UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2022

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: 001-39799

Certara, Inc.

(Exact Name of Registrant as Specified in Its Charter)

Delaware	**82-2180925**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
100 Overlook Center, Suite 101 **Princeton, New Jersey**	**08540**
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: **(609) 716-7900**

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

Title of each class	Trading Symbol	Name of each exchange on which registered
Common stock, par value $0.01 per share	CERT	The Nasdaq Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: None

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

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

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

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

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

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. ☒

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

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

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

The aggregate market value of the registrant's outstanding voting common stock held by non-affiliates on June 30, 2021, determined using the per share closing price on that date on The Nasdaq Global Select Market, was $2.5 billion. There is no non-voting common equity of the registrant outstanding. Shares held by each executive officer and director and by each other person or entity deemed to be an affiliate have been excluded in such calculation. The determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of February 15, 2023, the registrant had 159,458,375 shares of common stock, par value $0.01 per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the proxy statement for the registrant's 2022 Annual Meeting of Stockholders to be held May 23, 2023, which will be filed with the Securities and Exchange Commission within 120 days after the end of the 2022 fiscal year, are incorporated by reference in Part III of this Annual Report on Form 10-K.

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Unless otherwise indicated, references to the "Company," "Certara," "we," "us" and "our" refer to Certara, Inc. and its consolidated subsidiaries.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K (this "Annual Report") contains "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended (the "Securities Act"), and Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), which are subject to the "safe harbor" created by those sections. All statements (other than statements of historical facts) in this Annual Report regarding the prospects of the industry and our prospects, plans, financial position and business strategy may constitute forward-looking statements. In addition, forward-looking statements generally can be identified by the use of forward-looking terminology such as "may," "should," "expect," "might," "intend," "will," "estimate," "anticipate," "plan," "believe," "predict," "potential," "continue," "suggest," "project" or "target" or the negatives of these terms or variations of them or similar terminology. Although we believe that the expectations reflected in these forward-looking statements are reasonable, we cannot provide any assurance that these expectations will prove to be correct. Such statements reflect the current views of our management with respect to our operations, results of operations and future financial performance. The following factors are among those that may cause actual results to differ materially from the forward-looking statements:

- our ability to compete within our market;
- any deceleration in, or resistance to, the acceptance of model-informed biopharmaceutical discovery and development;
- our ability to retain key personnel or recruit additional qualified personnel;
- changes or delays in government regulation relating to the biopharmaceutical industry;
- increasing competition, regulation and other cost pressures within the pharmaceutical and biotechnology industries;
- trends in research and development ("R&D") spending, the use of third parties by biopharmaceutical companies and a shift toward more R&D occurring at smaller biotechnology companies;
- our ability to successfully enter new markets, increase our customer base and expand our relationships with existing customers;
- the occurrence of natural disasters and epidemic diseases, including the ongoing COVID 19 pandemic, which may result in delays or cancellations of customer contracts or decreased utilization by our employees;
- our ability to sustain recent growth rates;
- any future acquisitions and our ability to successfully integrate such acquisitions;
- consolidation within the biopharmaceutical industry;
- reduction in the use of our products by academic institutions;
- pricing pressures due to increased customer utilization of our products;
- any delays or defects in our release of new or enhanced software or other biosimulation tools;
- failure of our existing customers to renew their software licenses or any delays or terminations of contracts or reductions in scope of work by our existing customers;
- our ability to accurately estimate costs associated with our fixed-fee contracts;
- risks related to our contracts with government customers, including the ability of third parties to challenge our receipt of such contracts;
- the accuracy of our addressable market estimates;
- the length and unpredictability of our software and service sales cycles;
- our ability to successfully operate a global business;
- our ability to comply with applicable anti-corruption, trade compliance and economic sanctions laws and regulations;;
- our ability to perform our services in accordance with contractual requirements, regulatory standards and ethical considerations;

- the loss of more than one of our major customers;
- our future capital needs;
- the ability or inability of our bookings to accurately predict our future revenue and our ability to realize the anticipated revenue reflected in our bookings;
- any disruption in the operations of the third-party providers who host our software solutions or any limitations on their capacity or interference with our use;
- our ability to reliably meet our data storage and management requirements, or the experience of any failures or interruptions in the delivery of our services over the internet;
- our ability to comply with the terms of any licenses governing our use of third-party open source software utilized in our software solutions;
- any unauthorized access to or use of customer or ither proprietary or confidential data or other breach of our cybersecurity measures;
- our ability to comply with applicable privacy and cybersecurity laws;
- our ability to adequately enforce or defend our ownership and use of our intellectual property and other proprietary rights;
- any allegations that we are infringing, misappropriating or otherwise violating a third party's intellectual property rights;
- risks related to litigation against us;
- the adequacy of our insurance coverage and our ability to obtain adequate insurance coverage in the future;
- our ability to meet the obligations under our current or future indebtedness as they become due and have sufficient capital to operate our business and react to changes in the economy or industry;
- any limitations on our ability to pursue our business strategies due to restrictions under our current or future indebtedness or inability to comply with any restrictions under such indebtedness;
- any impairment of goodwill or other intangible assets;
- our ability to use our net operating loss ("NOLs") and R&D tax credit carryforwards to offset future taxable income;
- the accuracy of our estimates and judgments relating to our critical accounting policies and any changes in financial reporting standards or interpretations;
- any inability to design, implement, and maintain effective internal controls when required by law, or inability to timely remediate internal controls that are deemed ineffective; and
- the other factors discussed under "Risk Factors."

You should not rely upon forward-looking statements as predictions of future events. The forward-looking statements in this Annual Report are based on our beliefs, assumptions and expectations of future performance, taking into account the information currently available to us. These statements are only predictions based upon our current expectations and projections about future events. There are important factors, including those described in the section titled "Risk Factors" and elsewhere in this Annual Report, that could cause our actual results, level of activity, performance or achievements to differ materially from the results, level of activity, performance or achievements expressed or implied by the forward-looking statements. Other sections of this Annual Report may include additional factors that could adversely impact our business and financial performance. Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time and it is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make in this Annual Report. Before investing in our common stock, investors should be aware that the occurrence of the events described under the caption "Risk Factors" and elsewhere in this Annual Report could have a material adverse effect on our business, results of operations and financial condition.

Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee that the future results, levels of activity, performance and events and circumstances reflected in the forward-looking statements will be achieved or occur. For a more detailed discussion of the risks, uncertainties and other factors that could cause actual results to differ, please refer to the "Risk Factors" in this Annual Report, as such risk factors may be updated from time to time in our periodic filings with the U.S. Securities and Exchange Commission (the "SEC"). Our periodic filings are accessible on the SEC's website at www.sec.gov.

The forward-looking statements made in this Annual Report relate only to events as of the date on which the statements are made. Except as required by law, we undertake no obligation to update publicly any forward-looking statements for any reason after the date of this Annual Report to conform these statements to actual results or to changes in our expectations.

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, and 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.

Channels for Disclosure of Information

Investors and others should note that we may announce material information to the public through filings with the SEC, our Investors Relations website (https://ir.certara.com), press releases, public conference calls and public webcasts. We use these channels to communicate with the public about the Company, our products, our services and other matters. We encourage our investors, the media and others to review the information disclosed through such channels as such information could be deemed to be material information. The information on such channels, including on our website, is not incorporated by reference in this Annual Report and shall not be deemed to be incorporated by reference into any other filing under the Securities Act or the Exchange Act, except as expressly set forth by specific reference in such a filing. Please note that this list of disclosure channels may be updated from time to time.

PART I

Item 1. Business.

Our Company

We accelerate medicines to patients using biosimulation software, technology, and services to transform traditional drug discovery and development.

Biosimulation is a powerful technology used to conduct virtual trials using virtual patients to better understand how drugs behave in different individuals. Biopharmaceutical companies use our proprietary biosimulation software throughout drug discovery and development to inform critical decisions that not only save significant time and money but also advance drug safety and efficacy, improving millions of lives each year.

As a global leader in biosimulation based on 2022 revenue, we provide an integrated, end-to-end platform used by more than 2,300 biopharmaceutical companies and academic institutions across 70 countries, including 39 of the top 40 biopharmaceutical companies by R&D spend in 2021. Since 2014, customers who use our biosimulation software and technology-driven services have received 90% of all new drug approvals by the U.S. Food and Drug Administration ("FDA"). Moreover, 20 global regulatory authorities license our biosimulation software to independently analyze, verify, and review regulatory submissions, including the FDA, Health Canada, Japan's Pharmaceuticals and Medical Devices Agency ("PMDA"), and the UK's Medicines and Healthcare products Regulatory Agency ("MHRA"). Demand for our offerings continues to expand rapidly.

While traditional drug development has led to important therapies, such as vaccines and chemotherapy, many patients still wait for life-saving medicines, which can take more than 10 years and $2 billion to bring to market. Change is necessary to continue delivering meaningful gains in human health at an accelerated pace. We believe that biosimulation helps enable this change.

We build our biosimulation technology on first principles of biology, chemistry, and pharmacology with proprietary mathematical algorithms that model how medicines and diseases behave in the body. For over two decades, we have honed and validated our biosimulation technology with an abundance of data from scientific literature, lab research, and preclinical and clinical studies. In turn, our customers use biosimulation to conduct virtual trials to answer critical questions, such as: What will be the human response to a drug based on preclinical data? How will other drugs interfere with this new drug? What is a safe and efficacious dose for children, the elderly, or patients with pre-existing conditions? Virtual trials may be used to optimize dosing on populations that are otherwise difficult to study for ethical or logistical reasons, such as infants, pregnant women, the elderly, and cancer patients.

The benefits of biosimulation are significant. One of our customers, a top ten global biopharmaceutical company by R&D spend, estimated that they saved more than half a billion dollars over three years using biosimulation to inform key decisions. Biosimulation can reduce the size of and cost of human trials, the most expensive and time-consuming part of drug development, and in some cases, eliminate certain human trials completely, thereby accelerating time to market. An analysis published on Applied Clinical Trials Online, to which we contributed, estimated that $1 billion was saved in clinical trial costs using biosimulation for a cancer drug due to consistently shorter completion times in the later phase clinical trials.

We develop and apply our biosimulation technology throughout drug discovery and development with what we believe to be the largest and best team of scientists with deep expertise in biosimulation. Our scientists are recognized key opinion leaders who are at the forefront of the science and technology underpinning the rapidly emerging biosimulation field. We have collaborated on more than 7,000 customer projects in the past decade in therapeutic areas ranging from cancer and hematology to diabetes and hundreds of rare diseases.

Biosimulation results need to be incorporated into regulatory documents for compelling submissions. Accordingly, we provide regulatory science solutions and integrate them with biosimulation, so that our customers can navigate the complex and evolving regulatory landscape and maximize their chances of approval. Our differentiated regulatory services are powered by submissions management software and natural language processing for scalability and speed, allowing us to deliver more than 300 regulatory submissions over the past five years. Our team of regulatory professionals has extensive experience applying industry guidelines and global regulatory requirements. In addition, in October 2021, we completed the acquisition of Pinnacle 21, LLC ("Pinnacle"), which develops advanced software for standards-based data management for regulatory submission. Pinnacle enhances our software offerings in data management and the regulatory drug approval process, accelerating the speed and efficiency of developing and bringing drugs to market. Pinnacle's products are used by the FDA and Japan's PMDA to review the quality of submissions.

A final hurdle to delivering medicines to patients is market access, defined as strategies, processes, and activities to ensure that therapies are available to patients at the right price. We believe that biosimulation and market access will continue to be increasingly intertwined as healthcare systems and countries move toward outcomes-based pricing. We provide technology-driven market access solutions, which help our customers understand the real-world impact of therapies and dosing regimens earlier in the process and effectively communicate this to payors and health authorities. Our solutions are underpinned by software as a service ("SaaS") based offerings.

We have a proven track record of steady growth, driven by higher adoption of biosimulation, expansion of our technology portfolio, strategic acquisitions, and cross-selling of biosimulation, regulatory science, and market access solutions across our end-to-end platform:

- From 2021 to 2022, our revenue increased by 17% from $286.1 million to $335.6 million.

- The number of customers with Annual Customer Value ("ACV") of $100,000 or more in revenue increased from 299 in 2021 to 370 in 2022.

We believe that biosimulation continues to grow in adoption, driven by increasing global regulatory support and advancements in technology. We believe we are well-positioned to capture the significant market opportunity ahead of us. Our growth strategy is to build out the depth and breadth of our scalable, end-to-end biopharmaceutical platform to advance all stages of the continuum, from discovery and development to regulatory submission and market access. We continue to innovate and introduce new functionality and uses of biosimulation and technology-driven solutions. We increasingly integrate the science and data we obtain across this end-to-end platform to inform critical decisions. We further reduce the cost and time of human trials to materially accelerate the speed of development and availability of therapies to patients worldwide. As exciting new research areas arise, we attract and hire specialized talent and acquire complementary businesses to expand our offerings to address these market opportunities.

With continued innovation in and adoption of our biosimulation software, technology and services, we believe more biopharmaceutical companies worldwide will leverage more of our end-to-end platform to reduce cost, accelerate speed to market, and ensure safety and efficacy of medicines for all patients.

Our Markets

We believe our addressable market within the biopharmaceutical industry is large and rapidly expanding. The current total addressable market ("TAM") for our solutions represents an estimated $12 billion today and is expected to grow at a compound annual growth rate ("CAGR") of approximately 9% to 17% annually over the next four years. Our TAM estimate includes the biosimulation market estimated at $2.8 billion, which is estimated to grow at 17% CAGR over such period according to Grand View Research; the regulatory science market estimated at $7.1 billion, which is estimated to grow at 9% CAGR over such period according to Grand View Research; and the market access market estimated at $1.8 billion, which is estimated to grow at 12% CAGR over such period according to SpendEdge. With increasing adoption of technology across all stages of drug discovery and development, we believe our end-to-end platform and growth strategies position us to further penetrate the rapidly growing technology-driven biopharmaceutical R&D market of the future that leverages advanced modeling and analytics.

Traditional drug discovery and development is costly and prone to failure. The biopharmaceutical industry was estimated to have spent a total of approximately $238 billion in 2022 on R&D. The probability of success of compounds entering Phase I trials continues under 10%. With less than 50% of Phase III drugs reaching the market, late-stage failures are common and especially disappointing as sponsors have already incurred significant cost and time. At the same time, scientific advances are driving increased complexity as the R&D pipeline shifts from small molecules to biologics and cell and gene therapies.

With greater investment dollars being spent and increasing competition in the race to develop novel medicines, the speed and efficiency with which drugs are developed and brought to market have never been more critical. As a result, the demand for and willingness to adopt innovative approaches to discovery, development, and commercialization are rapidly increasing. Continued development and innovation in software and technology such as biosimulation, virtual trials, and real-world evidence tools are helping biopharmaceutical companies increase efficiency and decrease costs. This is further supported by regulatory agencies that have increasingly issued guidance that supports adoption of many of these innovations. For example, the FDA recently announced their Project Optimus initiative to reform the dose selection and optimization paradigm in oncology drug development to maximize both efficacy and safety. Biosimulation's use cases in dose finding and optimization are well-suited to help biopharmaceutical companies navigate this evolving regulatory landscape.

As technology and analytics become increasingly powerful and the application of new solutions is validated, we anticipate this will drive further demand for these innovations. We believe we are still in the early stages of a long-term trend that will continue to advance traditional drug discovery and development into a technology-driven era of advanced modeling and analytics.

In addition, as a result of the COVID-19 pandemic, we believe that the demand for innovative technology solutions in drug discovery and development will continue to be strong. Sponsors and regulators have adopted a number of technology-driven solutions and procedures, which we believe they will continue to use and benefit from in the post-COVID environment.

Our core markets today include:

- ***Biosimulation***: Biosimulation is the mathematical modeling of biological processes and systems to simulate how a drug affects the body, how the body affects the drug, how potential doses will affect different patient groups, and how patients will respond under various clinical scenarios. Biosimulation informs every stage of the drug discovery and development process and brings value through:
    - Identifying potential winners and losers at an earlier stage and allowing programs to “fail faster;”
    - Streamlining preclinical and clinical studies or eliminating certain ones altogether;
    - Optimizing dosing for different populations for enhanced safety and efficacy; and
    - Increasing probability of success and return on R&D, among others.
- ***Regulatory Science***: Regulatory science is the development and application of scientific methods, tools, and approaches to support regulatory and other policy objectives. Expert management of these processes is critical to drugs receiving regulatory approval and ultimately reaching patients and generating sales. Providers of regulatory technology and expertise drive significant value for biopharmaceutical companies through:
    - Utilizing best-in-class technology to reduce time-intensive regulatory writing activities and the need for regulatory writing staff;
    - Managing submission timelines and other requirements of global regulatory agencies;

- Generating clear, accurate applications and submissions; and

- Developing comprehensive global regulatory strategies, among others.

- ***Market Access***: To achieve commercial access, sponsors must assess, optimize and persuasively communicate the value of a new therapy, both therapeutic and economic, that stakeholders such as payors and health care providers will accept and act on. Market access services, including real-world evidence and health economics outcomes research, generate value by:

  - Creating cost and comparative effectiveness models to support pricing and payor reimbursement;

  - Analyzing payor needs and using economic models to develop contracting strategies that optimize value; and

  - Collecting and analyzing real-world data for use in market and payor communications, among others.

We believe that our end-to-end platform is well-positioned to continue benefiting from market trends. In addition to continued growth in our core markets, we expect to capture a broader share of overall biopharmaceutical R&D spend as we continue to innovate and add new solutions to our end-to-end platform.

Our Competitive Strengths

We compete by offering a broad and deep combination of industry-standard biosimulation software and technology-driven services across all stages of the continuum, from discovery and development to regulatory approval and market access. We have cultivated the following competitive strengths for more than two decades.

Our Proprietary, Scalable Biosimulation Software

Our proprietary, scalable biosimulation software, built on first principles integrates biosimulation models, scientific knowledge, and data, which we believe would require years of effort, immense resources, and scarce expertise to duplicate. Our versatile biosimulation software is deployed to public and private cloud networks, on-premises, and data centers. Scientists can run multiple simulation projects on a cloud compute platform or internal clusters. We protect our proprietary technology through intellectual property rights, including copyrights, patents, trade secrets, know-how, and trademarks.

Our Integrated End-to-End Platform

We have developed a differentiated, integrated end-to-end platform of software and technology-driven services, powered by proprietary technology and unique talent, spanning discovery through market access. Our customers, facing declining R&D productivity and an increasingly complex regulatory and market access environment, seek trusted partners to accelerate their R&D programs and achieve regulatory and commercial success. Our integrated set of solutions uniquely positions us to be their first-choice partner. Nearly ninety percent of our top 300 customers by revenue use two or more of our biosimulation solutions, regulatory and market access offerings, and other major solutions.

Our Innovation Framework

We are at the forefront of innovation in biosimulation. Beyond our sustained R&D investment ($39.3 million or 12% of revenues in 2022), our innovation framework advances both incremental and breakthrough innovations in biosimulation to transform traditional drug discovery and development.

- ***Customer-Centricity***: Through our consortium model and over 2,000 biosimulation projects and workshops in 2022, we derive significant insights that inform the development of our biosimulation software. These insights help us to anticipate and align our technology roadmap with our customers' needs and priorities.

- ***Regulatory Alignment***: As we continuously engage with regulators through our customers' programs, training workshops, and attendance at FDA and other regulator meetings, we develop an in-depth understanding of how to align our biosimulation software and services to meet evolving regulatory expectations and requirements.

- ***Scalable Data Collection and Curation***: Using artificial intelligence and our scientific team, we have curated data from more than 10,000 clinical studies and nearly 15,000 peer-reviewed manuscripts. We have created 29 different virtual patient populations, approximately 115 compound drug files, 56 clinical outcomes databases, and advanced mathematical models for ten organs.

- ***Scientific Research***: We work with our customers, a scientific advisory board of thought leaders, and academic institutions to innovate bottom-up, mechanistic models of drug, disease, and human biology. Each mathematical equation or parameter estimation is based on up-to-date scientific knowledge and data. We use scientific literature, lab data, and our customers' preclinical and clinical studies to refine, verify, and validate these models to ensure that they meet rigorous scientific and quality standards.

Our Trusted, Long-Term Customer and Regulatory Partnerships

We work continuously and closely with our customers to provide software and technology-driven services from drug discovery and development to regulatory science and market access, applying biosimulation throughout the continuum to maximize R&D productivity and increase the probability of success. We have substantial repeat business and long-term partnerships. Our top 30 customers by revenue in 2022 have been with us for more than ten years on average. We are often favored by our customers for follow-on projects throughout a drug's lifecycle, leveraging our early engagements in preclinical or Phase I to provide continuous support in later phases such as dose optimization for a Phase III study or a new drug application regulatory filing.

- ***Consortium Model with Biopharmaceutical Companies***: Our Simcyp Platform benefits from a unique business and customer collaboration model that we term a "consortium." Established more than 20 years ago, our consortium model provides for intense and detailed customer input into software enhancements. This R&D feedback loop, driven by customer needs, results in ongoing advancement and incorporation of more scientific data that increases the value of our Simcyp Platform over time. Our consortium members, consisting of scientists from leading global biopharmaceutical companies, sign multi-year contracts and actively participate in consortium meetings, so that we continuously extend our scientific and commercial leadership.

