping" third parties or causing them otherwise to buy or sell securities. Any restrictions under these laws or regulations are separate from and in addition to any restrictions that may be imposed under the Company's trading policy. Neither the Company nor any of its affiliates will be responsible for such restrictions or liable for the failure on the Participant's part to know and abide by such restrictions. The Participant should consult with his or her own personal advisor regarding compliance with such restrictions.

(l) Participant's Acknowledgements. The Participant acknowledges that he or she: (i) has read this Agreement; (ii) has been represented in the preparation, negotiation and execution of this Agreement by legal counsel of the Participant's own choice or has voluntarily declined to seek such counsel; (iii) understands the terms and consequences of this Agreement; (iv) is fully aware of the legal and binding effect of this Agreement; and (v) agrees that in accepting this award, to the extent permitted by law, he or she will be bound by any clawback policy that the Company may adopt in the future.

Schrödinger, Inc.

COUNTRY-SPECIFIC APPENDIX TO

RESTRICTED STOCK UNIT AGREEMENT FOR NON-U.S. PARTICIPANTS

Capitalized terms used but not defined in this Country-Specific Appendix (the "Appendix") shall have the same meanings assigned to them in the Plan or the Agreement.

Terms and Conditions

This Appendix, which is part of the Agreement, includes additional terms and conditions that govern the RSUs if the Participant works and/or resides in one of the countries listed below. If the Participant is a citizen or resident of a country other than the one in which he or she is currently working (or is considered as such for local law purposes), or if the Participant transfers employment or residency to a different country after receiving the RSUs, the Company will, in its discretion, determine the extent to which the terms and conditions contained herein will be applicable to the recipient.

Notifications

This Appendix also includes information regarding certain other issues about which the Participant should be aware with respect to participation in the Plan. The information is based on the securities, exchange control and other laws in effect in the respective countries as of August 2021. Such laws are often complex and change frequently. As a result, the recipient should not rely on the information noted herein as the only source of information relating to the consequences of participation in the Plan because the information may be out-of-date when the RSUs vest and/or when the Participant sells any shares of Common Stock acquired under the Plan.

In addition, the information contained herein is general in nature and may not apply to the Participant's particular situation. As a result, the Company is not in a position to assure the Participant of any particular result. Accordingly, the Participant is strongly advised to seek appropriate professional advice as to how the relevant laws in the recipient's country may apply to his or her situation.

If the Participant is a citizen or resident of a country other than the one in which he or she is currently working (or is considered as such for local law purposes), or transfers employment/residency to a different country after receiving the RSUs, the notifications contained in this Appendix may not be applicable to the Participant in the same manner.

AUSTRALIA

Notifications

Tax Conditions. Subdivision 83A-C of the Income Tax Assessment Act 1997 (Cth) applies to the RSUs granted under the Plan, such that the RSU grant is intended to be subject to deferred taxation.

Securities Law Information. This grant of RSUs is intended to comply with the provisions of the Corporations Act 2001, ASIC Regulatory Guide 49 and ASIC Class Order CO 14/1000. Additional details are set forth in the Australian Offer Document provided herewith.

Exchange Control Information. If the Participant is an Australian resident, exchange control reporting is required for cash transactions exceeding AUD10,000 and international fund transfers. If an Australian bank is assisting with the transaction, the bank will file the report on the Participant's behalf. If there is no Australian bank involved with the transfer, the Participant will be required to file the report.

FRANCE

Terms and Conditions

Consent to Receive Information in English. By accepting the RSUs, the Participant confirms that he or she has read and understood the Plan and the Agreement, including all terms and conditions included therein, which were provided in the English language. The Participant accepts the terms of those documents accordingly.

En acceptant les RSUs, le Titulaire de les RSUs confirme avoir lu et compris le Plan et le Contrat y relatifs, incluant tous leurs termes et conditions, qui ont été transmis en langue anglaise. Le Titulaire de les RSUs accepte les dispositions de ces documents en connaissance de cause.

Notifications

Tax Information. The RSUs are not intended to qualify for special tax and social security treatment applicable to restricted stock units granted under Section L.225-197-1 to L.225-197-6 of the French Commercial Code, as amended.