- ***Long-Standing Regulatory Partnerships***: Twenty regulatory agencies license our biosimulation software. In addition, our scientists are regularly invited by U.S, European, and Japanese regulatory agencies to teach and participate in their workshops. We have received six grants and a Cooperative Research and Development Agreement from the FDA as well as grants from seven European organizations, including the EU Commission, to develop biosimulation models and conduct biosimulation analyses.

- ***Academic Centers of Excellence***: We work closely with the global academic community on research, publications, and training of the next generation of biopharmaceutical scientists. We have established nine Centers of Excellence worldwide, which use our biosimulation software in their courses and scientific research. Additionally, nearly 400 academic institutions worldwide license our biosimulation software.

- ***Certara University***: We recognize that education in the theory and practice of biosimulation is pivotal to adoption and achieving the benefits of biosimulation. Certara University provided in-person and online training on biosimulation and the use of our biosimulation software to more than 4,500 scientists in 2022.

The Deep Expertise of Our People and Our Culture of Innovation

We are led by a diverse, global, and talented team of scientists, software engineers, and subject matter experts who not only advance our technology but also seek to understand and tackle our customers' greatest challenges. Over the last decade, we have worked on more than 7,000 customer projects, leading to extensive experience, which our customers

highly value. As of December 31, 2022, 380 of our employees held PhD degrees. Our team of software engineers and technologists excels at applying computer science, engineering, and scientific and mathematical principles in designing and developing complex software with consistent execution. World-leading experts in biosimulation, drug discovery and development, software development, regulatory science, and market access work and thrive at Certara.

Our global executive management team brings together extensive experience in science, technology, and business. Sharing core values of dedication, quality, and respect, the executive management team is focused on fostering our passion for science and growing our culture of innovation, excellence, collaboration, and customer-centricity as well as delivering exceptional performance.

Our Growth Strategy

Our growth strategy is to build upon our scalable, end-to-end platform. We continue to innovate in biosimulation, engage with regulatory agencies, and land and expand our customer partnerships. We remain focused on reducing the cost, time, and probability of failure of clinical trials for our customers, so that they can materially accelerate the availability of future therapies that are needed by patients worldwide. As exciting, new research areas arise, such as cell and gene therapy, we attract and hire specialized talent and acquire complementary businesses to expand our offerings accordingly.

Advance Our Technology

The science, technology, and data behind biosimulation continue to advance rapidly, and our top investment priority is to develop additional functionality and uses for biosimulation to improve decision making and patient outcomes. We release new software, additional features, and upgrades on a frequent and regular basis. In 2022, we introduced 20 new software applications and upgrades, including Simcyp Discovery Simulator and Pinnacle 21 Enterprise Tier 2, a new advanced tier of modules for Data Exchange and Specification Design.

We are investing in four major areas to elevate our technology:

- ***Spearheading the Frontier of QSP and Toxicology***, an emerging approach with enormous potential for industry-wide transformation to optimize decisions in both drug discovery and development. In addition to QSP for immunogenicity, immuno-oncology, and COVID-19, we are ramping up our quantitative systems pharmacology ("QSP") consortia for neurodegenerative diseases, such as Alzheimer's and Parkinson's, and for quantitative systems toxicology and safety ("QSTS"). Neuroscience is expected to have the most growth in QSP modeling over the next several years, followed by oncology and autoimmune disorders. All of our mechanistic simulators communicate seamlessly with each other, which is a major advantage for complex drug discovery and development programs.

- ***Continuing to Develop Cloud-Based Solutions***, such as Certara Integral Data Repository, CODEx Clinical Outcomes Databases, BaseCase Value Communication Software, and Pinnacle 21 Enterprise, which enhance computing scalability, significantly reduce maintenance time and cost, and promote access, collaboration and mobility. This also allows us to easily deliver new features and explore new business models.

- ***Architecting an Ecosystem of Interconnected Software Applications*** to facilitate seamless workflows and sharing of data across the drug discovery and development continuum for efficiency and speed.

- ***Applying and embedding Artificial Intelligence*** across our technologies and databases to drive further insights and analysis.

Grow Within Our Existing Customer Base

As we continue to expand our portfolio of offerings, we integrate our solutions and sell more across our end-to-end platform. Our scientists and regulatory and market access experts, business developers, marketing professionals, and business leaders work together to ensure a high-quality customer experience and nurture long-term partnerships. As a

result, our customer relationships grow steadily over time, driven by higher adoption of biosimulation with additional user licenses and more modules.

We also cross-sell our software and technology-driven services throughout our end-to-end platform. Many of our customers who use biosimulation also rely on us for regulatory strategy, writing, and submissions support, including the majority of our top 50 customers. The number of customers with annual customer value of $100,000 or more in revenue increased from 299 in 2021 to 370 in 2022, a 24% increase. The success of our land and expand approach is further demonstrated by our high re-occurring revenue streams with an aggregate renewal rate of 91% for our software customers from 2021 to 2022 and net revenue repeat rate (defined as the level of technology-driven services revenue generated from our existing services customers from period to period, accounting for expansion and churn) of 101% for our technology-driven services customers from 2021 to 2022.

Expand Our Customer Base Globally

We are growing our footprint globally to match that of the biopharmaceutical industry. There are more than 5,400 biopharmaceutical companies worldwide with active R&D pipelines in 2022, up from nearly 2,400 in 2011, according to Informa's Pharma R&D Annual Review 2022. Informa also estimates that the R&D pipeline encompassed more than 20,000 drug programs in 2022. As drug discovery and development in Asia Pacific grows, we are investing heavily to expand our presence in the region to work with these customers where they are, just as we already have in North America, Europe, China and Japan. We continue to build our sales and marketing capabilities and capacity to expand our global reach.

Scale Through Acquisitions

Biosimulation is an exciting technology with many promising, future developments, and we believe there are numerous opportunities to pursue strategic acquisitions to accelerate our development roadmap. We have a proven record of successfully acquiring and integrating software and services companies. From 2012, we have acquired 17 companies of which 12 included software or technology such as Simcyp, the core of our mechanistic biosimulation platform, Xenologiq, which jumpstarted our biosimulation initiative using QSP, Pinnacle 21, which enhances our software offerings in data management and the regulatory drug approval process, and Vyasa, which brings state-of-the-art artificial intelligence (AI) capabilities to our end-to-end platform. As we build out the depth and breadth of our biosimulation platform, we continually seek and assess a range of highly focused opportunities in our immediately addressable market and in related adjacent markets, whether through acquisitions, licenses, or partnerships.

Inspire Our People

Our more than 1,200 employees are the key to our success. The diversity and depth of expertise, experience, and backgrounds in our vibrant community bring richness of ideas, problem-solving capabilities, and mutual respect. We are dedicated to attracting, retaining, and growing leading scientists and experts who are passionate about developing medicines that matter. We strive to encourage intellectual curiosity and offer a myriad of professional development opportunities. We continue to invest in our people to help them thrive and solidify our position as an employer of choice in our industry.

The Certara End-to-End Platform

We provide both software and technology-driven services to enable customers to realize the full benefits of biosimulation in drug discovery, preclinical and clinical research, regulatory submission, and market access. Our software is primarily subscription-based with licenses ranging from one to three years.

Software

Our software, utilized by more than 20,000 licensed users in biosimulation and 40,000 more in regulatory, compliance and market access, addresses seven main applications: 1) mechanistic biosimulation; 2) empirical pharmacokinetic and pharmacodynamic biosimulation; 3) data standardization and compliance software; 4) scientific informatics; 5) clinical

outcomes databases for biosimulation; 6) authoring and management of regulatory submissions; and 7) market access communication. We deploy our software to customers on public and private cloud networks, on-premises, and in data centers.

- ***Mechanistic Biosimulation Platform (Simcyp)***: Mechanistic biosimulation predicts both how a drug is handled within the body (known as "pharmacokinetics" or "PK") and drug effect (known as "pharmacodynamics" or "PD"), without the need for actual in vivo human or animal studies. Seventeen of the top 20 biopharmaceutical companies by R&D spend in 2021 used the Simcyp Platform in 2022. Simcyp includes three main modules:

  - *Physiologically-based pharmacokinetic ("PBPK") modeling and simulation*: Our industry-standard Simcyp PBPK Simulator includes a whole-body model to run virtual "what if?" scenarios without human clinical studies. One benefit is understanding how dosing should be adjusted for special populations such as children or the elderly. A second is to identify potential drug-drug interactions so they can be included on drug labels to make the product safer. Simcyp is used by 13 regulatory agencies to evaluate submissions.

  - *Quantitative systems pharmacology*: A rapidly growing field in biosimulation, QSP combines computational modeling and vast amounts of omics (e.g., genomics, proteomics, metabolomics) data to predict clinical efficacy outcomes for novel targets, drug modalities, and combination therapies. By using QSP to understand the physiological mechanisms driving efficacy, customers can terminate unpromising discovery programs earlier, and promote stronger candidates to clinical testing, thus reducing costly late-stage failures. Once marketed, the same physiological knowledge can differentiate launch messaging, helping the drug to stand out from the competition.

  - *Quantitative systems toxicology and safety*: Secondary Intelligence, our QSTS software, integrates toxicology with quantitative analysis of large networks of molecular and functional biological changes to identify drug toxicity and adverse drug reactions earlier.

Our Simcyp Platform has generated results that inform more than 300 label claims for nearly 90 drugs. Had customers attempted to acquire the same information through conventional human trials, we believe they would have faced in aggregate tens of millions of dollars in additional costs and significant launch delays, given that clinical trials are estimated to take 1 to 2.5 years on average and cost many millions of dollars, according to Nature Reviews Drug Discovery.

- ***Empirical PK/PD Biosimulation Platform (Phoenix)***: Once our customers have empirical data from their actual trials assessing drug dissolution, blood concentration, and effect, they must interpret the data and make interpolations and extrapolations to inform dosing, handling of drug-drug interactions, and formulation decisions for subsequent trials and for patient use after launch. Phoenix includes multiple modules for the full empirical biosimulation workflow including conventional and biosimulation-driven interpretation (WinNonlin, NLME, and IVIVC), and related workflow modules for validated data handling, model management, and regulatory reporting (PK Submit, Certara Integral, Validation Suites). Customers benefit by gaining a validated, streamlined workflow for reporting their clinical pharmacology information to the FDA and other agencies. Furthermore, customers can be confident they are using the same tools used by regulators to evaluate their products.

- ***Data Standardization and Compliance Software* (*Pinnacle 21 Enterprise*)**: Pinnacle 21 Enterprise helps to ensure that submission data is compliant with regulatory standards, which helps to enable a more efficient review process. Data standards are complex and increasingly challenging to adhere to as the volume of data in clinical trials continues to grow. Pinnacle 21 Enterprise creates consistent, compliant, and high-quality datasets that reduce the risk of costly regulatory delays, while accelerating the speed and efficiency of developing and bringing drugs to market. It is the same tool used by the FDA and Japan's PMDA to review the quality of submissions.

- ***Scientific Informatics Platform (D360)***: D360 provides customers with self-service access and analytics to manage their small molecule and biologics discovery projects. The platform includes chemical structure search capabilities for structure-activity relationship analysis, molecular design tools and visualization solutions. The

product connects seamlessly with biology and chemistry data systems from third-party companies, without extensive IT setup and maintenance.

- ***Clinical Outcomes Databases for Biosimulation (CODEx)***: Our customers license our 56 proprietary CODEx databases in a range of disease areas for meta-analysis of a new drug's safety and efficacy in relation to competitive products. The databases cover more than 10,000 clinical trials and observational studies and are accessible via an online portal with analytical and visualization tools.

- ***Authoring and Management of Regulatory Submissions Platform (GlobalSubmit)***: Our customers license our advanced, cloud-based electronic common technical document ("eCTD") software for publishing, reviewing, validating and electronic filing of regulatory submissions.

- ***Market Access Communication Platform (BaseCase)***: We license a cloud-based SaaS platform for drag-and-drop visualization of biosimulation results and other complex data. Customers use our software to communicate the value of a new therapy to payors and providers to gain formulary acceptance and reimbursement.

Technology-Driven Services

Our technology-driven, biosimulation services help our customers who do not have staff capability or availability to gain the benefits of biosimulation. We also provide related, technology-driven services to guide our customers' new drugs through the regulatory submission process and into the market. Our technology-driven services include integrated drug development services include mechanistic biosimulation, empirical biosimulation, drug development and regulatory writing and medical communications, regulatory operations, and market access. Regulatory agencies promote and endorse the use of biosimulation in drug development as "model informed drug discovery and development," which integrates our software and technology-driven services to inform key decisions during drug discovery, development, approval, and subsequent market access.

- ***Mechanistic Biosimulation:*** We utilize our Simcyp Platform for predicting PK to determine first-in-human dose selection, design more efficient and effective clinical studies, evaluate new drug formulations, and predict drug-drug interactions. We use our QSP and QSTS software to advise customers on target selection and ranking and strategies for avoiding toxicities.

- ***Empirical Biosimulation:*** We use our Phoenix Platform and other tools to provide a wide range of quantitative biosimulation approaches such as non-compartmental analysis, PK/PD modeling, and population PK/PD analyses.

- ***Drug Development and Regulatory Strategy:*** We develop and deliver drug development and regulatory plans and provide high-level regulatory input to customer projects, incorporating biosimulation and supporting decision making through critical development and investment stage gates.

- ***Clinical Pharmacology:*** We provide early-phase development plans and study designs across the development life cycle, often incorporating biosimulation. We use clinical pharmacology gap analysis and modeling to anticipate and manage development risks.

- ***Model-Based Meta-Analysis:*** We utilize curated clinical trial and real-world data from our CODEx clinical outcomes database platform together with model-based meta-analysis to assess a new drug's safety and efficacy in relation to competitive products.

- ***Regulatory Writing and Medical Communications:*** We support submissions from early-stage investigational new drugs to late-stage new drug applications, biologics license applications, and market authorization applications, by writing regulatory documents such as clinical study protocols/reports, safety submissions, and other summary documents for submission to the FDA and global regulatory authorities. We manage technical editing including transparency and disclosure services to ensure that our customers' regulatory documents are

"filing-ready." Our team also offers advanced publication planning and writing support for scientific and medical publications. We deploy natural language processing software and other technology to enable efficient and scalable document creation.

- ***Regulatory Operations:*** We manage the submission of regulatory documents using our GlobalSubmit platform. Our submission management services include submission leadership, program management and planning, due diligence and readiness preparation, submission compilation, and eCTD publishing. We support applications to all major health agencies, including the FDA, Europe's European Medicines Agency ("EMA"), Health Canada, Japan's PMDA, and China's NMPA.

- ***Market Access:*** We assist customers in demonstrating the value of new drugs and health technologies to payors and other stakeholders to support their efforts in securing reimbursement and access in global markets. These services include conducting real-world evidence and health economics outcomes research, delivering value and access consultancy solutions, creating cost and comparative effectiveness models to support pricing and payor reimbursement, and collecting and analyzing real-world data for use in market and payor communications.

Sales and Marketing

Our sales and marketing functions pursue a coordinated approach with a global commercial team of business development, product management, and marketing experts. Our global commercial team collaborates with our scientists, subject matter experts, and technologists to engage with customers and prospects to understand their needs and offer tailored solutions with our biosimulation software and technology-driven services. Our scientists and experts have authored thousands of scientific publications, posters, and articles to share biosimulation knowledge and methods to advance adoption. We also partner with software distributors in global regions to expand our reach.

Competition

The market for our biosimulation products and related services for the biopharmaceutical industry is competitive and highly fragmented. In the biosimulation software market, we primarily compete with companies smaller than ourselves, such as Simulations Plus and NONMEM, a division of ICON. Other competitors include Schrodinger, open-sourced solutions such as R and PK-Sim, and internally-developed software in biopharmaceutical companies. We generally compete in the biosimulation software market on the basis of the quality and capabilities of our products, our scientific and technical expertise, our ability to innovate and develop solutions attractive to customers, our customer and regulatory agency partnerships, and price, among other factors.

Our technology-driven services generally compete with companies significantly smaller than ourselves, such as Metrum Research Group and Simulations Plus. We also face competition in this space from in-house teams at biopharmaceutical companies and academic and government institutions. In some standard biosimulation services and in regulatory science and market access, we compete with contract research organizations. We generally compete in the technology-driven services markets on the basis of our reputation and experience, our expertise and the qualifications of our team, our ability to offer services that are attractive to customers, and price, among other factors.

We believe that our competitive position is strong, and that we are able to effectively win new projects with our integrated, end-to-end platform.

Intellectual Property

We safeguard and enhance our innovative technology platforms, systems, processes, and databases with a full array of intellectual property rights, including copyrights, trade secrets, know-how, patents, and tradenames/trademarks.

All of our proprietary software products are copyright protected, and further reinforced by contractual provisions in our software license agreements prohibiting our users from reverse engineering, deriving, or otherwise using the source code and underlying algorithms for anything other than the permitted and intended use. Embedded within some of our biosimulation tools, including the Simcyp Simulator, are several decades' worth of proprietary data that have been

compiled and collated from both public and private sources. These data, in tandem with our proprietary source code and algorithms, create powerful modeling tools that cannot be readily duplicated. Continual ongoing development of source code and algorithms as well as new version release of modeling tools also ensures that our proprietary software products are difficult to copy. Our processes and systems are further protected by trade secrets and know-how, which we secure by requiring and strictly enforcing confidentiality obligations with our employees, contractors, customers, and other third parties, and invention assignment agreements with our employees, as well as through administrative and technical safeguards. However, trade secrets and confidential know-how are difficult to protect. Agreements may not always 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. We license and use the intellectual property of third parties, primarily in our software development, although no one such license is considered to be material to the business as a whole.

We also maintain a portfolio of issued and pending patents in several of jurisdictions in which we do business. As of December 31, 2022 our patent portfolio consisted of 28 issued patents and 11 pending patent applications related to our software and technology. We do not currently consider any of our issued patents to be material to our business. Several of our most recently filed patent applications relate to our liquid biopsy project, and describe a method of gleaning information from a simple blood test that can be used to predict and optimize how that individual patient will absorb and metabolize a drug, thereby allowing a clinician to determine the optimal dosing of a drug on an individual basis. We believe these patent applications, if issued, will accelerate our leadership in individualized precision dosing. 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 have applied for and/or obtained and maintain registration in the United States and other countries for numerous trademarks, including Certara, Simcyp, Phoenix, Pinnacle 21, Virtual Twin, WinNonlin, Vyasa, and BaseCase. We pursue trademark registrations to the extent we believe doing so would be beneficial to our competitive position.

We are not presently a party to any legal proceedings relating to intellectual property that, in the opinion of our management, would individually or taken together have a material adverse effect on our business, financial condition, results of operations or cash flows.

Human Capital

We are led by a diverse, global, and talented team of scientists, software developers, and subject matter experts who seek to understand our customers' challenges and are dedicated to tackling these challenges. As of December 31, 2022, we employed a total of 1,204 individuals, including 1,150 full-time employees and 54 part-time employees, of which 380 held PhDs. in their respective disciplines, including clinical pharmacology and pharmacometrics. As of December 31, 2022, we employed 372 scientists, 247 regulatory experts, 75 market access specialists, and 154 software developers and technologists. Most of the senior management team and the members of our board of directors hold either PhDs and/or other advanced degrees.

We offer our employees a myriad of professional development opportunities and support a performance-driven environment. In 2022, we focused on continuing to build a robust culture in a remote work environment by encouraging engagement and retention through Employee Spotlight programs and CEO Chats, and instituting a number of health and wellness initiatives, such as a global fitness challenge, yoga and meditation programs. We also enhanced our diversity and inclusion programs, including continuing company-wide unconscious bias training and expanding our recruiting efforts to reach a more diverse talent pool, in keeping with our CEO's pledge to act on supporting a more inclusive workplace. None of our employees are represented by a labor union, and we have never experienced a work stoppage. In alignment with our purpose to accelerate medicine to patients, we strive to reinforce a positive and rewarding work environment for our employees.

Government Regulation

Regulation of Biopharmaceutical Products

The development, testing, manufacturing, labeling, approval, promotion, distribution and post-approval monitoring and reporting of biopharmaceutical products are subject to regulation by numerous governmental authorities at both the national and local levels, including the FDA in the United States, as well as those of other countries, such as the EMA in the European Union and the MHRA in the United Kingdom. Although our biosimulation software products and platforms are not approved by the FDA or other government agencies, our customers' products are subject to these regulations, which may be applicable to us to the extent that the services and deliverables we provide to our customers are used in their marketing applications. Consequently, we must comply with relevant laws and regulations relating to certain aspects of the drug and biologic development and approval process. For example, our customers may require that documents or records we produce that may be used in the approval process be compliant with part 11 of Title 21 of the U.S. Code of Federal Regulations, which relates to the creation, modification, maintenance, storage, retrieval, or transmittal of electronic records submitted to the FDA. Further, certain portions of our business, such as the biosimulation work we conduct in connection with designing clinical trials, must comply with current Good Laboratory Practices ("GLP") and Good Clinical Practices ("GCP") requirements as established by the International Council on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use, as adopted by the FDA and similar regulatory authorities in other countries, which helps ensure the quality and integrity of the data we produce. To help ensure compliance with GLP and GCP, we have established a robust quality management system that includes standard operating procedures, working practice documents and processes, and quality assurance personnel to audit deliverables intended to be used in our customers' drug and biologic approval applications.

Privacy and Cybersecurity Laws

The collection, use, disclosure, disposal, protection other processing of information about individuals, in particular healthcare data, is highly regulated both in the United States, EU and other jurisdictions, including but not limited to, under the U.S. Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), as amended by the Health Information Technology for Economic and Clinical Health Act ("HITECH") and other U.S. privacy, security and breach notification and healthcare information laws; the European Union's General Data Protection Directive ("GDPR" and its national implementing laws) and other European privacy laws as well as privacy laws in other jurisdictions around the world. Although most of the clinical data we receive from our customers is de-identified within the meaning of HIPAA, in certain parts of our business, such as our real-world data and analytics program, we hold personal health and other information relating to persons who have been, are and may in the future be involved in clinical trials. The collection, retention, use, disclosure and other processing of such information is highly regulated, including under the laws described above. These data privacy and cybersecurity laws govern the use, handling and disclosure of information about individuals.

In relation to HIPAA, we do not consider our service offerings to generally cause us to be subject as a covered entity; however, in certain circumstances we are subject to HIPAA as a business associate. HIPAA requires the use of standard contracts (business associate agreements), notice and consent procedures and other privacy and cybersecurity standards. Accordingly, we may enter into business associate agreements with our customers who are covered entities under HIPAA. These business associate agreements define our obligations to safeguard the protected health information of patients provided by our covered-entity customers. We have adopted practices and have implemented procedures to satisfy the privacy and security rules and other to safeguard the receipt, maintenance and transmission of protected health information.

In addition, the Federal Trade Commission (the "FTC") and many state attorneys general interpret federal, state and local consumer protection laws to impose evolving standards for the handling and security of personal information, including health-related information. Courts may also adopt the standards for fair information practices promulgated by the FTC, which concern consumer notice, choice, security and access. Consumer protection laws require us to publish statements that describe how we handle information about individuals and choices individuals may have about the way we handle their information.

Certain states have also adopted robust data privacy laws. For example, the California Consumer Privacy Act ("CCPA"), which became effective on January 1, 2020, as amended by the California Privacy Rights Act , which became effective

on January 1, 2023, imposes obligations and restrictions on businesses regarding their collection, use, and sharing of personal information and provides new and enhanced data privacy rights to California residents, such as affording them the right to access and delete their personal information and to opt out of certain sharing of personal information. Additional privacy laws in Virginia, Connecticut, Colorado and Utah which also take effect during 2023 have similar requirements but more limited application (i.e., only consumers and not employees or B2B data). The interpretation and application of the new state laws and their pending regulations are uncertain.

The processing of any personal data regarding individuals in the European Economic Area ("EEA") , including personal health data, is subject to the GDPR as of May 25, 2018. The GDPR and the UK's post-Brexit equivalent of the GDPR ("UK 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 personal data, cross-border transfers, notice and consent and contractual obligations with vendors and service providers. The GDPR permits data protection authorities to impose large administrative penalties for violations of the GDPR or UK GDPR, including potential fines of up to €20 million or 4% of annual global revenues, whichever is greater, for each law.

Legal developments in Europe have created complexity and uncertainty regarding transfers of personal data from the EEA to the United States, including the Court of Justice of the European Union (the "CJEU") decision to invalidate the EEA to U.S. personal data transfer framework as well as decisions from regulators in Austria, Denmark, France and Italy about transfers made by Google. We also currently rely on the standard contractual clauses to transfer personal data outside the EEA, including to the United States, among other data transfer mechanisms pursuant to the GDPR. While the CJEU upheld the adequacy of the standard contractual clauses (a standard form of contract approved by the European Commission as an adequate personal data transfer mechanism,), it made clear that reliance on them alone may not necessarily be sufficient in all circumstances; this has created uncertainty.

In response to the data privacy laws discussed above and those in other countries in which we do business, we have implemented a multi-disciplinary privacy management program that includes technological safeguards, processes, contractual third-parties provisions, and employee trainings to help ensure that we handle information about our employees and customers in a compliant manner. Concurrently, we observe a trend toward expanding privacy data protection law both in number and scope that will expand our obligations. We may need to modify our practices and incur expenses to accommodate this evolving privacy compliance landscape.

Bribery, Anti-Corruption and Other Laws

We are subject to compliance with the U.S. Foreign Corrupt Practices Act ("FCPA") and similar anti-bribery laws, such as the U.K. Bribery Act of 2010 ("Bribery Act"), which generally prohibit companies and their intermediaries from making improper payments to foreign government officials for the purpose of obtaining or retaining business. In addition, in the United States, we may also be subject to certain state and federal fraud and abuse laws, including the federal Anti-Kickback Statute and False Claims Act, that are intended to reduce waste, fraud and abuse in the health care industry. Our employees, distributors, and agents are required to comply with these laws, and we have implemented policies, procedures, and training, to minimize the risk of violating these laws.

Our Corporate Information

Certara, Inc. was incorporated in Delaware on June 27, 2017. Our principal business office is located at 100 Overlook Center, Suite 101, Princeton, New Jersey 08540, and the telephone number of our principal business office is (609) 716-7900. Our internet address is www.certara.com. Our internet website and the information contained therein or connected to or linked from our internet web site are not incorporated information and do not constitute a part of this Annual Report or any amendment thereto.

Available Information

Our Investor Relations website is located at https://ir.certara.com. We have used, and intend to continue to use, our Investor Relations website and our corporate website located at www.certara.com as a means of disclosing material non-public information and for complying with our disclosure obligations under Regulation FD. The following filings are available

through our Investor Relations website as soon as reasonably practicable after we file them with, or furnish them to, the SEC: Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and our Proxy Statement for our annual meeting of stockholders, as applicable (as well as any amendments to those reports). These documents are also available for download free of charge through a link on our Investor Relations website. The SEC also maintains a website at www.sec.gov that contains reports, proxy and information statements, and other information about reporting issuers, like us, that file electronically with the SEC. Our internet website and the information contained therein or connected to or linked from our internet web site are not incorporated information and do not constitute a part of this Annual Report.

Item 1A. Risk Factors.

Investing in our common stock involves a high degree of risk. You should carefully consider the following risk factors together with other information in this filing, including our consolidated financial statements and related notes included elsewhere in this filing, before deciding whether to invest in shares of our common stock. The occurrence of any of the events described below could harm our business, financial condition, results of operations and growth prospects. In such an event, the trading price of our common stock may decline and you may lose all or part of your investment.

Summary of Risk Factors

Our business is subject to numerous risks and uncertainties, discussed in more detail in the following section. These risks include, among others, the following key risks:

- Deceleration in, or resistance to, the acceptance of model-informed biopharmaceutical discovery and development by regulatory authorities or academic institutions could damage our reputation or reduce the demand for our products and service.
- We compete in a competitive and highly fragmented market.
- We depend on key personnel and may not be able to retain these employees or recruit additional qualified personnel, which could harm our business.
- Changes or delays in government regulation relating to the biopharmaceutical industry could decrease the need for some of the services we provide.
- Reduction in research and development spending by our customers for a variety of reasons, as well as delays in the drug discovery and development process, may reduce demand for our products and services and negatively impact our results of operations and financial condition.
- Consolidation within the biopharmaceutical industry may reduce the pool of potential customers for our products and services or reduce the number of licenses for our software products.
- As customers increase their utilization of our products and services, we may be subject to additional pricing pressures.
- Our continued revenue growth depends on our ability to successfully enter new markets, increase our customer base and expand our relationship and the products and services we provide to our existing customers.
- Delays or defects in the release of new or enhanced software or other biosimulation tools may result in increased cost to us, delayed market acceptance of our products, diminished demand for our products, delayed or lost revenue, and liability.
- If our existing customers do not renew their software licenses, do not buy additional solutions from us or renew at lower prices, our business and operating results will suffer.
- Our customers may delay or terminate contracts, or reduce the scope of work, for reasons beyond our control, or we may underprice or overrun cost estimates with our fixed-fee contracts, potentially resulting in financial losses.
- We depend on key personnel and may not be able to retain these employees or recruit additional qualified personnel, which could harm our business.
- We have government customers and have received government grants, which subject us to risks including early termination, audits, investigations, sanctions, or penalties.

- Our recent growth rates may not be sustainable or indicative of future growth.
- We regularly evaluate potential acquisitions of other companies and 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.
- Our estimated addressable market is subject to inherent challenges and uncertainties. If we have overestimated the size of our addressable market or the various markets in which we operate, our future growth opportunities may be limited.
- We are subject to risks associated with the operation of a global business.
- We are subject to the FCPA and the Bribery Act and similar anti-corruption laws and regulations in other countries. Violations of these laws and regulations could harm our reputation and business, or materially adversely affect our business, results of operations, financial condition and/or cash flows.
- Our failure to comply with trade compliance and economic sanctions laws and regulations of the United States and applicable international jurisdictions could materially adversely affect our reputation and results of operations.
- Current and future litigation against us, which may arise in the ordinary course of our business, could be costly and time consuming to defend.
- Our insurance coverage may not be sufficient to avoid material impact on our financial position resulting from claims or liabilities against us, and we may not be able to obtain insurance coverage on attractive terms, or at all, in the future.
- If we fail to perform our services in accordance with contractual requirements, regulatory standards and ethical considerations, we could be liable for significant costs or penalties and our reputation could be harmed.
- We derive a significant percentage of our revenues from a concentrated group of customers and the loss of more than one of our major customers could materially and adversely affect our business, results of operations and/or financial condition.
- We may need additional funding. 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.
- Our bookings might not accurately predict our future revenue, and we might not realize all or any part of the anticipated revenue reflect in our bookings.
- 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.
- If we are not able to reliably meet our data storage and management requirements, or if we experience any failure or interruption in the delivery of our services over the internet, customer satisfaction and our reputation could be harmed and customer contracts may be terminated.
- Our software solutions utilize third-party open source software, and any failure to comply with the terms of one or more of these open source licenses could adversely affect our business, subject us to litigation and create potential liability.
- If our security measures are breached or unauthorized access to customer or other proprietary 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 and loss of customer confidence.
- We are subject to numerous privacy and data security laws and related contractual requirements and our failure to comply with those obligations could cause us significant harm, including financial and reputational losses.
- We may be unable to adequately enforce or defend our ownership and use of our intellectual property and other proprietary rights.
- 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.
- Failure to comply with requirements to design, implement and maintain effective internal controls, or inability to timely remediate internal controls that are deemed ineffective could have a material adverse effect on our business and stock price.
- Our amended and restated certificate of incorporation provides, subject to limited exceptions, that the Court of Chancery of the State of Delaware and, to the extent enforceable, the federal district courts of the United States

of America will be the sole and exclusive forums for certain stockholder litigation matters, which could limit our stockholder's ability to obtain a favorable judicial forum for disputes with us or our current and former directors, officers, employees or stockholders.

- Our board of directors are authorized to issue and designate shares of our preferred stock in additional series without stockholder approval.

Risks Related to Our Industry

Deceleration in, or resistance to, the acceptance of model-informed biopharmaceutical discovery and development by regulatory authorities or academic institutions could damage our reputation or reduce the demand for our products and services.

There has been a steady increase in the recognition by regulatory and academic institutions of the role that modeling and simulation can play in the biopharmaceutical development and approval process, as demonstrated by new regulations and guidance documents describing and encouraging the use of modeling and simulation in the biopharmaceutical discovery, development, testing and approval process, which has directly led to an increase in the demand for our services. Changes in government or regulatory policy, or a reversal in the trend toward increasing the acceptance of and reliance upon in silico data (trials, studies, or experiments conducted via computer or computer simulation) in the drug approval process, could decrease the demand for our products and services or lead regulatory authorities to cease use of, or to recommend against the use of, our products and services. This, in turn, could have a material adverse impact on our revenue and future growth.

Our software products are licensed by the FDA, Japan's PMDA and 18 other regulatory authorities, who use them in assessing new drug applications. These licenses, which accounted for 0.1 % of our annual revenue in 2022, are typically renewed on an annual basis, and there is no obligation for these regulatory authorities to renew these licenses at the same or any level. Although we do not believe that reduction or elimination of the use of any of our software products that are currently licensed by regulatory authorities would have a direct impact on the use of those products by our industry customers, it could diminish our reputation and negatively impact our ability to effectively market and sell our software products, particularly if such move were part of a wider reversal of government or regulatory acceptance of in silico data.

We also work closely with the global academic community on research, publications, and training of the next generation of biopharmaceutical scientists. Our software products are used in many academic institutions, often free of charge, where students, including PhD candidates, are first exposed to the types of tools and models that we offer. Upon graduating, these students often become employed by biopharmaceutical companies, where they continue to use our products and advocate for their continued use. If academic institutions decide to use competitive products, or develop their own biosimulation products, or reduce the exposure to biosimulation tools in general, familiarity with our products by the future generations of pharmacometricians and clinical pharmacologists will be diminished, which could ultimately result in a reduction in demand for our products.

We compete in a competitive and highly fragmented market.

The market for our biosimulation products and related services for the biopharmaceutical industry is competitive and highly fragmented. In biosimulation software, we compete with other scientific software providers, technology companies, in-house development by biopharmaceutical companies, and certain open source solutions. In the technology-driven services market, we compete with specialized companies, in-house teams at biopharmaceutical companies, academic and government institutions. In some standard biosimulation services, and in regulatory, and market access, we also compete with contract research organizations. Some of our competitors and potential competitors have longer operating histories in certain segments of our industry than we do and could have greater financial, technical, marketing, research and development and other resources. Some of our competitors offer products and services directed at more specific markets than those we target, enabling these competitors to focus a greater proportion of their efforts and resources on those specific markets. Some competing products are developed and made available at lower cost by government organizations and academic institutions, and these entities may be able to devote substantial resources to product development. Some clinical research organizations or technology companies may decide to enter into or expand their offerings in the biosimulation

area, whether through acquisition or internal development. We also face competition from open source software initiatives, in which developers provide software and intellectual property free of charge, such as R and PK-Sim software. In addition, some of our customers spend significant internal resources in order to develop their own solutions. Our current or potential competitors may develop products, services or technologies that are comparable, or superior to, or will render obsolete, the products, services and technologies we offer. In addition, our competitors may adapt more quickly than we do to technological advances and customer demands, thereby increasing such competitors' market share relative to ours. Any material decrease in demand for our technologies or services may have a material adverse effect on our business, financial condition and results of operations.

Changes or delays in government regulation relating to the biopharmaceutical industry could decrease the need for some of the services we provide.

Governmental agencies throughout the world strictly regulate the biopharmaceutical development process. Our business involves assisting biopharmaceutical companies strategically and tactically navigate the regulatory approval process. New or amended regulations are expected to result in higher regulatory standards and potentially additional revenues for companies that service these industries. However, some changes in regulations, such as a relaxation in regulatory requirements or the introduction of streamlined or expedited approval procedures, or an increase in regulatory requirements that we have difficulty satisfying or that make our regulatory strategy services less competitive, could eliminate or substantially reduce the demand for our regulatory services. Regulatory developments that could potentially increase demand for our services could also be postponed or not fully implemented. Any material decrease or delay in demand for our technologies or services may have a material adverse effect on our business, financial condition and results of operations.

We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative action, or changes to governmental regulation that may be required as a result of judicial decisions, either in the United States or abroad. If we are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, our business may be harmed.

Reduction in research and development spending by our customers for a variety of reasons, as well as delays in the drug discovery and development process, may reduce demand for our products and services and negatively impact our results of operations and financial condition.

We provide biosimulation software platforms and services to the biopharmaceutical industry, both private and public companies as well as government and academic institutions. Because our products and services depend on our customers' research and development expenditures, our revenues may be materially negatively affected by any economic, competitive, regulatory, demand, or other market impact that decreases our customers' profitability or their ability to raise capital, which may cause them to decrease or delay research and development spend. In such an event, our revenues may be reduced through increased downward pricing pressure, reduction in the scope of projects, delays or cancellations of ongoing projects, or our customers' shifting away from using third parties for their modeling and simulation work. Our customers' expenses could continue to increase as a result of the higher costs of developing more complex drugs and biologics and complying with more onerous government regulations. Furthermore, our customers finance their research and development spending from both private and public sources, including the capital markets. As a result, our revenues and financial performance may be adversely impacted if our customers are unable to obtain sufficient capital on acceptable terms to finance their research and development spending. Government and university-based funding of scientific research can vary for a number of reasons, including general economic conditions, political priorities, changes in the number of students and other demographic changes.

Our customers' revenue and/or profitability could decline as a result of efforts by government and third-party payors to reduce the cost of healthcare. Governments worldwide have increased efforts to expand healthcare coverage while at the same time curtailing and better controlling the increasing costs of healthcare. If cost-containment efforts or other measures substantially change existing insurance models and limit our customers' profitability, our customers may decrease research and development spending, which could decrease the demand for our services and materially adversely affect our growth prospects. In addition, industry trends, economic factors, regulatory developments, patent protection and political and

other events and circumstances that affect the biopharmaceutical industry, such as volatility or declines in securities markets limiting capital and liquidity, decreased government funding of scientific research, or other circumstances that decrease our customers' research and development spending also affect us.

Delays in the biopharmaceutical development cycle, particularly related to clinical trials being delayed or canceled, such as those caused by the ongoing COVID-19 pandemic, could also impact the demand or timing for our products and services.

Furthermore, our financial success depends upon the creditworthiness and ultimate collection of amounts due from our customers. If we are not able to collect amounts due from our customers in a timely fashion due to funding or liquidity challenges or for any other reason, we may be required to write-off significant accounts receivable and recognize bad debt expenses, which could materially and adversely affect our operating results. All of these events could have a material adverse effect on our business, results of operations or financial condition.

Consolidation within the biopharmaceutical industry may reduce the pool of potential customers for our products and services or reduce the number of licenses for our software products.

A significant portion of our customer base consists of biopharmaceutical companies, and our revenue is dependent upon expenditures by these customers. Consolidation through mergers or contraction through business failures within the biopharmaceutical industry may reduce the number of potential customers, particularly larger customers, for our products and services. Consolidation of major biopharmaceutical companies could result in consolidation of software licenses used by those companies, reduction of the number of individual user licenses, or increased pressure to negotiate price discounts or other terms for service that are less favorable to us, which may have a material adverse effect on our revenue and financial condition. Personnel redundancies and layoffs by merged companies to achieve deal synergies would result in a commensurate reduction in total users of our software, reducing the license fees we charge based on number of users.

As customers increase their utilization of our products and services, we may be subject to additional pricing pressures.

One of our strategic goals is to increase the breadth and utilization of products and services we provide to our existing customers, such as increasing the number of user licenses for our software products, selling licenses for new software products and expanding the number and scope of services we provide to individual customers. As the total annual expenditure from a particular customer increases, we may experience pricing pressure, often from the customer's procurement department, in the form of requests for discounts or rebates, price freezes and less favorable payment terms. This could have an adverse impact on our profitability.

Risks Related to Our Business

Our continued revenue growth depends on our ability to successfully enter new markets, increase our customer base and expand our relationship and the products and services we provide to our existing customers.

Our products and services are used primarily by modeling and simulation specialists in pharmaceutical, biotechnology, and government research or regulatory organizations. We have relationships with many large companies in the biopharmaceutical sector, and part of our growth strategy entails deriving more revenues from these existing customers by expanding their use of our existing and new products and services. Our ability to increase revenues with existing customers may be limited without significant investment in marketing our existing products and services or developing new products, which could be time-consuming and costly and may not be successful. We are also focused on increasing the number of emerging or smaller biotechnology customers that we serve. These small companies are increasingly responsible for much of the discovery and development of new molecules and treatments, and their share of the total industry research and development discovery and development dollars is rapidly growing. Attracting these smaller customers may require us to expend additional resources on targeted marketing, as they may not be as familiar with our company or products. And although these small biotechnology companies tend to use third parties such as Certara for many of their development activities, these smaller companies also tend to be less financially secure. If their products are not successful or they have

difficulty raising sufficient investment capital, they may not be able to timely or fully pay for our services, or they may terminate or decrease the scope of projects for which they use our products and services, which could adversely impact our revenues.

Our strategy also includes expanding into new markets, new geographies, and new areas within our existing markets, either organically or by acquiring other companies in these markets. If our strategies are not executed successfully, our products and services may not achieve market acceptance or penetration in targeted new departments within our existing customers or new customers. We cannot guarantee that we will be able to identify new biosimulation or regulatory and market access technologies of interest to our customers, or develop or acquire them in a timely fashion. Even if we are able to identify and develop new technologies and biosimulation tools of interest, we may not be able to negotiate license agreements on acceptable terms, or at all. Some of our products, such as our QSP models, require significant time and investment to develop to a point where they can achieve market acceptance, and we may not be able to develop them at a rate that matches market demand. We may also face more significant pricing pressure as we expand geographically and our customer profile evolves. For example, smaller biotechnology companies, or companies based in countries that have less developed economies, may not be able to afford our products and services at our customary rates. If we are unable to develop or acquire new services and products and/or create demand for those newly developed services and products, accelerate the development of products where there is a market demand, or maintain or increase our historic pricing levels, our future business, results of operations, financial condition and cash flows could be adversely affected.

We depend on key personnel and may not be able to retain these employees or recruit additional qualified personnel, which could harm our business.

Our success depends to a significant extent on the continued services of our senior management and other key contributors throughout our business. As of December 31, 2022, 380 of our employees held PhDs. It is challenging to attract and retain critical and qualified employees because of the specialized scientific nature of our business and significant competition for qualified personnel in the biopharmaceutical industry. Many of our scientists also play a significant role in marketing and selling our products and services to new and existing customers. If any of our senior scientists or members of senior management team, such as our CEO, CFO or division presidents, do not continue in their present positions, our operations could be disrupted. Compensation for our employees makes up our most significant fixed cost. Unexpected revenue shortfalls in the future and rapid wage inflation may make it difficult for us to retain all of our employees. The loss of any key employee, or our inability to continue to recruit, retain, and motivate key personnel, replace departed personnel in a timely fashion, or train our scientists to develop new business, may adversely impact our ability to compete effectively and grow our business and negatively affect our ability to meet our short and long-term financial and operational objectives.