Foreign Asset/Account Reporting Information. If the Participant holds cash or shares of Common Stock outside of France, the Participant must declare all foreign bank and brokerage accounts (including any accounts that were opened or closed during the tax year) on an annual basis, on form No. 3916, together with his or her income tax return. *It is the Participant's responsibility to comply with French foreign asset and account reporting requirements, and neither the Company nor the Employer will be liable for any resulting fines or penalties.*

GERMANY

Notifications

Exchange Control Information. If the Participant remits funds in excess of €12,500 out of or into Germany, such cross-border payment must be reported monthly to the German Federal Bank (*Bundesbank*). The Participant is responsible for the reporting obligation and should file the report ("*Allgemeine Meldeportal Statistik*") electronically by the fifth day of the month following the month in which the payment is made. A copy of the report can be accessed via the Bundesbank's website at www.bundesbank.de and is available in both German and English.

Foreign Asset/Account Reporting Information. If the acquisition of shares of Common Stock under the Plan leads to a "qualified participation" at any point during the calendar year, the Participant will need to report the acquisition when he or she files his or her tax return for the relevant year. A qualified participation is attained if (i) the value of the shares of Common Stock acquired exceeds €150,000 or (ii) in the unlikely event the Participant holds shares of Common Stock exceeding 10% of the Company's total Common Stock. *The Participant is responsible for complying with this reporting obligation and should confer with his or her personal tax advisor to determine his or her obligations in this regard.*

INDIA

Notifications

Exchange Control Information. Indian residents are required to repatriate the proceeds from the sale of shares of Common Stock to India within specified timeframes. The Participant must retain the foreign inward remittance certificate received from the bank where the foreign currency is deposited in the event that the Reserve Bank of India or the Employer requests proof of repatriation. It is the Participant's responsibility to comply with these requirements. Neither the Company nor the Employer will be liable for any fines or penalties resulting from the Participant's failure to comply with any applicable laws.

Foreign Asset/Account Reporting Information. Indian residents are required to declare any foreign bank accounts and any foreign financial assets (including shares of Common Stock held outside of India) in their annual tax returns. *The Participant is responsible for complying with this reporting obligation and should confer with his or her personal tax advisor to determine his or her obligations in this regard.*

IRELAND

Notifications

Director Notification Obligation. If the Participant is a director, shadow director, or secretary of an Irish affiliate, the Participant is required to notify such Irish affiliate in writing if the Participant receives or disposes of an interest in the Company representing more than 1% of the Company's voting share capital (e.g., RSUs, shares of Common Stock, etc.), if the Participant becomes aware of the event giving rise to such notification requirement, or if the Participant

becomes a director, shadow director, or secretary of an Irish affiliate if such an interest exists at the time. This notification requirement also applies with respect to the interests of a spouse or children under the age of 18 (whose interests will be attributed to the director, shadow director, or secretary).

JAPAN

Notifications

Foreign Asset / Account Reporting Information. The Participant will be required to report details of any assets held outside of Japan as of December 31st to the extent such assets have a total net fair market value exceeding ¥50 million. Such report will be due by March 15th each year. *The Participant is responsible for complying with this reporting obligation and should confer with their personal tax advisor to determine the Participant's obligations in this regard.*

SOUTH KOREA

Notifications

Foreign Asset / Account Reporting Information. The Participant must declare all foreign financial accounts (*e.g.*, non-Korean bank accounts, brokerage accounts) to the Korean tax authority and file a report with respect to such accounts in June of the following year if the monthly balance of such accounts exceeds KRW 500 million (or an equivalent amount in foreign currency) on any month-end date during a calendar year. *The Participant is responsible for complying with this reporting obligation and should confer with their personal tax advisor to determine the Participant's obligations in this regard.*

UNITED KINGDOM

Terms and Conditions

Tax Matters. The following provision supplements Section 8 of the Agreement:

Without limitation to Section 8 of the Agreement, the Participant agrees that the Participant is liable for all Tax-Related Items and hereby covenants to pay all such Tax-Related Items, as and when requested by the Company or the Employer or by Her Majesty's Revenue and Customs ("HMRC") (or any other tax authority or any other relevant authority). The Participant also agrees to indemnify and keep indemnified the Company and the Employer against any Tax-Related Items that they are required to pay or withhold or have paid or will pay to HMRC (or any other tax authority or any other relevant authority) on the Participant's behalf.