Our business may be subject to risks arising from natural disasters and epidemic diseases, including the ongoing COVID 19 pandemic.

We may be subject to risks related to natural disasters and public health crises, such as the ongoing global COVID-19 pandemic.

The COVID-19 pandemic, and the numerous variants that have emerged in the last two years, have had a significant and sustained negative impact on the global economy and a negative impact on many of our customers. Some of our customers have experienced or may in the future be adversely impacted by supply chain interruptions, disruptions or delays to pipeline development and clinical trials and interruptions or delays in regulatory approvals due to the impact of the COVID-19 pandemic on the operations of certain regulatory authorities. These and other adverse impacts on our customers and economic conditions related to COVID-19 may cause our customers to delay or cancel projects or significantly scale back their operations or research and development spending and limit the use of third parties, which could have a material adverse effect on our business.

Public health crises, such as the COVID 19 pandemic, could also impact the health of our employees and cause extensive absences from work, which may delay the completion of internal projects and lower our consultant utilization rates. We have in the past undertaken several actions to mitigate and/or limit the spread of COVID 19 amongst our employees, including restricting employee travel, closing our offices in compliance with local guidelines and, when reopening offices,

implementing a number of safety measures, such as increasing sanitation, use of personal protective equipment, and limiting the number of employees at each location. As the impacts of the COVID-19 pandemic have subsided, we have relaxed some of these actions, but are prepared to reimplement them as and when necessary. However, even if we follow what we believe to be best practices, we may not be able to prevent the transmission of disease between employees. Any incidents of actual or perceived transmission may expose us to liability claims and adversely impact employee productivity and morale.

Travel restrictions and the cancellation of industry conferences resulting from public health crises could limit face-to-face interactions with existing and potential customers, which have traditionally been an effective avenue for developing new business. If our scientists and consultants are not able to effectively communicate and interact with our existing and potential customers remotely, a prolonged period of limited direct contact with customers could translate into reduced bookings and negatively impact our revenue generation.

Our business could be negatively impacted by other natural disasters, such as new disease epidemics, significant weather events, the outbreak of war or acts of terrorism, such as the war between Russia and Ukraine, or other "acts of God," each of which may be exacerbated by the effects of global climate change. We are a global company with offices in many countries. Disruptions in the infrastructure, either on a local or global scale, caused by these types of events could adversely affect our ability to serve our customers.

Although we have disaster recovery plans, carry business interruption insurance policies and typically have provisions in our contracts that protect us in certain force majeure type events, our coverage might not be adequate to compensate us for all losses that may occur.

Delays or defects in the release of new or enhanced software or other biosimulation tools may result in increased cost to us, delayed market acceptance of our products, diminished demand for our products, delayed or lost revenue, and liability.

Market acceptance of our products depends upon the continuous, effective and reliable operation of our software and other biosimulation tools and models. New or enhanced products or services, whether developed internally or acquired through acquisitions, can require long development and testing periods, which may result in delays in scheduled introduction. Our software solutions and biosimulation tools and models are inherently complex and may contain defects or errors. The risk of errors is particularly significant when a new product is first introduced or when new versions or enhancements of existing software solutions are released, such as the integration of artificial intelligence technology with our existing software products. Although we extensively test and conduct quality control on each new or enhanced biosimulation product before it is released to the market, there can be no assurance that significant errors will not be found in existing or future releases. As a result, in the months following the introduction of certain releases, we may need to devote significant resources to correct these errors. There can be no assurance, however, that all of these errors can be corrected. Many of our customers also require that new versions of our software be internally validated before implementing it, which can result in implementation delays or the decision to skip smaller updates altogether. Any errors, defects, disruptions or other performance problems with our products could hurt our reputation and may damage our customers' businesses. Any delays in the release schedule for new or enhanced products or services may delay market acceptance of these products or services and may result in delays in new customer orders for these new or enhanced products or services or the loss of customer orders, which may have a material adverse effect on our business, financial condition and results of operations.

To the extent that defects or errors cause our software or other biosimulation tools to malfunction and our customers' use of our products is interrupted, or the data derived from the use of our products is incorrect or incomplete, our customers may delay or withhold payment to us, cancel their agreements with us or 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.

If our existing customers do not renew their software 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 the renewal of existing license agreements. As a result, maintaining the renewal rate of our existing customers and selling additional or upgraded 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 products;
- the effectiveness of our professional services;
- ability to develop complementary software solutions, applications and services;
- 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 onto their own in-house hardware and use it for a specified term, or (ii) a subscription that allows our customers to access the cloud-based software solution for a specified term. Our customers have no obligation to renew their product licenses or subscriptions for our software solutions after the license term expires, which are typically between one and three years, and some 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.

Our customers depend on our support to resolve technical issues relating to our solutions, as our software requires expert usage to fully exploit its capabilities. Any failure to offer high-quality technical support, or a market perception that we do not offer high-quality support, could adversely affect our renewal rates and our ability to sell additional solutions to existing or to sell to prospective customers. Factors that are not within our control may also 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. 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. Furthermore, our sales process is dependent on the reputation of our solutions and business and on positive recommendations from our existing customers. Any dissatisfaction from existing customers may adversely impact our ability to sell our solutions to new customers.

Our customers may delay or terminate contracts, or reduce the scope of work, for reasons beyond our control, or we may underprice or overrun cost estimates with our fixed-fee contracts, potentially resulting in financial losses.

Many of our technology-driven service contracts may be terminated by the customer at its discretion immediately or after a short notice period without penalty. Customers terminate, delay or reduce the scope of these types of contracts for a variety of reasons, including but not limited to:

- lack of available funding or financing;
- mergers or acquisitions involving the customer;
- a change in customer priorities;
- impacts to client trial operations, such as those caused by COVID-19 interruptions or other health crises;
- delay or termination of a specific product candidate development program; and

- the customer decides to shift business to a competitor or to use internal resources.

As a result, contract terminations, delays and reductions in scope occur regularly in the normal course of our business. However, the delay, loss or reduction in scope of a large contract or multiple smaller contracts could result in under-utilization of our personnel, a decline in revenue and profitability and adjustments to our bookings, any or all of which could have a material adverse effect on our business, results of operations, financial condition and/or cash flows.

Many of our contracts with customers also provide for services on a fixed-price or fee-for-service with a cap basis. Accordingly, we bear the financial risk if we initially underprice our contracts or otherwise overrun our cost estimates. In these situations, we attempt to revise the scope of activity from the contract specifications and negotiate contract modifications shifting the additional cost to the customer, but are not always successful. If we fail to adequately price our contracts or if we experience significant cost overruns (including direct and indirect costs such as pass-through costs), or if we are delayed in, or fail to, execute contract modifications with customers increasing the scope of activity, our results of operations could be materially adversely affected. From time to time, we have had to commit unanticipated resources to complete fixed-fee projects, resulting in lower margins and profitability on those projects. We might experience similar situations in the future, which could have a material adverse impact on our results of operations and cash flows.

We have government customers and have received government grants, which subject us to risks including early termination, audits, investigations, sanctions, or penalties.

We derive limited revenue from contracts with U. S. government, including the FDA and the Center for Disease Control and Prevention within the Department of Health and Human Services. We have also accepted limited grant funds from governmental entities, whereby we are reimbursed for certain expenses incurred, subject to our compliance with the specific requirements of the applicable grant, including rigorous documentation requirements. We may enter into further contracts with the U.S. or foreign governments in the future, or accept additional grant funds. These subject us to statutes and regulations applicable to companies doing business with the government. These types of contracts customarily contain provisions that give the government substantial rights and remedies, many of which are not typically found in commercial contracts and which are unfavorable to contractors, including provisions that allow the government to unilaterally terminate or modify our federal government contracts, in whole or in part, at the government's convenience or in the government's best interest, including if funds become unavailable to the applicable government agency. Under general principles of government contracting law, if the government terminates a contract for convenience, the terminated company may generally recover only its incurred or committed costs and settlement expenses and profit on work completed prior to the termination. If the government terminates a contract for default, the defaulting company may be liable for any extra costs incurred by the government in procuring undelivered items from another source. Further, the laws and regulations governing the procurement of goods and services by the U.S. government provide procedures by which other bidders and interested parties may challenge the award of a government contract at the U.S. Government Accountability Office ("GAO") or in federal court. If we are awarded a government contract, such challenges or protests could be filed even if there are not any valid legal grounds on which to base the protest. If any such protests are filed, the government agency may decide to suspend our performance under the contract while such protests are being considered by the GAO or the applicable federal court, thus potentially delaying delivery of payment.

In addition, government contracts and grants normally contain additional requirements that may increase our costs of doing business, reduce our profits, and expose us to liability for failure to comply with these terms and conditions. These requirements include, for example:

- compliance with complex regulations for procurement, formation, administration, and performance of government contracts under the Federal Acquisition Regulations, agency-specific regulations supplemental to the Federal Acquisition Regulations, and regulations specific to the administration of grants by the U.S. government.
- specialized disclosure and accounting requirements unique to government contracts and grants.
- mandatory financial and compliance audits that may result in potential liability for price or cost adjustments, recoupment of government funds after such funds have been spent, civil and criminal penalties, or administrative sanctions such as suspension or debarment from doing business with the U.S. government.
- public disclosures of certain contract, grant, and company information; and

- mandatory socioeconomic compliance requirements, including labor requirements, non-discrimination and affirmative action programs and environmental compliance requirements.

Government contracts and grants are also generally subject to greater scrutiny by the government, which can unilaterally initiate reviews, audits and investigations regarding our compliance with government contract and grant requirements. In addition, if we fail to comply with government contract laws, regulations and contract or grant requirements, our contracts and grants may be subject to termination or suspension, and we may be subject to financial and/or other liability under our contracts or under the Federal Civil False Claims Act. The False Claims Act's "whistleblower" provisions allow private individuals, including present and former employees, to sue on behalf of the U.S. government. The False Claims Act statute provides for treble damages and other penalties and, if our operations are found to be in violation of the False Claims Act, we could face other adverse action, including suspension or prohibition from doing business with the United States government. Any penalties, damages, fines, suspension, or damages could adversely affect our ability to operate our business and our financial results.

Our recent growth rates may not be sustainable or indicative of future growth.

We have experienced significant growth in recent years. Revenue increased from $286.1 million for 2021 to $335.6 million for 2022. Our historical rate of growth may not be sustainable or indicative of our future rate of growth. We believe that our continued growth in revenue, as well as our ability to improve or maintain margins and profitability, will depend upon, among other factors, our ability to address the challenges, risks and difficulties described elsewhere in this "Risk Factors" section and the extent to which our various product offerings grow and contribute to our results of operations. In addition, our customer base may not continue to grow or may decline due to a variety of possible risks, including increased competition, changes in the regulatory landscape and the maturation of our business. Any of these factors could cause our revenue growth to decline and may adversely affect our margins and profitability. Failure to continue our revenue growth or improve margins would have a material adverse effect on our business, financial condition and results of operations. You should not rely on our historical rate of revenue growth as an indication of our future performance.

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

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

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 underwrite at the time of the acquisition. The following factors could result in our failure to achieve the expected synergies:

- 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.

For example, we also recently acquired Vyasa Analytics, which provides a novel deep learning AI-powered platform for organizations to integrate and analyze content across enterprise data landscape. The planned integration of the Vyasa technology into our existing software products may be delayed or may not achieve sufficient market acceptance to justify the increase in price to our enhanced products.

Furthermore, acquired businesses may change or increase the risks to which we are exposed. For example, in October 2021 we acquired Pinnacle, whose software is used by the FDA and PMDA to validate compliance with the Clinical Data Interchange Standards Consortium (CDISC) standards. As a result, this acquisition increased our exposure to risks related to changes in the FDA's or the PMDA's regulatory standards and risks related to government customers. Some acquisitions are structured in such a way that a portion of the purchase price may be based on achieving certain post-closing conditions (i.e. "earn-outs"), such as the Company recognizing certain levels of revenue generated by the acquired business. Failure to achieve the expected synergies or market acceptance could also result in the failure to achieve some or all of these conditions, which could result in disputes with the seller of the applicable business.

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 the 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 estimated addressable market is subject to inherent challenges and uncertainties. If we have overestimated the size of our addressable market or the various markets in which we operate, our future growth opportunities may be limited.

Our TAM is based on publicly available third-party market research and internal estimates regarding the size of our markets, and is subject to significant uncertainty and is based on assumptions that may not prove to be accurate. We base the TAM for our business on our current core markets, biosimulation, regulatory science, and market access. These estimates may change or prove to be inaccurate. While we believe the information on which we base our TAM is generally reliable, such information is inherently imprecise. In addition, our expectations, assumptions and estimates of future opportunities are necessarily subject to a high degree of uncertainty and risk due to a variety of factors, including those described herein. If third-party or internally generated data prove to be inaccurate or if we make errors in our assumptions based on that data, our future growth opportunities may be affected. If our TAM, or the size of any of the various markets in which we operate, proves to be inaccurate, our future growth opportunities may be limited and there could be a material adverse effect on our prospects, business, financial condition and results of operations.

We are subject to risks associated with the operation of a global business.

We derive a significant portion of our total revenue from our operations in international markets. During the years ended December 31, 2022 and 2021, 26% and 29%, respectively, of our revenues were transacted in foreign currencies, the majority of which included the British pound sterling, the euro and Japanese yen. Our global business may be affected by local economic conditions, including inflation, recession and currency exchange rate fluctuations. Changes in the value of the U.S. dollar relative to other currencies could result in material foreign currency exchange rate fluctuations and, as a result, our revenue and net earnings could be materially adversely affected. In addition, political and economic changes, including international conflicts and terrorist acts, throughout the world may interfere with our or our customers' activities in particular locations and result in a material adverse effect on our business, financial condition and operating results. Although we do not believe the current conflict between Russia and Ukraine poses any immediate material impact to our business, if the conflict intensifies or expands beyond Ukraine, it could have an adverse impact on our business, particularly our operations in Poland and our ability to use consultants in that region of the world. We could also experience a delay

or cancellation of work orders to the extent they rely on clinical trials being conducted in Ukraine. Potential trade restrictions, exchange controls, adverse tax consequences and legal restrictions may affect our revenue from customers located outside the United States and the repatriation of funds into the United States. Also, we could be subject to unexpected changes in regulatory requirements, the difficulties of compliance with a wide variety of foreign laws and regulations, potentially negative consequences from changes in or interpretations of U.S. and foreign tax laws, import and export licensing requirements and longer accounts receivable cycles in certain foreign countries. Foreign currency exchange rate hedges, transactions, re-measurements, or translations could also materially impact our financial results. These risks, individually or in the aggregate, could have an adverse effect on our operating and financial results.

We are subject to the FCPA and the Bribery Act and similar anti-corruption laws and regulations in other countries. Violations of these laws and regulations could harm our reputation and business, or materially adversely affect our business, results of operations, financial condition and/or cash flows.

We operate in numerous countries around the world and are subject to the FCPA, the Bribery Act and similar anti-bribery laws in the countries in which we operate. Our business involves sales to government and state-owned agencies and brings us and others acting on our behalf, into contact with government officials around the world. The FCPA and the Bribery Act prohibit us and our officers, directors, employees and third parties acting on our behalf, including agents, from corruptly offering, promising, authorizing or providing anything of value to a "foreign official" for the purposes of influencing official decisions or obtaining or retaining business or otherwise obtaining favorable treatment. The FCPA further requires us to make and keep books, records and accounts that accurately reflect transactions and dispositions of assets and to maintain a system of adequate internal accounting controls. The Bribery Act also prohibits "commercial" bribery and accepting bribes.

Although our officers, directors, employees, distributors, and agents are required to comply with these laws, we cannot be sure that our internal policies and procedures will always protect us from liability for violations of these laws committed by persons associated with us, including our employees or third parties acting on our behalf. Violations of anti-corruption laws, or even allegations of such violations, could disrupt our business and result in a material adverse effect on our reputation, business, results of operations, financial condition and/or cash flows. For example, violations may result in criminal or civil penalties, disgorgement of profits, related stockholder lawsuits, debarment from government contracting and other remedial measures.

Our failure to comply with trade compliance and economic sanctions laws and regulations of the United States and applicable international jurisdictions could materially adversely affect our reputation and results of operations.

We must operate our business in compliance with applicable economic and trade sanctions laws and regulations, such as those administered and enforced by the U.S. Department of Treasury's Office of Foreign Assets Control, the U.S. Department of State, the U.S. Department of Commerce, the United Nations Security Council and other relevant sanctions authorities. Our global operations and use of distributors in jurisdictions outside the U.S. expose us to the risk of violating, or being accused of violating, either directly or indirectly through our distributors, economic and trade sanctions laws and regulations. Our failure to comply with these laws and regulations may expose us to reputational harm as well as significant penalties, including criminal fines, imprisonment, civil fines, disgorgement of profits, injunctions and debarment from government contracts, as well as other remedial measures. Investigations of alleged violations can be expensive and disruptive. Despite our compliance efforts and activities we cannot assure compliance by our employees or representatives, such as our distributors or resellers, for which we may be held responsible, and any such violation could materially adversely affect our reputation, business, financial condition and results of operations.

Current and future litigation against us, which may arise in the ordinary course of our business, could be costly and time consuming to defend.

We are subject to claims that arise in the ordinary course of business, such as claims in connection with commercial disputes, employment claims made by our current or former employees, or claims brought by third-parties for failure to adequately protect their personal data. Third parties may in the future assert intellectual property rights to technologies that are important to our business and demand back royalties or that we license their technology. Litigation may result in substantial costs and may divert management's attention and resources, which may seriously harm our business, overall

financial condition and operating results. Insurance may not cover such claims, may not be sufficient for one or more of such claims and may not continue to be available on terms acceptable to us. A claim brought against us that is uninsured or underinsured could result in unanticipated costs, negatively affecting our business, financial condition and results of operations.

Our insurance coverage may not be sufficient to avoid material impact on our financial position resulting from claims or liabilities against us, and we may not be able to obtain insurance coverage on attractive terms, or at all, in the future.

We maintain insurance coverage for protection against many risks of liability, including directors and officers liability, professional errors and omissions, breach of fiduciary duty, and cybersecurity risks. The extent of our insurance coverage is under continuous review and is modified as we deem it necessary. Despite this insurance, it is possible that claims or liabilities against us may not have been fully insured, or our insurance carriers may contest coverage, which could have a material adverse impact on our financial position or results of operations. In addition, we may not be able to obtain any insurance coverage, or adequate insurance coverage on attractive terms, or at all, when our existing insurance coverage expires and the cost of obtaining such insurance coverage may materially increase.

If we fail to perform our services in accordance with contractual requirements, regulatory standards and ethical considerations, we could be liable for significant costs or penalties and our reputation could be harmed.

The services we provide to biopharmaceutical companies and other customers are complex and subject to contractual requirements, regulatory standards and ethical considerations. For example, some of our services must adhere to the regulatory requirements of the FDA governing our activities relating to preclinical studies and clinical trials, including GLP and GCP. Additionally, we are subject to compliance with FDA's regulations set forth in part 11 of title 21 of the Code of Federal Regulations, which relates to the creation, modification, maintenance, storage, retrieval, or transmittal of electronic records submitted to the FDA. FDA may also issue or finalize guidance documents that may have implications for our customers and our products, platforms, and services. We may be subject to inspection by regulatory authorities in connection with our customers' marketing applications and other regulatory submissions. If we fail to perform our services in accordance with regulatory requirements, regulatory authorities may take action against us or our customers for failure to comply with applicable regulations governing the development and testing of therapeutic products. Regulatory authorities may also disqualify certain data or analyses from consideration in connection with applications for regulatory approvals, which would result in our customers not being able to rely on our services in connection with their regulatory submissions and may subject our customers to additional or repeat clinical trials and delays in the development and regulatory approval process. Mistakes in providing services to our customers, such as dosing models, could affect medical decisions for patients in clinical trials and create liability for personal injury. Such actions may include sanctions, such as warning or untitled letters, injunctions, or failure of such regulatory authorities to grant marketing approval of products, delay, suspension, or withdrawal of approvals, license revocation, loss of accreditation; product seizures or recalls; operational restrictions; civil or criminal penalties or prosecutions, damages or fines. Customers may also bring claims against us for breach of our contractual obligations or errors in the outcomes of our products or services, may terminate their contracts with us and/or may choose not to award further work to us. Any such action could have a material adverse effect on our reputation, business, financial condition and results of operations.

We derive a significant percentage of our revenues from a concentrated group of customers and the loss of more than one of our major customers could materially and adversely affect our business, results of operations and/or financial condition.

Our ten largest customers accounted for 28% and 29% of revenues for the years ended December 31, 2022 and 2021, respectively. The loss of any of our major customers could have a material adverse effect on our results of operations and financial condition. We may not be able to maintain our customer relationships, and our customers may delay payment under, or fail to renew, their agreements with us, which could adversely affect our business, results of operations or financial condition. Any reduction in the amount of revenues that we derive from these customers, without an offsetting increase in new sales to other customers, could have a material adverse effect on our operating results. A significant change in the liquidity or financial position of our customers could also have a material adverse effect on the collectability of our accounts receivable, our liquidity, and our future operating results.

We may need additional funding. 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, results of operations, and financial condition.

We expect to devote substantial financial resources to our ongoing and planned activities, including the continued investment in our biosimulation software platform.

As of December 31, 2022, we had cash and cash equivalents of $236.6 million. We believe that our existing cash and cash equivalents will be sufficient to fund our operations and capital expenditure requirements for an extended period. 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 revenue;
- the growth of our employee base;
- the timing and launch of new products;
- the continued expansion of sales and marketing activities; and
- mergers and acquisitions of technologies or services complementing or extending our biosimulation, regulatory science and market access businesses.

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.

Our bookings might not accurately predict our future revenue, and we might not realize all or any part of the anticipated revenue reflected in our bookings.

Our bookings represent anticipated revenue for work not yet completed or performed under a signed contract or purchase order where there is sufficient or reasonable certainty about the customer's ability and intent to fund and commence the software or services. Bookings vary from period to period depending on numerous factors, including sales performance and the overall health of the biopharmaceutical industry, among others. Once work begins, we recognize direct revenue over the life of the contract based on our performance of services under the contract. Contracts may be terminated or delayed by our customers for reasons beyond our control. To the extent projects are delayed, the anticipated timing of our direct revenue could be materially affected.

In the event a customer terminates a contract, we are generally entitled to be paid for services rendered through the termination date and for services provided in winding down the project. However, we are generally not entitled to receive the full amount of direct revenue reflected in our bookings in the event of a contract termination. A number of factors may affect bookings and the direct revenue generated from our bookings, including:

- the size, complexity and duration of solutions;
- changes in the scope of work during the course of a project; and
- the cancellation or delay of a solution.

Our bookings for the year ended December 31, 2022 were $409.0 million compared to bookings of $341.7 million for the year ended December 31, 2021. Although an increase in bookings will generally result in an increase in future revenue to be recognized over time (depending on future contract modifications, contract cancellations and other adjustments), an increase in bookings at a particular point in time does not necessarily correspond to an increase in revenues during a

particular period. The timing and extent to which bookings will result in direct revenue depend on many factors, including the timing of the commencement of work, the rate at which we perform services, scope changes, cancellations, delays, the receipt of regulatory approvals, and the nature, duration, size, complexity, and phase of the studies. In addition, delayed projects remain in bookings until they are canceled. As a result of these factors, our bookings are not necessarily a reliable indicator of future direct revenue, and we might not realize all or any part of the revenue from the authorizations in bookings at any given point in time.

Risks Related to Intellectual Property, Information Technology and Data Privacy

We rely on 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, reputation 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 software 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 or other similar events beyond our control could negatively affect our cloud-based solutions. Work-from-home and other measures introduced to mitigate the spread of the COVID 19 pandemic have impacted our third-party vendors by increasing operational challenges and risks, including vulnerabilities to cybersecurity and information technology infrastructure threats. 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 we are not able to reliably meet our data storage and management requirements, or if we experience any failure or interruption in the delivery of our services over the internet, customer satisfaction and our reputation could be harmed and customer contracts may be terminated.

As part of our current business model, the portion of our software that is delivered over the internet as SaaS is increasing, and we store and manage significant data for our customers, resulting in substantial information technology infrastructure and ongoing technological challenges, which we expect to continue to increase over time. If we do not reliably meet these data storage and management requirements, or if we experience any failure or interruption in the delivery of our services over the internet, customer satisfaction and our reputation could be harmed, leading to reduced revenues and increased expenses. Our hosting services are subject to service-level agreements and, in the event that we fail to meet guaranteed service or performance levels, we could be subject to customer credits or termination of these customer contracts. If the cost of meeting these data storage and management requirements increases, our results of operations could be harmed.

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

Some of our software solutions utilize software covered by open source licenses, and we expect to continue to incorporate open source software in our solutions in the future. Open source software is typically freely accessible, usable and modifiable, and is used by our development team in an effort to reduce development costs and speed up the development process. Use of open source software also in some respects entails 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.

Although we have processes intended to fully comply with all license requirements in our software, certain open source software licenses require, among other things, that a licensor that distributes the open source software as a component of the licensor's proprietary software to provide or offer to provide to the customer-licensee part or all of the source code to the licensor's proprietary software. If the owner of the copyright of the relevant open source software were to allege that we had not complied with the conditions of one or more of these licenses, we 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 or other enforcement actions initiated by a copyright owner could 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. Moreover, we could effectively 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.

If our security measures are breached or unauthorized or unlawful access to customer or other proprietary data occurs, 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.

The evolution of technology systems introduces ever more complex security risks that are difficult to predict and defend against. An increasing number of companies, including those with significant online operations, have recently disclosed breaches of their security, some of which involved sophisticated tactics and techniques allegedly attributable to criminal enterprises or nation-state actors. While we believe that we have taken appropriate measures to prevent unintended access to the data we hold (including implementing security and privacy controls, training our workforce and implementing new technology) and we continue to improve and enhance our systems in this regard, our efforts may not always be successful. In addition, we do not know whether our current practices will be deemed sufficient under applicable laws or whether new regulatory requirements might make our current practices insufficient.

Our solutions involve the collection, analysis and retention of our customers' proprietary information related to their drug development efforts, including clinical data. Unauthorized access to this information or data, whether deliberate or unintentional, could result in the loss of information, litigation, indemnity obligations, damage to our reputation and other liability. Our increased reliance on remote access to our information systems due to the COVID 19 pandemic has increased our exposure to potential cybersecurity breaches and the risk of loss or exposure of such information and data. Additionally, we rely on third parties and their security procedures for the secure storage, processing, maintenance, and transmission of information that is critical to our operations and such third- parties may also suffer cybersecurity incidents. Depending on their nature and scope, this could potentially result in the misappropriation, destruction, corruption or unavailability of critical data and confidential or proprietary information (our own or that of third parties, including information about our customers and employees) and the disruption of business operations.

If there is a cybersecurity incident and we know or reasonably suspect that certain personal information has been subject to unauthorized or unlawful access or use, we may need to inform the affected individuals and may be subject to significant fines and penalties. Further, under certain regulatory schemes, such as the CCPA, individual California residents may

bring private claims for our failure to deploy reasonable and appropriate cybersecurity controls and we also may be liable for statutory and multiple damages in California and other states. Further, if our technical and operational safeguards fail, our existing and prospective customers may lose confidence in our ability to maintain the confidentiality of their intellectual property and other proprietary data, we may be subject to breach of contract claims by our customers and we may suffer reputational and other harm as a result. 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. Defending against investigations, claims or litigation based on any security breach or incident, regardless of their merit, will be costly and may cause reputation harm. The successful assertion of one or more large claims against us that exceed available insurance coverage, denial of coverage as to any specific claim, or any change or cessation in our insurance policies and coverages, including premium increases or the imposition of large deductible requirements, could have a material adverse effect on our reputation, business, financial condition and results of operations.

We are subject to numerous privacy and cybersecurity laws and related contractual requirements and our failure to comply with those obligations could cause us significant harm, including financial losses and reputational harm.

In the normal course of our business, we collect, process, use and disclose information about individuals, including protected health information and other patient data, as well as information relating to health professionals and our employees. The collection, processing, use, disclosure, disposal and protection of such information is highly regulated both in the U. S. and other jurisdictions, including but not limited to, under HIPAA, as amended by HITECH; United States state privacy, security and breach notification and healthcare information laws; the European Union's GDPR, UK GDPR, and other European and UK privacy laws, as well as the expanding number of privacy laws around the world, including China and Canada. These laws are complex and their interpretation is rapidly evolving, making implementation and enforcement, and thus compliance requirements, uncertain and potentially inconsistent. In addition, our collection, use, disclosure, protection and other processing of information is subject to related contractual requirements. Compliance with such laws and related contractual requirements may require changes to our information processing practices, and may thereby increase compliance costs. Failure to comply with such laws and/or related contractual obligations could result in regulatory enforcement or claims against us for breach of contract, or may lead third parties to terminate their contracts with us and/or choose not to work with us in the future. Should this occur, there could be a material adverse effect on our reputation, business, financial condition, and results of operations.

These regulations often govern the handling of information about individuals, including personal health information and require the use of standard contracts, privacy and security standards and other administrative simplification provisions. In relation to HIPAA, we do not consider our service offerings to generally cause us to be subject as a covered entity; however, in certain circumstances, we are subject to HIPAA as a business associate and may enter into business associate agreements.

Additionally, the Federal Trade Commission (the "FTC") and many state attorneys general are interpreting existing federal and state consumer protection laws to impose evolving standards for the online collection, use, dissemination and security of information about individuals, including health-related information. Courts may also adopt the standards for fair information practices promulgated by the FTC, which concern consumer notice, choice, security and access. Consumer protection laws require us to publish statements that describe how we handle information about individuals and choices individuals may have about the way we handle their information. If such information that we publish is considered untrue, we may be subject to government claims of unfair or deceptive trade practices, which could lead to significant liabilities and consequences. Furthermore, according to the FTC violating consumers' privacy rights or failing to take appropriate steps to keep information about consumers secure may constitute unfair acts or practices in or affecting commerce in violation of Section 5(a) of the FTC Act.

In addition, certain states have adopted robust privacy and security laws and regulations. Such laws and regulations will be subject to interpretation by various courts and other governmental authorities, thus creating potentially complex compliance issues for us and our future customers and strategic partners. For example, the California Consumer Privacy Act ("CCPA"), which took effect in 2020, imposes obligations and restrictions on businesses regarding their collection, use, and sharing of personal information and provides new and enhanced data privacy rights to California residents, such

as affording them the right to access and delete their personal information and to opt out of certain sharing of personal information. Protected health information that is subject to HIPAA is excluded from the CCPA, however, information we hold about individuals that is not subject to HIPAA would be subject to the CCPA. It is unclear how HIPAA and the other exceptions may be applied under the CCPA. The CCPA may increase our compliance costs and potential liability. Many similar privacy laws have been proposed at the federal level and in other states.

The GDPR became enforceable on May 25, 2018. The GDPR and the UK's version of the GDPR regulate our processing of personal data, and imposes stringent requirements. Failure to comply with the GDPR or UK GDPR may result in fines up to the greater of €20 million or 4.0% of worldwide gross annual revenue and applies to services providers such as us under each of GDPR and UK GDPR.

Recent legal developments in Europe have created complexity and uncertainty regarding transfers of personal data from the EEA to the United States, e.g., on July 16, 2020, the Court of Justice of the European Union ("CJEU") invalidated the EU-US Privacy Shield Framework ("Privacy Shield") under which personal data could be transferred from the EEA to U.S. entities who had self-certified under the Privacy Shield scheme. While the CJEU upheld the adequacy of the standard contractual clauses (a standard form of contract approved by the European Commission as an adequate personal data transfer mechanism, and potential alternative to the Privacy Shield), it made clear that reliance on them alone may not necessarily be sufficient in all circumstances; this has created uncertainty. In June 2021, the European Commission published revised standard contractual clauses, and shortly thereafter the European Data Protection Board promulgated guidance on implementation of the new clauses. Even with the additional clarity provided by these developments, the validity of the standard contractual clauses as a transfer mechanism remains uncertain. The concerns raised by the CJEU relating to the perceived risks of transferring personal data to the United States, and the ability of the standard contractual clauses to address those risks, persist under the new standard contractual clauses framework. We have previously relied on our own Privacy Shield certification and our relevant customers' and third parties' Privacy Shield certification(s) for the purposes of transferring personal data from the EEA to the United States in compliance with the GDPR's data export conditions. We also currently rely on the standard contractual clauses to transfer personal data outside the EEA, including to the United States. If all or some jurisdictions within the European Union or the United Kingdom determine that the standard contractual clauses do not provide sufficient safeguards to transfer personal data to the United States, our ability to effect cross-border transfers of personal data will be severely limited or cause us to need to establish systems to maintain certain data in the EEA or UK, and thereby divert resources from other aspects of our operations, all of which may adversely affect our business or we may face governmental enforcement actions, litigation, fines and penalties or adverse publicity, which could have an adverse effect on our reputation and business.

We believe we maintain adequate processes and systems in compliance with the requirements of the GDPR and UK GDPR, but it is possible that we could fail to comply or that we could incur liability due to the acts or omissions of our vendors. In the event we are not able to secure indemnification or the indemnification and any insurance coverage is inadequate to cover our losses, we could suffer significant financial, operational, reputational and other harm and our business, results of operations, financial condition and/or cash flows could be materially adversely affected. Furthermore, as supervisory authorities issue further guidance on personal data export mechanisms, including circumstances where the standard contractual clauses cannot be used, and/or start taking enforcement action, we could suffer additional costs, complaints and/or regulatory investigations or fines, and/or if we are otherwise unable to transfer personal data between and among countries and regions in which we operate, it could affect the manner in which we provide our services, the geographical location or segregation of our relevant systems and operations, and could adversely affect our financial results.

Privacy and data security laws are rapidly evolving both in the United States and internationally, and the future interpretation of those laws is somewhat uncertain. Additional legislation or regulation might, among other things, require us to implement new security measures and processes or bring within the legislation or regulation de-identified health or other information about individuals, each of which may require substantial expenditures or limit our ability to offer some of our services.

We may be unable to adequately enforce or defend our ownership and use of our intellectual property and other proprietary rights.

Our success is dependent upon our intellectual property and other proprietary rights. We rely upon a combination of trademark, trade secret, copyright, patent and unfair competition laws, as well as contractual provisions, to protect our intellectual property and other proprietary rights. In addition, we attempt to protect our intellectual property and proprietary information by enforcing cyber and physical security measures and requiring our employees and certain of our consultants to enter into confidentiality, non-competition and assignment-of-inventions agreements. The steps we take to protect these rights may not be adequate to prevent misappropriation of our technology by third parties or may not be adequate under the laws of some foreign countries, which may not protect our intellectual property rights to the same extent as do the laws of the United States. Our attempts to protect our intellectual property may be challenged by others or invalidated through administrative process or litigation, and agreement terms that address non-competition are difficult to enforce in many jurisdictions and may not be enforceable in any particular case. In addition, there remains the possibility that others will "reverse engineer" our software products in order to introduce competing products, or that others will develop competing technology independently. If we resort to legal proceedings to enforce our intellectual property rights or to determine the validity and scope of the intellectual property or other proprietary rights of others, the proceedings could be burdensome and expensive, even if we were to prevail. The failure to adequately protect our intellectual property and other proprietary rights may have a material adverse effect on our business, results of operations or financial condition.

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 to develop, market and sell our products and services, allowing our customers 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 be threatened with, adversarial proceedings or litigation regarding intellectual property rights with respect to our technology and product candidates.

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 with 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, or we may incorrectly conclude that third-party intellectual property is invalid or that our activities do not infringe such intellectual property. Thus, we do not know with certainty that our technology does not and will not infringe, misappropriate or otherwise violate any third party's intellectual property.

Parties making claims against us may obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize the product candidates that we may identify. Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of employee resources from our business. In the event of a successful claim of infringement against us, we may have to pay substantial damages (including treble damages and attorneys' fees for willful infringement), pay royalties, redesign our infringing products, be forced to indemnify our customers or collaborators or obtain one or more licenses from third parties, which may be impossible or require substantial time and monetary expenditure.

We may choose to take a license or, if we are found to infringe, misappropriate or otherwise violate a third party's intellectual property rights, we could also be required to obtain a license from such third party to continue developing and marketing our technology. 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 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 a product. Claims that we have misappropriated the confidential information or trade secrets of third parties could have a similar material adverse effect on our reputation, business, financial condition and results of operations.

If we fail to comply with certain healthcare laws, including fraud and abuse laws, we could face substantial penalties and our business, results of operations, financial condition and prospects could be adversely affected.

Even though we do not order healthcare services or bill directly to Medicare, Medicaid or other third party payors, as a result of contractual, statutory or regulatory requirements, we may be subject to healthcare fraud and abuse laws of both the federal government and the states in which we conduct our business. Because of the breadth of these laws and the narrowness of available statutory and regulatory exceptions, it is possible that some of our business activities could be subject to challenge under one or more of such laws. If we or our operations are found to be in violation of any of the laws described above or any other governmental regulations that apply to us, we may be subject to penalties, including civil and criminal penalties, damages, fines, imprisonment and the curtailment or restructuring of our operations, any of which could materially adversely affect our ability to operate our business and our financial results.

Risks Related to Our Indebtedness

Our indebtedness could materially adversely affect our financial condition and our ability to operate our business, react to changes in the economy or industry or pay our debts and meet our obligations under our debt and could divert our cash flow from operations to debt payments.

As of December 31, 2022, we had $297.5 million in total borrowings under our credit agreement, originally dated July 15, 2017, as amended ("Credit Agreement"). As of December 31, 2022, we had a $100.0 million revolving credit facility under our Credit Agreement of which we had $99.9 million of availability after giving effect to outstanding letters of credit. In addition, subject to restrictions governing our Credit Agreement, we may incur additional debt.

Our debt could have important consequences to you, including the following:

- it may be difficult for us to satisfy our obligations, including debt service requirements under our outstanding debt, resulting in possible defaults on and acceleration of such indebtedness;
- our ability to obtain additional financing for working capital, capital expenditures, debt service requirements or other general corporate purposes may be impaired;
- a portion of cash flow from operations may be dedicated to the payment of principal and interest on our debt, therefore reducing our ability to use our cash flow to fund our operations, capital expenditures, future business opportunities, acquisitions and other purposes;
- we may be more vulnerable to economic downturns and adverse industry conditions and our flexibility to plan for, or react to, changes in our business or industry may be more limited;
- our ability to capitalize on business opportunities and to react to competitive pressures, as compared to our competitors, may be compromised due to our level of debt; and
- our ability to borrow additional funds or to refinance debt may be limited.

Furthermore, all of our debt under our Credit Agreement bears interest at variable rates. If these rates were to increase significantly, whether because of an increase in market interest rates or a decrease in our creditworthiness, our ability to borrow additional funds may be reduced and the risks related to our debt would intensify.

Servicing our debt requires a significant amount of cash. For the years ended December 31, 2022 and 2021, we used operating cash of $19.1 million and $17.9 million, respectively, to service our debt. Our ability to generate sufficient cash depends on numerous factors beyond our control, and we may be unable to generate sufficient cash flow to service our debt obligations.

Our business may not generate sufficient cash flow from operating activities to service our debt obligations. Our ability to make payments on and to refinance our debt and to fund planned capital expenditures depends on our ability to generate cash in the future. To some extent, this is subject to general economic, financial, competitive, legislative, regulatory and other factors that are beyond our control.

If we are unable to generate sufficient cash flow from operations to service our debt and meet our other commitments, we may need to refinance all or a portion of our debt, sell material assets or operations, delay capital expenditures or raise additional debt or equity capital. We may not be able to effect any of these actions on a timely basis, on commercially reasonable terms or at all, and these actions may not be sufficient to meet our capital requirements. In addition, the terms of our existing or future debt agreements may restrict us from pursuing any of these alternatives.

Restrictive covenants governing our Credit Agreement may restrict our ability to pursue our business strategies, and failure to comply with any of these restrictions could result in acceleration of our debt.

The operating and financial restrictions and covenants governing our Credit Agreement may materially adversely affect our ability to finance future operations or capital needs or to engage in other business activities. Such agreements limit our ability, among other things, to:

- incur additional indebtedness and guarantee indebtedness;
- pay dividends on or make distributions in respect of our common stock or make other restricted payments;
- make certain acquisitions, investments, loans and advances;
- transfer or sell certain assets;
- create liens on certain assets;
- consolidate, merge, sell or otherwise dispose of all or substantially all of our assets;
- make certain payments in respect of certain junior debt obligations;
- create negative pledges;
- enter into certain transactions with our affiliates; and
- designate our subsidiaries as unrestricted subsidiaries.

In addition, the restrictive covenants in our Credit Agreement require us to maintain a specified first lien leverage ratio when a certain percentage of our revolving credit facility commitments are borrowed and outstanding as of the end of each fiscal quarter. In certain circumstances, our ability to meet this financial covenant may be affected by events beyond our control.

A breach of any of these covenants could result in a default under our Credit Agreement. Upon the occurrence of an event of default under our Credit Agreement, the lenders could elect to declare all amounts outstanding under our Credit Agreement to be immediately due and payable and terminate any commitments to extend further credit. If we were unable to repay those amounts, the lenders under our Credit Agreement could proceed against the collateral granted to them to secure that indebtedness. We have pledged substantially all of our assets as collateral to secure our Credit Agreement. In

the event of an acceleration of our debt upon a default, we may not have or be able to obtain sufficient funds to make any accelerated payments.

Furthermore, the terms of any future indebtedness we may incur could have further additional restrictive covenants. We may not be able to maintain compliance with these covenants in the future, and in the event that we are not able to maintain compliance, we cannot assure you that we will be able to obtain waivers from the lenders or amend the covenants.

We and our subsidiaries may still be able to incur substantially more debt. This could further exacerbate the risks associated with our leverage.

We and our subsidiaries may be able to incur substantial additional debt in the future. Although the agreements governing our Credit Agreement contain restrictions on the incurrence of additional debt, these restrictions are subject to a number of qualifications and exceptions, and the debt incurred in compliance with these restrictions could be substantial. Additionally, we may successfully obtain waivers of these restrictions. If we incur additional debt above the levels currently in effect, the risks associated with our leverage, including those described above, would increase.

Risks Related to our Financial Statements and Results

Impairment of goodwill or other intangible assets may adversely impact future results of operations.