Notwithstanding the foregoing, if the Participant is a director or an executive officer of the Company (within the meaning of such terms for purposes of Section 13(k) of the Exchange Act), the Participant acknowledges that the Participant may not be able to indemnify the Company or the Employer for the amount of any income tax not collected from or paid by the Participant, as it may be considered a loan. In this case, the amount of any income tax not collected within 90 days of the end of the U.K. tax year in which the event giving rise to the Tax-Related Item(s)

occurs may constitute an additional benefit to the Participant on which additional income tax and National Insurance contributions ("NICs") may be payable. The Participant will be responsible for reporting and paying any income tax due on this additional benefit directly to HMRC under the self-assessment regime and for reimbursing the Company or the Employer (as appropriate) for the value of any employee NICs due on this additional benefit, which the Company or the Employer may recover from the Participant by any of the means referred to in the Plan or Section 8 of the Agreement.

Schedule A

Automatic Sale Instructions

The undersigned hereby consents and agrees that any taxes due on a vesting date as a result of the vesting of RSUs on such date shall be paid through an automatic sale of shares as follows:

(a) Upon any vesting of RSUs pursuant to Section 2 hereof, the Company shall arrange for the sale of such number of shares of Common Stock issuable with respect to the RSUs that vest pursuant to Section 2 as is sufficient to generate net proceeds sufficient to satisfy the Company's minimum statutory withholding obligations (or, for Participants outside the United States, applicable statutory withholding obligations) with respect to the income recognized by the Participant upon the vesting of the RSUs (based on minimum statutory withholding rates (or, for Participants outside the United States, applicable statutory withholding rates) for all tax purposes, including payroll and social security taxes, that are applicable to such income), and the net proceeds of such sale shall be delivered to the Company in satisfaction of such tax withholding obligations.

(b) The Participant hereby appoints the Chief Executive Officer, the Chief Financial Officer and the Chief Legal Officer (or a person holding a similar title), and any of them acting alone and with full power of substitution, to serve as his or her attorneys in fact to arrange for the sale of the Participant's Common Stock in accordance with this Schedule A. The Participant agrees to execute and deliver such documents, instruments and certificates as may reasonably be required in connection with the sale of the shares pursuant to this Schedule A.

(c) The Participant represents to the Company that, as of the date hereof, he or she is not aware of any material nonpublic information about the Company or the Common Stock and is not subject to any restriction on trading activities with respect to the Common Stock pursuant to any Company insider trading policy or other policy. The Participant and the Company have structured this Agreement, including this Schedule A, to constitute a "binding contract" relating to the sale of Common Stock, consistent with the affirmative defense to liability under Section 10(b) of the Securities Exchange Act of 1934 under Rule 10b5-1(c) promulgated under such Act.

The Company shall not deliver any shares of Common Stock to the Participant until it is satisfied that all required withholdings have been made.

_____

Participant Name: _____

Date: _____

Exhibit 21.1

List of Subsidiaries

Name	Jurisdiction of Incorporation
Schrödinger, LLC	Delaware
Schrödinger GmbH	Germany
Synaptic Science LLC	Delaware
Schrödinger, KK	Japan
Reo Discovery Limited	Ireland
Faxian Therapeutics, LLC	Delaware
Schrödinger Technologies Ltd	United Kingdom
Schrödinger India Private Limited	India
Schrodinger Korea LLC	South Korea
XTAL BioStructures, Inc.	Massachusetts

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 statements (No. 333-236297 and 333-253864) on Form S-8 and in the registration statement (No. 333-253865) on Form S-3 of our reports dated February 24, 2022, with respect to the consolidated financial statements of Schrödinger, Inc. and the effectiveness of internal control over financial reporting.

/s/ KPMG LLP

Portland, Oregon
February 24, 2022

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)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
    a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
    b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
    c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
    d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
    a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 24, 2022

/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)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
    a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
    b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
    c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
    d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
    a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 24, 2022

/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, 2021 (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: February 24, 2022

/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, 2021 (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: February 24, 2022

/s/ Joel Lebowitz

Chief Financial Officer (Principal Financial Officer)