We have intangible assets, including goodwill and other finite-lived and indefinite-lived intangibles, on our balance sheet due to our acquisitions of businesses. The initial identification and valuation of these intangible assets and the determination of the estimated useful lives at the time of acquisition involve use of management judgments and estimates. These estimates are based on, among other factors, input from accredited valuation consultants, reviews of projected future income cash flows and statutory regulations. The use of alternative estimates and assumptions might have increased or decreased the estimated fair value of our goodwill and other intangible assets that could potentially result in a different impact to our results of operations. If the future growth and operating results of our business are not as strong as anticipated and/or our market capitalization declines, this could impact the assumptions used in calculating the fair value of goodwill or other indefinite-lived intangibles. To the extent goodwill or other indefinite-lived intangibles are impaired, their carrying value will be written down to its implied fair value and a charge will be made to our income from continuing operations. Such an impairment charge could materially and adversely affect our operating results. As of December 31, 2022, and 2021, the carrying amount of goodwill and other intangibles was $1.2 billion and $1.2 billion, respectively, on our consolidated balance sheets.

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

As of December 31, 2022, we had federal and state NOLs of approximately $1.8 million and $0.05 million, respectively, which are available to reduce future taxable income and expire between 2024 and 2036 and 2029 and 2040, respectively. We had federal R&D tax credit carryforwards of approximately $0.4 million, which expire between 2025 and 2042, and state R&D tax credit carryforwards of approximately $0.1 million with indefinite carryover period, which are available to offset future income taxes. We also had foreign tax credits of approximately $10.6 million, which will start to expire in 2027. These carryforwards that may be utilized in a future period may be subject to limitations based upon changes in the ownership of our stock in a future period. Additionally, we carried forward foreign NOLs of approximately $65.8 million which began to expire in 2022, foreign research and development credits of $0.4 million which will start to expire in 2029, and Canadian investment tax credits of approximately $3.5 million which will expire if unused in years 2030 through 2040. Our carryforwards are subject to review and possible adjustment by the appropriate taxing authorities.

In addition, in general, under Section 382 of the Internal Revenue Code of 1986, as amended (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, R&D tax credit carryforwards and disallowed interest expense carryforwards to offset future taxable income. We have performed an analysis for the period January 1, 2022 through December 31, 2022 and determined that an ownership change did not occur during this period. In addition, we

determined that ownership changes occurred in prior periods and therefore our NOLs and R&D tax credit carryforwards reflect the amounts available after considering such limitations. We may experience further ownership changes in the future and/or subsequent changes in our stock ownership (which may be outside our control). As a result, if, and to the extent that, we earn net taxable income, our ability to use our pre-change NOLs, R&D tax credit carryforwards and disallowed interest expense carryforwards to offset such taxable income may be subject to limitations.

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

The preparation of financial statements in conformity with U. S. generally accepted accounting principles ("GAAP") requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. We base our estimates on historical experience, known trends and events, and various other factors that we believe to be reasonable under the circumstances, as provided in "Management's Discussion and Analysis of Financial Condition and Results of Operations—Critical Accounting Policies and Significant Judgments and Estimates." The results of these estimates form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Significant assumptions and estimates used in preparing our consolidated financial statements include the estimated variable consideration included in the transaction price in our contracts with customers and equity-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 Ownership of Our Common Stock

We are a holding company with no operations and rely on our operating subsidiaries to provide us with funds necessary to meet our financial obligations.

We are a holding company with no material direct operations. Our principal assets are the shares of common stock of Certara Holdco, Inc. ("Certara Holdco") that we hold indirectly through our subsidiaries. Certara Holdco, together with its subsidiaries, owns substantially all of our operating assets. As a result, we are dependent on loans, dividends and other payments from our subsidiaries to generate the funds necessary to meet our financial obligations. Our subsidiaries are legally distinct from us and may be prohibited or restricted from paying dividends or otherwise making funds available to us, including restrictions under the covenants of the agreements governing our Credit Agreement. If we are unable to obtain funds from our subsidiaries, we may be unable to meet our financial obligations.

Future sales, or the perception of future sales, by us or our existing stockholders in the public market could cause the market price for our common stock to decline.

The sale of additional shares of our common stock in the public market, or the perception that such sales could occur, could harm the prevailing market price of shares of our common stock. These sales, or the possibility that these sales may occur, also might make it more difficult for us to sell equity securities in the future at a time and at a price that we deem appropriate.

On December 8, 2022, an entity controlled by Arsenal Capital Partners ("Arsenal") acquired all of our stock shares held by EQT Avatar Parent LP("EQT"). As of December 31, 2022, shares controlled by Arsenal and our officers and directors in aggregate represented approximately 25.3% of our outstanding common stock. Although Arsenal agreed with the Company not to sell any of the shares acquired by EQT for a 2-year period (with certain limited exceptions or without the

written consent of the Company), the market price of our shares of common stock could drop significantly if Arsenal or our officers and directors sell their shares or are perceived by the market as intending to sell them. These factors could also make it more difficult for us to raise additional funds through future offerings of our shares of common stock or other securities.

In addition, the shares of our common stock reserved for future issuance under the 2020 Incentive Plan ("Plan Share Reserve") or our 2020 Employee Stock Purchase Plan will become eligible for resale in the public market once those shares are issued, subject to provisions relating to various vesting agreements, lock-up agreements and Rule 144, as applicable. As of December 31, 2022, a total of 19,460,378 and 1,700,000 shares of common stock have been reserved for future issuance under the 2020 Incentive Plan and our 2020 Employee Stock Purchase Plan, respectively. Pursuant to the terms of the 2020 Incentive Plan, the Plan Share Reserve automatically increases on the first day of each fiscal year by a number of shares of common stock equal to the lesser of (i) the positive difference, if any, between (A) 4% of the Company's outstanding common stock on the last day of the immediately preceding fiscal year, and (B) the Plan Share Reserve on the last day of the immediately preceding fiscal year, and (ii) the number of shares of common stock as may be determined by the Board.

In the future, we may also issue our securities in connection with investments or acquisitions. For example, we issued 2,239,717 shares of common stock in connection with our acquisition of Pinnacle in October 2021. We may issue additional shares in connection with our acquisition of Vyasa Analytics, LLC based on the results of its future performance. The amount of shares of our common stock issued in connection with an investment or acquisition could constitute a material portion of our then-outstanding shares of our common stock. Any issuance of additional securities in connection with investments or acquisitions may result in additional dilution.

Provisions in our organizational documents could delay or prevent a change of control.

Certain provisions of our amended and restated certificate of incorporation, amended and restated bylaws and stockholders agreement may have the effect of delaying or preventing a merger, acquisition, tender offer, takeover attempt or other change of control transaction that a stockholder might consider to be in its best interest, including attempts that might result in a premium over the market price of our common stock.

These provisions provide, among other things:

- for the division of our board of directors into three classes, as nearly equal in size as possible, with directors in each class serving three-year terms and with terms of the directors of only one class expiring in any given year;

- that directors may only be removed for cause, and only by the affirmative vote of the holders of at least two-thirds in voting power of all the then-outstanding shares of stock entitled to vote thereon, voting together as a single class;

- for the ability of our board of directors to issue one or more series of preferred stock with voting or other rights or preferences that could have the effect of impeding the success of an attempt to acquire us or otherwise effect a change of control;

- for advance notice for nominations of directors by stockholders and for stockholders to include matters to be considered at stockholder meetings;

- that special stockholder meetings may be called only by or at the direction of our board of directors or the chairman of our board of directors; and

- that certain provisions of our amended and restated certificate of incorporation and amended and restated bylaws pertaining to amendments, our board of directors, limitation of director liability, stockholder consents, annual and special stockholder meetings, competition and corporate opportunities and business combinations, may be amended only by the affirmative vote of the holders of at least two-thirds in voting power of all the then-

outstanding shares of our stock entitled to vote thereon, voting together as a single class, which limitation may have the effect of deferring, delaying or discouraging hostile takeovers, or changes in control or management of our Company.

These provisions could make it more difficult for a third party to acquire us, even if the third party's offer may be considered beneficial by many of our stockholders. As a result, our stockholders may be limited in their ability to obtain a premium for their shares.

Arsenal holds a substantial amount of our outstanding common stock, and its interests may be different than the interests of other holders of our common stock.

As of December 31, 2022, Arsenal owns or controls approximately 22.8% of our outstanding common stock, and subject to the terms of the Stockholder Agreement, maintains the right to nominate up to two board members. In addition, Arsenal will have significant influence over the outcome of all matters requiring stockholder approval, including any potential change of control of our Company. The concentration of ownership could deprive investors of an opportunity to receive a premium for shares of common stock as part of a sale of our Company and ultimately might affect the market price of our common stock.

Arsenal is in the business of making investments in companies and may from time to time acquire and hold interests in businesses that compete directly or indirectly with us. Our amended and restated certificate of incorporation provides that any director who is not employed by us or his or her affiliates will have any duty to refrain from engaging, directly or indirectly, in the same business activities or similar business activities or lines of business in which we operate. Arsenal also may pursue acquisition opportunities that may be complementary to our business, and, as a result, those acquisition opportunities may not be available to us..

Our amended and restated certificate of incorporation provides, subject to limited exceptions, that the Court of Chancery of the State of Delaware and, to the extent enforceable, the federal district courts of the United States of America will be the sole and exclusive forums for certain stockholder litigation matters, which could limit our stockholder's ability to obtain a favorable judicial forum for disputes with us or our current and former directors, officers, employees or stockholders.

Our amended and restated certificate of incorporation provides, subject to limited exceptions, that unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware shall, to the fullest extent permitted by law, be the sole and exclusive forum for any (i) derivative action or proceeding brought on behalf of our company, (ii) action asserting a claim of breach of a fiduciary duty owed by any current or former director, officer, employee or stockholder of our company to the Company or our stockholders, (iii) action asserting a claim against the Company or any current or former director, officer, employee or stockholder of the Company arising pursuant to any provision of the Delaware General Corporation Law ("DGCL"), or our amended and restated certificate of incorporation or our amended and restated bylaws (as either might be amended from time to time) or (iv) action asserting a claim governed by the internal affairs doctrine of the State of Delaware. Unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States of America shall be the exclusive forum for the resolution of any complaint asserting a cause of action arising under the federal securities laws of the United States of America. Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock shall be deemed to have notice of and consented to the forum provisions in our amended and restated certificate of incorporation. Although our amended and restated certificate of incorporation contains the exclusive forum provision described above, it is possible that a court could find that such a provision is inapplicable for a particular claim or action or that such provision is unenforceable.

These choice of forum provisions may limit a stockholder's ability to bring a claim in a different judicial forum, including one that it may find favorable or convenient for disputes with us or any of our directors, officers or other employees which may discourage lawsuits with respect to such claims. Alternatively, if a court were to find the choice of forum provisions that will be contained in our amended and restated certificate of incorporation to be inapplicable or unenforceable with respect to one or more of the specified types of actions or proceedings, we may incur additional costs associated with resolving such action in other jurisdictions, which could harm our business, operating results and financial condition.

Our board of directors are authorized to issue and designate shares of our preferred stock in additional series without stockholder approval.

Our amended and restated certificate of incorporation authorizes our board of directors, without the approval of our stockholders, to issue 50,000,000 shares of our preferred stock, subject to limitations prescribed by applicable law, rules and regulations and the provisions of our amended and restated certificate of incorporation, as shares of preferred stock in series, to establish from time to time the number of shares to be included in each such series and to fix the designation, powers, preferences and rights of the shares of each such series and the qualifications, limitations or restrictions thereof. The powers, preferences and rights of these additional series of preferred stock may be senior to or on parity with our common stock, which may reduce its value.

General Risk Factors

Our stock price may change significantly, and you may not be able to resell shares of our common stock at or above the price you paid or at all, and you could lose all or part of your investment as a result.

The trading price of our common stock is likely to be volatile. The stock market has experienced extreme volatility. This volatility often has been unrelated or disproportionate to the operating performance of particular companies. You may not be able to resell your shares at or above the initial price you paid due to a number of factors such as those listed in other portions of this "Risk Factors" section and the following:

- results of operations that vary from the expectations of securities analysts and investors;
- results of operations that vary from those of our competitors;
- changes in expectations as to our future financial performance, including financial estimates and investment recommendations by securities analysts and investors;
- declines in the market prices of stocks generally;
- strategic actions by us or our competitors;
- announcements by us or our competitors of significant contracts, new products, acquisitions, joint marketing relationships, joint ventures, other strategic relationships or capital commitments;
- changes in general economic or market conditions or trends in our industry or markets;
- changes in business or regulatory conditions;
- additions or departures of key management personnel;
- future sales of our common stock or other securities by us or our existing stockholders, or the perception of such future sales;
- investor perceptions of the investment opportunity associated with our common stock relative to other investment alternatives;
- the public's response to press releases or other public announcements by us or third parties, including our filings with the SEC;
- announcements relating to litigation;
- guidance, if any, that we provide to the public, any changes in this guidance or our failure to meet this guidance;
- the development and sustainability of an active trading market for our stock;
- changes in accounting principles; and
- other events or factors, including those resulting from natural disasters, war, acts of terrorism or responses to these events.

These broad market and industry fluctuations may materially adversely affect the market price of our common stock, regardless of our actual operating performance. In addition, price volatility may be greater if the public float and trading volume of our common stock are low.

In the past, following periods of market volatility, stockholders have instituted securities class action litigation. If we were involved in securities litigation, it could have a substantial cost and divert resources and the attention of executive management from our business regardless of the outcome of such litigation.

Our quarterly operating results fluctuate and may fall short of prior periods, our projections or the expectations of securities analysts or investors, which could materially adversely affect our stock price.

Our operating results have fluctuated from quarter to quarter at points in the past, and they may do so in the future. Therefore, results of any one fiscal quarter are not a reliable indication of results to be expected for any other fiscal quarter or for any year. If we fail to increase our results over prior periods, to achieve our projected results or to meet the expectations of securities analysts or investors, our stock price may decline, and the decrease in the stock price may be disproportionate to the shortfall in our financial performance. Results may be affected by various factors, including those described in these risk factors.

If securities analysts do not publish research or reports about our business or if they downgrade our stock or our sector, our stock price and trading volume could decline.

The trading market for our common stock will rely in part on the research and reports that industry or financial analysts publish about us or our business or industry. We do not control these analysts. Furthermore, if one or more of the analysts who do cover us were to downgrade our stock or our industry, or the stock of any of our competitors, or publish inaccurate or unfavorable research about our business or industry, the price of our stock could decline. If one or more of these analysts ceases coverage of us or fails to publish reports on us regularly, we could lose visibility in the market, which in turn could cause our stock price or trading volume to decline.

Failure to comply with requirements to design, implement and maintain effective internal controls could have a material adverse effect on our business and stock price.

As a public company, we have significant requirements for enhanced financial reporting and internal controls. The process of designing and implementing effective internal controls is a continuous effort that requires us to anticipate and react to changes in our business and the economic and regulatory environments and to expend significant resources to maintain a system of internal controls that is adequate to satisfy our reporting obligations as a public company. If we are unable to establish or maintain appropriate internal financial reporting controls and procedures, it could cause us to fail to meet our reporting obligations on a timely basis, result in material misstatements in our consolidated financial statements and harm our results of operations. In addition, we are required, pursuant to Section 404, to furnish a report by management on, among other things, the effectiveness of our internal control over financial reporting in our annual report.

This assessment will need to include disclosure of any material weaknesses identified by our management in our internal control over financial reporting. The rules governing the standards that must be met for our management to assess our internal control over financial reporting are complex and require significant documentation, testing and possible remediation. Testing internal controls may divert our management’s attention from other matters that are important to our business.

In connection with the implementation of the necessary procedures and practices related to internal control over financial reporting, we may identify deficiencies that we may not be able to remediate in time to meet the deadline imposed by the SOX for compliance with the requirements of Section 404. In addition, we may encounter problems or delays in completing the remediation of any deficiencies identified by our independent registered public accounting firm in connection with the issuance of their attestation report.

Our testing, or the subsequent testing by our independent registered public accounting firm, may reveal deficiencies in our internal controls over financial reporting that are deemed to be material weaknesses. A material weakness in internal

controls could result in our failure to detect a material misstatement of our annual or quarterly consolidated financial statements or disclosures. We may not be able to conclude on an ongoing basis that we have effective internal controls over financial reporting in accordance with Section 404. If we are unable to conclude that we have effective internal controls over financial reporting, investors could lose confidence in our reported financial information, which could have a material adverse effect on the trading price of our common stock.

We incur substantial costs as a result of operating as a publicly traded company, and our management is required to devote substantial time to compliance initiatives.

As a publicly traded company, and a large accelerated filer, we incur material legal, accounting, and other expenses that we did not previously incur. In addition, the Sarbanes-Oxley, the Dodd-Frank Wall Street Reform and Consumer Protection Act, and the rules of the SEC, and the stock exchange on which our common shares are listed, have imposed various requirements on public companies. Our management and other personnel need to devote a substantial amount of time to these compliance initiatives as well as investor relations. Moreover, these rules and regulations increase our legal and financial compliance costs and make some activities more time-consuming and costly.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

As of December 31, 2022, we had 32 offices in 15 countries, with our headquarters located in Princeton, New Jersey. We lease or sublease all of our offices. None of our facilities are used for anything other than general office use. We believe that our facilities are suitable and adequate for our operations and we anticipate that additional suitable space will be available when needed.

As of December 31, 2022, our material operating locations, which we define as the facilities we lease with more than 10,000 square feet, were as follows:

LOCATION	APPROXIMATE SQUARE FOOTAGE	LEASE EXPIRATION DATES
Wilmington, Delaware, USA	18,250	2/28/2027
Princeton, New Jersey, USA	17,560	6/30/2025
Sheffield, UK	13,910	1/28/2028
Raleigh, North Carolina, USA	11,250	8/31/2027

Item 3. Legal Proceedings.

From time to time, we may become involved in legal proceedings arising in the ordinary course of our business. Management believes that there is no pending or threatened litigation to which the Company and any of its subsidiaries, or any of the Company or its subsidiaries' properties is the subject of or party to, which, individually or in the aggregate, would have a material adverse effect on our business, results of operations, financial condition and/or cash flows.

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 listed on The Nasdaq Global Select Market (the "Nasdaq") under the symbol "CERT" since December 11, 2020. Prior to that date, there was no public trading market for our common stock.

As of February 15, 2023, there were 50 holders of record of our common stock as reported by our transfer agent. Holders of record are defined as those stockholders whose shares are registered in their names in our stock records and do not include beneficial owners of common stock whose shares are held in the names of brokers, dealers, and clearing agencies.

Dividend Policy

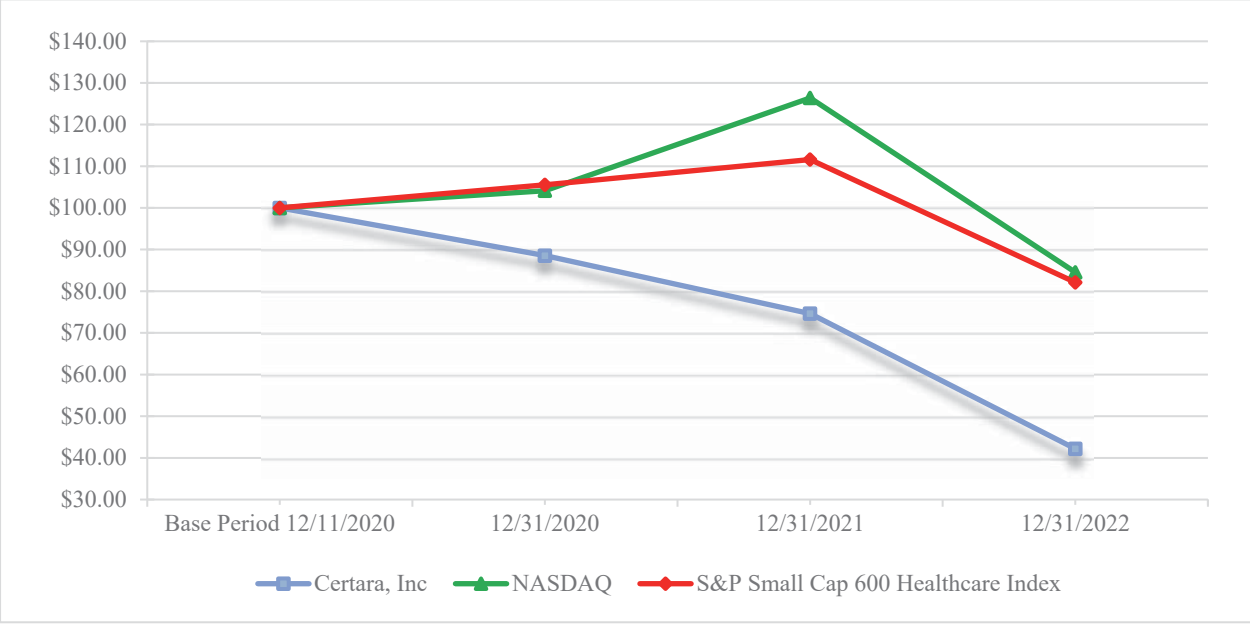
We currently do not expect to declare any dividends on our common stock in the foreseeable future. Instead, we anticipate that all of our earnings in the foreseeable future will be used to provide working capital, to support our operations, to finance the growth and development of our business and to reduce our net debt. Any determination to declare dividends in the future will be at the discretion of our board of directors, subject to applicable laws, and will be dependent on a number of factors, including our earnings, capital requirements and overall financial condition. In addition, because we are a holding company, our ability to pay dividends on our common stock may be limited by restrictions on our ability to obtain sufficient funds through dividends from subsidiaries, including restrictions under our Credit Agreement, and may be further restricted by the terms of any future debt or preferred securities.

Stock Performance Graph

This performance graph shall not be deemed "soliciting material" or to be "filed" with the Securities and Exchange Commission, or the SEC, 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, and shall not be deemed to be incorporated by reference into any of our filings under the Securities Act of 1933, as amended, or the Securities Act.

The following graph compares (i) the cumulative total stockholder return on our common stock from December 11, 2020 (the date our common stock commenced trading on the Nasdaq) through December 31, 2022 with (ii) the cumulative total return of the NASDAQ Index and the S&P Small Cap 600 HealthCare Index over the same period, assuming the investment of $100 in our common stock and in each index on December 11, 2020 and the reinvestment of dividends. The graph uses the closing market price on December 11, 2020 of $38.08 per share as the initial value of our common stock.

As discussed above, we have never declared or paid a cash dividend on our common stock and do not anticipate declaring or paying a cash dividend in the foreseeable future.



Issuer Purchases of Equity Securities

The following table summarizes our purchases of common stock in the three months ended December 31, 2022:

	Total Number of Shares Purchased(a)	Weighted Average Price Paid per Share	Total Number of Shares Purchased Under Announced Programs	Approximate Dollar Value of Shares That May Yet be Purchased Under Announced Programs
10/1/2022 to 10/31/2022	4,751	$ 13.28	0	$ 0
11/1/2022 to 11/30/2022	2,248	$ 12.23	0	$ 0
12/1/2022 to 12/31/2023	2,664	$ 16.98	0	$ 0
Total	9,663	$ 14.06	0	

(a) Shares purchased were due to shares delivered by employees to us for the payment of taxes resulting from issuance of common stock upon the vesting of restricted stock or restricted stock units (RSUs) relating to stock-based compensation plans.

Item 6. [Reserved]

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

For purposes of this Management's Discussion and Analysis of Financial Condition and Results of Operations ("MD&A") section, we use the terms "Certara Inc.", "the Company", "we", "us", and "our" to refer to Certara, Inc.

You should read the following discussion of our financial condition and results of operations in conjunction with our audited consolidated financial statements and the related notes and other financial information included elsewhere in this Form 10K and our audited consolidated financial statements and notes thereto.

As discussed in the section titled "Special Note Regarding Forward Looking Statements," the following discussion and analysis, in addition to historical financial information, contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth in the section titled "Risk Factors" under Part I, Item 1A above.

We intend the discussion of our financial condition and results of operations that follows to provide information that will assist the reader in understanding our consolidated financial statements, the changes in certain key items in those financial statements from year to year, and the primary factors that accounted for those changes, as well as how certain accounting principles, policies and estimates affect our Consolidated Financial Statements.

Executive Overview

We accelerate medicines to patients using biosimulation software, technology, and services to transform traditional drug discovery and development. Biosimulation is a powerful technology used to conduct virtual trials using virtual patients to predict how drugs behave in different individuals. Biopharmaceutical companies use our proprietary biosimulation software throughout drug discovery and development to inform critical decisions that not only save significant time and money but also advance drug safety and efficacy, improving millions of lives each year.

As a global leader in biosimulation based on 2022 revenue, we provide an integrated, end-to-end platform used by more than 2,300 clients including biopharmaceutical companies, regulatory agencies and academic institutions across 70 countries, including 39 of the top 40 biopharmaceutical companies by research and development spend in 2021. Since 2014, customers who use our biosimulation software and technology-driven services have received 90% of all new drug approvals by the FDA. Moreover, 20 global regulatory authorities license our biosimulation software to independently analyze, verify, and review regulatory submissions, including the FDA, Health Canada, Japan's PMDA, and UK's MHR. Demand for our offerings continues to expand rapidly.

We build our biosimulation technology on first principles of biology, chemistry, and pharmacology with proprietary mathematical algorithms that model how medicines and diseases behave in the body. For over two decades, we have honed and validated our biosimulation technology with an abundance of data from scientific literature, lab research, and preclinical and clinical studies. In turn, our customers use biosimulation to conduct virtual trials to answer critical questions, such as: What will be the human response to a drug based on preclinical data? How will other drugs interfere with this new drug? What is a safe and efficacious dose for children, the elderly, or patients with pre-existing conditions? Virtual trials may be used to optimize dosing on populations that are otherwise difficult to study for ethical or logistical reasons, such as infants, pregnant women, the elderly, and cancer patients.

Biosimulation results need to be incorporated into regulatory documents for compelling submissions. Accordingly, we provide regulatory science solutions and integrate them with biosimulation so that our customers can navigate the complex and evolving regulatory landscape and maximize their chances of approval. Our differentiated regulatory services are powered by submissions management software and natural language processing for scalability and speed, allowing us to deliver more than 300 regulatory submissions over the past five years. Our team of regulatory professionals has extensive experience applying industry guidelines and global regulatory requirements.

A final hurdle to delivering medicines to patients is market access, defined as strategies, processes, and activities to ensure that therapies are available to patients at the right price. We believe that biosimulation and market access will continue to be increasingly intertwined as health systems and countries move toward outcomes-based pricing. We have expanded into market access solutions, which help our customers understand the real-world impact of therapies and dosing regimens earlier in the process and effectively communicate this to payors and health authorities. Our solutions are underpinned by SaaS-based value communication tools.

With continued innovation in and adoption of our biosimulation software, technology, and services, we believe more biopharmaceutical companies worldwide will leverage more of our end-to-end platform to reduce cost, accelerate speed to market, and ensure safety and efficacy of medicines for all patients.

Public Offerings and Other Key Shareholders Transactions

On December 11, 2020, we completed our initial public offering ("IPO"), pursuant to which we issued and sold 14,630,000 shares of common stock and certain selling stockholders, including former controlling shareholder, EQT, sold 18,783,250 shares of our common stock (representing the full exercise of the underwriters' option to purchase additional shares), at a public offering price of $23.00 per share. We received net proceeds of $316,3 million, after deducting underwriters' discounts and commissions. In addition, $4,4 million of legal, accounting and other offering costs, net of the tax effect of $0.3 million, incurred in connection with the sale of the Company's common stock in the IPO, were capitalized and offset against the proceeds received in the IPO.

On March 29, 2021, we completed an underwritten secondary public offering in which certain selling stockholders, including EQT, sold 11,500,000 shares of our common stock, which included 1,500,000 shares of common stock pursuant to the full exercise of the underwriters' option to purchase additional shares. We did not offer any common stock in that transaction and did not receive any proceeds from the sale of the shares of common stock by the selling stockholders. We incurred cost of $1.1 million in relation to the secondary public offering.

On September 13, 2021, we completed another public offering, at a public offering price of $31.00 per share, pursuant to which we sold 4,500,000 shares of our common stock, and certain selling stockholders sold 18,500,000 shares of our common stock, which included 3,000,000 shares of common stock pursuant to the full exercise of the underwriters' option to purchase additional shares. We received net proceeds of $134.1 million, after deducting underwriters' discounts and commissions. In addition, $0.7 million of legal, accounting and other offering costs incurred in connection with the sale of our common stock in the public offering, were capitalized and offset against the proceeds received.

On November 22, 2021, we completed another secondary public offering in which certain selling stockholders, including EQT, sold 10,000,000 shares of our common stock. We did not offer any common stock in this transaction and did not receive any proceeds from the sale of the shares of common stock by the selling stockholders. We incurred costs of $0.6 million, recorded in general and administrative expenses, in relation to the secondary public offering.

On August 11, 2022, the Company completed another secondary public offering in which certain selling stockholders, including EQT, sold 7,000,000 shares of the Company's common stock. The Company did not offer any common stock in this transaction and did not receive any proceeds from the sale of the shares of common stock by the selling stockholders. The Company incurred costs of $0.6 million, recorded in general and administrative expenses, in relation to the secondary public offering.

On December 8, 2022, Arsenal acquired an aggregate of 29,954,521 shares of our common stock from EQT at a price of $15.00 per share. In connection with this transaction, we entered into a letter agreement, effective December 8, 2022, with Arsenal providing that, subject to certain exceptions, Arsenal is prohibited from transferring the acquired shares until December 8, 2024. Also, in connection with the transaction, we entered into a stockholders agreement with Arsenal, effective December 8, 2022, which, among other things, grants certain conditional rights to Arsenal to nominate up to two directors to our Board.

Key Factors Affecting Our Performance

We believe that the growth of and future success of our business depends on many factors. While each of these factors presents significant opportunities for our business, they also pose important challenges that we must successfully address to sustain our growth and improve results of operations.

Customer Retention and Expansion

Our future operating results depend, in part, on our ability to successfully enter new markets, increase our customer base, and retain and expand our relationships with existing customers. We monitor two key performance indicators to evaluate retention and expansion: new bookings and renewal rates.

- ***Bookings:*** Our new bookings represent the estimated annual contract value of a signed contract or purchase order where there is sufficient or reasonable certainty about the customer's ability and intent to fund and commence the software and/or services. Bookings vary from period to period depending on numerous factors, including the overall health of the biopharmaceutical industry, regulatory developments, industry consolidation, and sales performance. Bookings have varied and will continue to vary significantly from quarter to quarter and from year to year. See "Risk Factors — Risks Related to Our Business — Our bookings might not accurately predict our future revenue, and we might not realize all or any part of the anticipated revenue reflected in our backlog."

- ***Renewal Rates:*** Our renewal rates measure the percentage of software customers who renew their licenses or subscriptions at the end of the license or subscription periods. The renewal rate is based on revenues and excludes the effect of price increases or expansions.

The table below summarizes our quarterly bookings and renewal rate trends:

	2020					2021					2022				
	Q1	Q2	Q3	Q4	FULL YEAR	Q1	Q2	Q3	Q4	FULL YEAR	Q1	Q2	Q3	Q4	FULL YEAR
Bookings	61.0	70.1	72.9	84.3	288.3	81.9	75.1	72.3	112.4	341.7	108.5	100.3	79.8	120.4	409.0
Renewal Rate	92 %	96 %	84 %	89 %	90 %	92 %	90 %	87 %	96 %	92 %	92 %	92 %	93 %	88 %	91 %

Investments in Growth

We have invested and intend to continue to invest in expanding the breadth and depth of our solutions, including through acquisitions and international expansion. We expect to continue to invest (i) in scientific talent to expand our ability to deliver solutions across the drug development spectrum; (ii) in sales and marketing to promote our solutions to new and existing customers and in existing and expanded geographies; (iii) in research and development to support existing solutions and innovate new technology; (iv) in other operational and administrative functions to support our expected growth; and (v) in complementary business. We expect that our headcount will increase over time and also expect our total operating expenses will continue to increase over time.

Our Operating Environment

The acceptance of model-informed biopharmaceutical discovery and development by regulatory authorities affects the demand for our products and services. Support for the use of biosimulation in discovery and development from regulatory bodies, such as the FDA and EMA, has been critical to its rapid adoption by the biopharmaceutical industry. There has been a steady increase in the recognition by regulatory and academic institutions of the role that modeling and simulation can play in the biopharmaceutical development and approval process, as demonstrated by new regulations and guidance documents describing and encouraging the use of modeling and simulation in the biopharmaceutical discovery, development, testing, and approval process, which has directly led to an increase in the demand for our services. Changes in government or regulatory policy, or a reversal in the trend toward increasing the acceptance of and reliance upon in silico data in the drug approval process, could decrease the demand for our products and services or lead regulatory authorities to cease use of, or recommend against the use of, our products and services.

Governmental agencies throughout the world, but particularly in the United States where the majority of our customers are based, strictly regulate the biopharmaceutical development process. Our business involves helping biopharmaceutical companies strategically and tactically navigate the regulatory approval process. New or amended regulations are expected to result in higher regulatory standards and often additional revenues for companies that service these industries. However, some changes in regulations, such as a relaxation in regulatory requirements or the introduction of streamlined or expedited approval procedures, or an increase in regulatory requirements that we have difficulty satisfying or that make our regulatory strategy services less competitive, could eliminate or substantially reduce the demand for our regulatory services.

Competition

The market for our biosimulation products and related services for the biopharmaceutical industry is competitive and highly fragmented. In biosimulation software, we compete with other scientific software providers, technology companies, in-house development by biopharmaceutical companies, and certain open source solutions. In the technology-driven services market, we compete with specialized companies, in-house teams at biopharmaceutical companies, and academic and government institutions. In some standard biosimulation services, and in regulatory and market access, we also compete with contract research organizations. Some of our competitors and potential competitors have longer operating histories in certain segments of our industry than we do and could have greater financial, technical, marketing, R&D, and other resources. Some of our competitors offer products and services directed at more specific markets than those we target, enabling these competitors to focus a greater proportion of their efforts and resources on those specific markets. Some competing products are developed and made available at lower cost by government organizations and academic institutions, and these entities may be able to devote substantial resources to product development. Some clinical research organizations or technology companies may decide to enter into or expand their offerings in the biosimulation area, whether through acquisition or internal development. We also face competition from open source software initiatives, in which developers provide software and intellectual property free of charge, such as R and PK-Sim software. In addition, some of our customers spend significant internal resources in order to develop their own solutions.

Impact of COVID-19

The continued spread of COVID-19 may adversely impact our business, financial condition or results of operations. As of December 31, 2022, we believe there have been and will be short-term impacts on our business due to new variants of COVID-19. The presence of these new variants has caused a slowdown in closing out clinical trials and delays in regulatory services projects. We believe that these are transitory impacts that we are well-equipped to manage going forward.

non-GAAP measures

Management uses various financial metrics, including total revenues, income from operations, net income, and certain metrics that are not required by, or presented in accordance with, GAAP, such as adjusted EBITDA, adjusted net income, and adjusted diluted earnings per share, to measure and assess the performance of our business, to evaluate the effectiveness of our business strategies, to make budgeting decisions, to make certain compensation decisions, and to

compare our performance against that of other peer companies using similar measures. We believe that presentation of the GAAP and the non-GAAP metrics in this filing will aid investors in understanding our business.

Management measures operating performance based on adjusted EBITDA defined for a particular period as net income (loss) excluding interest expense, provision (benefit) for income taxes, depreciation and amortization expense, intangible asset amortization, equity-based compensation expense, acquisition and integration expense, and other items not indicative of our ongoing operating performance. Management also measures operating performance based on adjusted net income defined for a particular period as net income (loss) excluding, equity-based compensation expense, amortization of acquisition-related intangible assets, acquisition and integration expense, and other items not indicative of our ongoing operating performance. Further, management measures operating performance based on adjusted diluted earnings per share defined for a particular period as adjusted net income divided by the weighted-average diluted common shares outstanding.

We believe adjusted EBITDA, adjusted net income, and adjusted diluted earnings per share are helpful to investors, analysts, and other interested parties because they can assist in providing a more consistent and comparable overview of our operations across our historical periods. In addition, these measures are frequently used by analysts, investors, and other interested parties to evaluate and assess performance.

Adjusted EBITDA, adjusted net income, and adjusted diluted earnings per share are non-GAAP measures and are presented for supplemental purposes only and should not be considered as an alternative or substitute to financial information presented in accordance with GAAP. Adjusted EBITDA, adjusted net income and adjusted diluted earnings per share have certain limitations in that they do not include the impact of certain expenses that are reflected in our consolidated statements of operations and comprehensive income (loss) that are necessary to run our business. Other companies, including other companies in our industry, may not use these measures and may calculate both differently than as presented, limiting the usefulness as a comparative measure.

The following table reconciles net income (loss) to adjusted EBITDA :

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
		(in thousands)	
Net income (loss)	$ 14,731	$ (13,266)	$ (49,397)
Interest expense[a]	17,773	16,837	25,296
Interest income[a]	(1,294)	(271)	(44)
(Benefit from) provision for income taxes[a]	4,024	9,891	(784)
Depreciation and amortization expense[a]	1,731	2,135	2,443
Intangible asset amortization[a]	50,739	42,980	40,310
Currency (gain) loss[a]	(3,166)	(175)	715
Equity-based compensation expense[b]	30,345	29,483	64,507
Acquisition-related expense[d]	2,233	11,241	1,456
Integration expense[e]	—	31	78
Transaction related expenses[f]	1,136	2,754	1,908
Severance expense[g]	653	60	557
Reorganization expense[h]	—	—	525
Loss on disposal of fixed assets[i]	169	351	19
Executive recruiting expense[j]	139	733	288
First-year Sarbanes-Oxley and ASC 842 implementation costs[k]	961	929	—
Adjusted EBITDA	$ 120,174	$ 103,713	$ 87,877

The following table reconciles net income (loss) to adjusted net income:

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
		(in thousands)	
Net income (loss)	$ 14,731	$ (13,266)	$ (49,397)
Currency (gain) loss[a]	(3,166)	(175)	715
Equity-based compensation expense[b]	30,345	29,483	64,507
Amortization of acquisition-related intangible assets[c]	43,822	36,413	33,534
Acquisition-related expense[d]	2,233	11,241	1,456
Integration expense[e]	—	31	78
Transaction related expenses[f]	1,136	2,754	1,908
Severance expense[g]	653	60	557
Reorganization expense[h]	—	—	525
Loss on disposal of fixed assets[i]	169	351	19
Executive recruiting expense[j]	139	733	288
First-year Sarbanes-Oxley and ASC 842 implementation costs[k]	961	929	—
Income tax expense impact of adjustments[l]	(17,633)	(15,344)	(10,213)
Adjusted net income	$ 73,390	$ 53,210	$ 43,977

The following table reconciles diluted earnings per share to adjusted diluted earnings per share:

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
Diluted earnings per share[a]	$ 0.09	$ (0.09)	$ (0.37)
Currency (gain) loss[a]	(0.02)	—	0.01
Equity-based compensation expense[b]	0.19	0.19	0.48
Amortization of acquisition-related intangible assets[c]	0.28	0.24	0.25
Acquisition-related expense[d]	0.01	0.07	0.01
Integration expense[e]	—	—	—
Transaction related expenses[f]	0.01	0.02	0.01
Severance expense[g]	—	—	0.01
Reorganization expense[h]	—	—	0.01
Loss on disposal of fixed assets[i]	—	—	—
Executive recruiting expense[j]	—	—	—
First-year Sarbanes-Oxley and ASC 842 implementation costs[k]	0.01	0.01	—
Income tax expense impact of adjustments[l]	(0.11)	(0.10)	(0.08)
Adjusted diluted earnings per share	$ 0.46	$ 0.34	$ 0.33
Basic weighted average common shares outstanding	156,876,942	149,842,668	133,247,212
Effect of potentially dilutive shares outstanding [m]	2,477,452	4,401,021	229,383
Adjusted diluted weighted average common shares outstanding	159,354,394	$154,243,689	133,476,595

(a) Represents amounts as determined under GAAP.

(b) Represents expense related to equity-based compensation. Equity-based compensation has been, and will continue to be for the foreseeable future, a recurring expense in our business and an important part of our compensation strategy.

(c) Represents amortization costs associated with acquired intangible assets in connection with business acquisitions.

(d) Represents costs associated with acquisitions and any retention bonuses pursuant to the acquisitions.

(e) Represents integration costs related to post - acquisition integration activities.

(f) Represents costs associated with our public offerings that are not capitalized.

(g) Represents charges for severance provided to former executives.

(h) Represents expense related to reorganization, including legal entity reorganization.

(i) Represents the gain/loss related to disposal of fixed assets.

(j) Represents recruiting and relocation expenses related to hiring senior executives.

(k) Represents the first-year Sarbanes-Oxley costs for accounting and consulting fees related to the Company's preparation to comply with Section 404 of the Sarbanes-Oxley Act, as well as implementation cost of adopting ASC 842.

(l) Represents the income tax effect of the non-GAAP adjustments calculated using the applicable statutory rate by jurisdiction.

(m) Represents dilutive shares or potentially dilutive shares that were excluded from the Company's GAAP diluted weighted average common shares outstanding because the Company had a reported net loss and therefore including these shares would have been anti-dilutive.

Components of Results of Operations

Revenues

Our business generates revenue from the sales of software products and delivery of consulting services.

- ***Software***. Our software business generates revenues from software licenses, software subscriptions and software maintenance as follows:
  - *Software licenses*: We recognize revenue for software license fees upfront, upon delivery of the software license.
  - *Software subscription*: Subscription revenue consists of subscription fees to provide our customers access to and related support for our cloud-based solutions. We recognize subscription fees ratably over the term of the subscription, usually one to three years. Any subscription revenue paid upfront that is not recognized in the current period is included in deferred revenue in our consolidated balance sheet until earned.
  - *Software maintenance*: Software maintenance revenue includes fees for providing updates and technical support for software offerings. Software maintenance revenue is recognized ratably over the contract term, usually one year.
- ***Services***. Our services business generates revenues primarily from technology-driven services and professional services, which include software implementation services. Our service arrangements are time and materials, fixed fee, or prepaid. Revenues are recognized over the time services are performed for time and materials, and over time by estimating progress to completion for fixed fee and prepaid services.

Cost of Revenues

Cost of revenues consists primarily of employee related expenses, equity-based compensation, the costs of third-party subcontractors, travel costs, distributor fees, amortization of capitalized software and allocated overhead. We may add or expand computing infrastructure service providers, make additional investments in the availability and security of our solutions, or add resources to support our growth.

Operating Expenses

- ***Sales and Marketing***. Sales and marketing expense consists primarily of employee-related expenses, equity-based compensation, sales commissions, brand development, advertising, travel-related expenses and industry conferences and events. We plan to continue to invest in sales and marketing to increase penetration of our existing client base and expand to new clients.

- ***Research and Development***. Research and development expense consist primarily of employee-related expenses, equity-based compensation, third-party consulting, allocated software costs and tax credits. We plan to continue to invest in our R&D efforts to enhance and scale our software product offerings by development of new features and increased functionality.

- ***General and Administrative***. 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 equity-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.

- ***Intangible Asset Amortization***. Intangible asset amortization consists primarily of amortization expense related to intangible assets recorded in connection with acquisitions and amortization of capitalized software development costs.

- ***Depreciation and Amortization Expense***. Depreciation and amortization expense consists of depreciation of property and equipment and amortization of leasehold improvements.

Other Expenses

- ***Interest Expense***. Interest expense consists primarily of interest expense associated with the Credit Agreement, including amortization of debt issuance costs and discounts.

- ***Net Other Income (Expense)***. Net other income (expense) consists of miscellaneous non-operating expenses primarily comprised of foreign exchange transaction gains and losses.

- ***Provision for (Benefit from) Income Taxes***. Provision for (benefit from) income taxes consists of U.S. federal and state income taxes and income taxes in certain foreign jurisdictions in which we conduct business. We expect income tax expense to increase over time as the Company continues to grow more profitable.

Acquisitions

Author! B.V.

On March 2, 2021, we completed a transaction that qualified as a business combination for a total consideration of $2.7 million. The business combination was not significant to our consolidated financial statements. Based on our purchase price allocation, approximately $1.2 million, $0.1 million and $1.2 million of the purchase price was assigned to customer relationships, non-compete agreements and goodwill, respectively.

Insight Medical Writing Limited

On June 7, 2021, we completed a transaction that qualified as a business combination for a total consideration of $15.2 million. The business combination was not significant to our consolidated financial statements. Based on our purchase price allocation, approximately $7.4 million and $4.7 million of the purchase price was assigned to customer relationships and goodwill, respectively.

Pinnacle 21, LLC

On October 1, 2021, we completed the acquisition of 100% of the equity of Pinnacle for a total consideration of $339.1 million, consisting of cash $266.3 million ($246.9 million net with cash acquired from the acquisition) and 2,239,717 shares of our restricted common stock. Based on our purchase price allocation, approximately $15.8 million, $103.0 million, $24.6 million and $180.9 million of the purchase price was assigned to trademark, acquired software, customer relationships, and goodwill, respectively. Pinnacle has been included in our consolidated results of operations since the date of acquisition.

Integrated Nonclinical Development Solutions, Inc.

On January 3, 2022, we completed an acquisition for a total consideration of $8.0 million, which qualified as a business combination. The business combination was not significant to our consolidated financial statements. Based on the purchase price allocation, approximately $2.4 million, $1.0 million, $0.1 million, and $2.9 million of the purchase price was assigned to customer relationships, developed technology, non-compete agreements, and goodwill, respectively.

Vyasa Analytics, LLC

On December 28, 2022, we completed the acquisition of Vyasa Analytics, LLC (“Vyasa”), a company that provides an AI powered, scalable deep learning software and analytics platform for organizations within healthcare and life sciences, higher education and state and local governments for total estimated consideration of $29.3 million. The business combination was not significant to the Company’s consolidated financial statements.

The total estimated consideration includes a portion of contingent consideration that is payable over the next three years in a combination of 70% cash and 30% Certara common stock. Future payments of contingent consideration are based on achieving certain eligible revenue thresholds for each of the twelve-month periods ended December 31, 2023, 2024, and 2025, respectively. Potential payments range from $0 to $60 million over the three years period. The fair value of the contingent consideration was estimated to be $19.8 million as of the acquisition date.

Based on the Company’s purchase price allocation, approximately $11.4 million, $1.5 million, $0.1 million, $0.1 million and $16.6 million of the purchase price was assigned to developed technology, customer relationships, trademarks, non-compete agreements and goodwill, respectively.

For more information about our acquisitions, see Note 5. “Business Combinations” in the notes to the consolidated financial statements.

Results of Operations

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
	(dollars in thousands)		
Statement of operations data:			
Revenues	$ 335,644	$ 286,104	$ 243,530
Cost of revenues	132,577	111,616	100,765
Operating expenses:			
Sales and marketing	27,408	20,141	19,202
Research and development	28,205	20,379	19,644
General and administrative	71,773	79,539	88,482
Intangible asset amortization	41,429	38,715	37,414
Depreciation and amortization expense	1,731	2,135	2,443
Total operating expenses	170,546	160,909	167,185
Income (loss) from operations	32,521	13,579	(24,420)
Other expenses:			
Interest expense	(17,773)	(16,837)	(25,296)
Net other income (expense)	4,007	(117)	(465)
Total other expenses	(13,766)	(16,954)	(25,761)
Income (loss) before income taxes	18,755	(3,375)	(50,181)
Provision for (benefit from) income taxes	4,024	9,891	(784)
Net Income (loss)	$ 14,731	$ (13,266)	$ (49,397)

Comparison of the Years Ended December 31, 2022 and 2021

Revenues

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
	(in thousands)			
Software	$ 115,466	$ 86,825	$ 28,641	33 %
Services	220,178	199,279	20,899	10 %
Total revenues	$ 335,644	$ 286,104	$ 49,540	17 %

Revenue increased by $49.5 million, or 17%, to $335.6 million for the year ended December 31, 2022, as compared to the same period in 2021. The overall increase in revenue was primarily due to business acquisitions, growth in our technology-driven services and software product offerings from strong renewal rates, client expansion, and new customers. The increase was partially offset by the negative impact on our revenues from fluctuations in foreign currency exchange rates and a decline in regulatory and access revenue.

Software revenue increased by $28.6 million, or 33%, to $115.5 million for the year ended December 31, 2022, as compared to the same period in 2021. The overall growth is primarily attributable to maintaining high net revenue retention rates and renewal rates for our core software products, growth from acquisitions, and new customers. The increase was partially offset by the negative impact on our revenue from fluctuation of the foreign currency exchange rates.

Services revenue increased by $20.9 million, or 10%, to $220.2 million for the year ended December 31, 2022, as compared to the same period in 2021. The growth in overall services revenue is primarily attributable to continued growth in biosimulation. The increase was partially offset by the negative impact on our revenue from fluctuations in foreign currency exchange rates and a decline in regulatory and access revenue.

Cost of Revenues

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
	(in thousands)			
Cost of revenues	$ 132,577	$ 111,616	$ 20,961	19 %

Cost of revenues increased by $21.0 million, or 19%, to $132.6 million for the year ended December 31, 2022, as compared to 2021. The increase was primarily due to a $12.8 million increase in employee-related costs resulting from billable head count growth, a $5.0 million increase in intangible assets amortization, a $2.3 million increase in equity-based compensation cost, a $1.5 million increase related to cost of licenses, a $1.2 million increase in travel, equipment, and facility related expenses, partially offset by a $2.6 million decrease in consulting and professional services cost.

Sales and Marketing Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
	(in thousands)			
Sales and marketing	$ 27,408	$ 20,141	$ 7,267	36 %
% of total revenues	8 %	7 %		

Sales and marketing expenses increased by $7.3 million, or 36%, to $27.4 million for the year ended December 31, 2022, as compared to 2021. Sales and marketing expenses increased primarily due to a $5.2 million increase in employee-related costs resulting from head count growth, a $0.9 million increase in marketing costs, a $0.5 million increase in travel related expenses, and a $0.3 million increase in professional and consulting costs.

Research and Development Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
	(in thousands)			
Research and development	$ 28,205	$ 20,379	$ 7,826	38 %
% of total revenues	8 %	7 %		

Research and development expenses increased by $7.8 million, or 38%, to $28.2 million for the year ended December 31, 2022, as compared to 2021. The increase in R&D expenses was primarily due to a $8.1 million increase in employee-related costs resulting from head count growth and a $3.0 million increase in equity-based compensation cost, partially offset by a $3.3 million increase in capitalized cost in R&D.

General and Administrative Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
	(in thousands)			
General and administrative	$ 71,773	$ 79,539	$ (7,766)	(10)%
% of total revenues	21 %	28 %		

General and administrative expenses decreased by $7.8 million, or 10 %, to $71.8 million for the year ended December 31, 2022, as compared to 2021. The decrease in general and administrative expenses was primarily due to a $9.7 million decrease in acquisition-related costs, a $4.3 million decrease in equity-based compensation cost, a $1.6 million decrease in transaction costs related to public offerings, and a $1.0 million decrease in facility and lease related expenses, partially offset by a $5.1 million increase in employee-related costs resulting from head count growth, a $2.4 million increase in professional and consulting costs, and a $1.0 million increase in travel and equipment related expenses.

Intangible Asset Amortization Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
		(in thousands)		
Intangible asset amortization	$ 41,429	$ 38,715	$ 2,714	7 %
% of total revenues	12 %	14 %		

Intangible asset amortization expense increased by $2.7 million, or 7%, to $41.4 million for the year ended December 31, 2022, as compared to 2021. The increase in intangible asset amortization was primarily the result of increased amortization in acquired intangible assets.

Depreciation and Amortization Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
		(in thousands)		
Depreciation and amortization	$ 1,731	$ 2,135	$ (404)	(19)%
% of total revenues	1 %	1 %		

Depreciation and amortization expense decreased by $0.4 million, or 19 %, to $1.7 million for the year ended December 31, 2022, as compared to 2021. The decrease was primarily due to a decrease in depreciation from computer equipment and furniture for the year ended December 31, 2022 as compared to the same period in 2021.

Interest Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
		(in thousands)		
Interest expense	$ 17,773	$ 16,837	$ 936	6 %
% of total revenues	5 %	6 %		

Interest expense increased by $0.9 million, or 6%, to $17.8 million for the year ended December 31, 2022, as compared to 2021. The increase in interest expense was primarily due to market interest rates increase reflected on our term loan floating rate debt. The increase in interest expense was partially offset by $3.3 million of interest expense reclassified from other comprehensive income due to hedge ineffectiveness in 2021 and the decrease of interest on interest swap.

Net other income (expense)

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
		(in thousands)		
Net other income (expense)	$ 4,007	$ (117)	$ 4,124	nm
% of total revenues	1 %	(0)%		

Net other income (expense) increased by $4.1 million to $4.0 million for the year ended December 31, 2022, as compared to 2021. The increase in net other income (expense) was primarily due to a $3.0 million increase in remeasurement gains related to the fluctuation of foreign currency exchange rates and a $1.0 million increase in interest income.

Provision for (Benefit from) Income Taxes

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
		(in thousands)		
Provision for (benefit from) income taxes	$ 4,024	$ 9,891	$ (5,867)	(59)%
Effective tax rate	21.5 %	(293.1)%		

Our income tax expense was $4.0 million, resulting in an effective income tax rate of 21.5%, for the year ended December 31, 2022, as compared to an income tax expense of $9.9 million, or an effective income tax rate of (293.1)% in 2021. Our income tax expense for the year ended December 31, 2022 was primarily due to the impact of rate changes in certain jurisdictions, the impact of non-deductible items, and the relative mix of domestic and international earnings.

Net income (Loss)

	YEAR ENDED DECEMBER 31,		CHANGE	
	2022	2021	$	%
	(in thousands)			
Net Income (loss)	$ 14,731	$ (13,266)	$ 27,997	(211)%

Net income increased by $28.0 million, or 211%, to $14.7 million for the year ended December 31, 2022, as compared to the same period in 2021. The increase was primarily due to a $49.5 million increase in revenues, a $5.9 million decrease in tax expense, and a $4.1 million increase in net other income mainly related to increase in remeasurement gain and interest income, partially offset by a $21.0 million increase in cost of revenue, a $9.6 million increase in operating expense, and a $0.9 million increase in interest expense.

Comparison of the Years Ended December 31, 2021 and 2020

Revenues

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
	(in thousands)			
Software	$ 86,825	$ 73,463	$ 13,362	18 %
Services	199,279	170,067	29,212	17 %
Total revenues	$ 286,104	$ 243,530	$ 42,574	17 %

Revenues increased by $42.6 million, or 17%, to $286.1 million for the year ended December 31, 2021, as compared to the same period in 2020. Excluding $6.1 million revenue from Pinnacle 21, which was acquired in the fourth quarter of 2021, the revenues increased $36.4 million, or 15% for the year ended December 31, 2021 as compared to the same period in 2020. The overall increase in revenues was primarily a result of growth in our technology enabled services and software product offerings from strong renewal rates, client expansions and new customers.

Software revenue increased by $13.4 million, or 18%, to $86.8 million for the year ended December 31, 2021 as compared to the same period in 2020, driven primarily by growth in sales of our software subscriptions of 29%, or $9.6 million and sales of our software licenses of 10%, or $3.7 million. Excluding $5.7 million revenue from Pinnacle 21, the revenue from software subscription increased $3.9 million, or 12%. The overall growth is primarily attributable to maintaining high net revenue retention rates and renewal rates for our core software products, growth from acquisitions and new customers.

Services revenue increased by $29.2 million, or 17%, to $199.3 million for the year ended December 31, 2021, as compared to the same period in 2020, primarily driven by growth in our technology-driven services product lines, which increased by 18%, or $29.5 million. The growth in overall services revenue is primarily attributable to strong growth in biosimulation and regulatory services from client expansions with ACV greater than $0.1 million and new customers.

Cost of Revenues

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
	(in thousands)			
Cost of revenues	$ 111,616	$ 100,765	$ 10,851	11 %

Cost of revenues increased by $10.9 million, or 11%, to $111.6 million for the year ended December 31, 2021, as compared to 2020. The increase was primarily due to a $10.0 million increase in employee-related costs resulting from billable head count growth, a $2.8 million increase in consulting costs, and $1.4 million increase in intangible assets amortization, partially offset by a $3.6 million decrease in equity-based compensation cost. Excluding $0.8 million expense from Pinnacle, the cost of revenue increased $10.1 million.

Sales and Marketing Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
	(in thousands)			
Sales and marketing	$ 20,141	$ 19,202	$ 939	5 %
% of total revenues	7 %	8 %		

Sales and marketing increased by $0.9 million, or 5%, to $20.1 million for the year ended December 31, 2021, as compared to 2020. Sales and marketing expenses increased primarily due to a $5.4 million increase in employee-related costs resulting from head count growth and a $0.5 million increase in professional and consulting costs as well as $0.1 million increase in equipment and software expenses, partially offset by a $5.2 million decrease in equity-based compensation cost.

Research and Development Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
	(in thousands)			
Research and development	$ 20,379	$ 19,644	$ 735	4 %
% of total revenues	7 %	8 %		

Research and development expenses increased by $0.7 million, or 4%, to $20.4 million for the year ended December 31, 2021 as compared to 2020. The increase in R&D expenses was primarily due to a $5.1 million increases in employee-related costs resulting from head count growth, partially offset by a $4.3 million decrease in equity-based compensation cost. Excluding $1.3 million expense in research and development from Pinnacle, the research and development expense decreased $0.6 million.

General and Administrative Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
	(in thousands)			
General and administrative	$ 79,539	$ 88,482	$ (8,943)	(10)%
% of total revenues	28 %	36 %		

General and administrative expenses decreased by $8.9 million, or 10 %, to $79.5 million for the year ended December 31, 2021 as compared to 2020. The decrease was primarily due to a $24.4 million decrease in employee-related costs resulting from a $22.0 million decrease in equity-based compensation cost and a $2.4 million decrease in other-employee related costs. The decreases were partially offset by increase of $10.7 million in acquisition costs, $2.7 million in insurance expenses, $1.0 million increase in public company expense, and $0.8 million increase in stock offering transaction cost.

Intangible Asset Amortization Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
	(in thousands)			
Intangibles asset amortization	$ 38,715	$ 37,414	$ 1,301	3 %
% of total revenues	14 %	15 %		

Intangible asset amortization expense increased by $1.3 million, or 3%, to $38.7 million for the year ended December 31, 2021 as compared to 2020. The increase in intangible asset amortization was primarily the result of increased amortization in acquired intangible assets. Excluding $2.4 million expense in intangible asset amortization from Pinnacle, the intangible asset amortization expense decreased $1.1 million.

Depreciation and Amortization Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
		(in thousands)		
Depreciation and amortization	$ 2,135	$ 2,443	$ (308)	(13)%
% of total revenues	1 %	1 %		

Depreciation and amortization expense decreased by $0.3 million, or (13) %, to $2.1 million for the year ended December 31, 2021 as compared to 2020. The decrease in depreciation and amortization expense was primarily due to the decrease in average carrying balances of fixed assets in 2021 compared to 2020.

Interest Expense

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
		(in thousands)		
Interest expense	$ 16,837	$ 25,296	$ (8,459)	(33)%
% of total revenues	6 %	10 %		

Interest expense decreased by $8.5 million, or 33%, to $16.8 million for the year ended December 31, 2021 as compared to 2020. The decrease in interest expense was primarily due to lower average outstanding principal balances on our credit facilities in 2021 compared to the same period in 2020. The decrease in interest expense was partially offset by interest expense reclassified in 2021 as interest from other comprehensive income due to hedge ineffectiveness.

Net other income (expense)

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
		(in thousands)		
Net other income (expense)	$ (117)	$ (465)	$ 348	(75)%
% of total revenues	0 %	0 %		

Net other income (expense) decreased by $0.3 million, or 75%, to $0.1 million for the year ended December 31, 2021 as compared to 2020. The decrease in net other income (expenses) was primarily due to increase in currency gain, partially offset by increase in loss from fixed asset disposals.

Provision for (Benefit from) Income Taxes

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
		(in thousands)		
Provision for (Benefit from) income taxes	$ 9,891	$ (784)	$ 10,675	nm
Effective income tax rate	(293.1)%	1.6 %		

Our income tax expense was $9.9 million, resulting in an effective income tax rate of (293.1)%, for the year ended December 31, 2021, as compared to an income tax benefit of $0.8 million, or an effective income tax rate of 1.6%, in

2020. Our income tax expense for the year ended December 31, 2021 was primarily due to the impact of rate changes in certain jurisdictions, the impact of non-deductible items, and the relative mix of domestic and international earnings.

Net Loss

	YEAR ENDED DECEMBER 31,		CHANGE	
	2021	2020	$	%
	(in thousands)			
Net loss	$ (13,266)	$ (49,397)	$ 36,131	(73)%

Net loss decreased by $36.1 million, or 73%, to $13.3 million for the year ended December 31, 2021, as compared to the same period in 2020. The decrease was primarily due to increase in revenues and decrease in stock-based compensation expense and interest costs in 2021 compared to 2020, partially offset by increase in cost of revenue, employee-related costs, acquisition costs, and taxes.

Liquidity and Capital Resources

We have consistently generated positive cash flow from operations, providing $92.5 million, $60.4 million, and $44.8 million as a source of funds each year for the years ended December 31, 2022, 2021, and 2020, respectively. Our additional liquidity comes from several sources: maintaining adequate balances of cash and cash equivalents, issuing common stock, and accessing credit facilities and revolving line of credit. The following table provides a summary of the major sources of liquidity for periods ended at December 31, 2022, 2021, and 2020 and as of December 31, 2022, 2021, and 2020.

	2022	2021	2020
		(in thousands)	
Net cash provided by operating activities	$ 92,543	$ 60,388	$ 44,810
Cash and cash equivalents[1]	$ 236,586	$ 185,797	$ 271,382
Proceeds from issuing common stock	$ —	$ 133,351	$ 316,301
Term loan credit facilities	$ 297,470	$ 300,490	$ 304,099
Revolving line of credit	$ 100,000	$ 100,000	$ 20,000

(1) Cash balance as of December 31, 2022, 2021, and 2020 included $56.4 million, $39.8 million, and $19.9 million cash and cash equivalents held outside of the United States.

Our material cash requirements from known contractual obligations as of December 31, 2022 are as follows:

	TOTAL	LESS THAN 1 YEAR	1 TO 3 YEARS	4 TO 5 YEARS	MORE THAN 5 YEARS
			(in thousands)		
Lease obligations:					
Operating leases	$ 16,031	$ 4,935	$ 7,455	$ 3,046	$ 595
Finance leases[1]	25	25	—	—	—
Principal payments of long-term debt	297,470	3,020	6,040	288,410	—
Interest on long-term debt[2]	85,645	23,685	46,711	15,249	—
Total	$ 399,171	$ 31,665	$ 60,206	$ 306,705	$ 595

(1) Inclusive of interest expense.

(2) Represents the expected cash payments for interest on our long-term debt based on the amounts outstanding as of the end of each period and the interest rates applicable on such debt as of December 31, 2022.

We believe our existing sources of liquidity will be sufficient to meet our working capital, capital expenditures, and contractual obligations for the foreseeable future. We believe we will meet longer-term expected future cash requirements and obligations through a combination of cash flows from operating activities, available cash balances, and potential future equity or debt transactions.

Our future capital requirements, however, will depend on many factors, including funding needed for potential acquisitions, investments, and other growth and strategic opportunities, which could increase our cash requirements. While we believe we have, and will be able to generate, sufficient liquidity to fund our operations for the foreseeable future, our sources of liquidity could be affected by factors described under "Risk Factors" elsewhere in this filing.

Cash Flows

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

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
		(in thousands)	
Net cash provided by operating activities	$ 92,543	$ 60,388	$ 44,810
Net cash used in investing activities	(27,837)	(269,922)	(8,612)
Net cash provided by (used in) financing activities	(7,363)	123,391	208,214
Effect due to foreign exchange rate changes on cash, cash equivalents, and restricted cash	(4,279)	(524)	(883)
Net(decrease) increase in cash, cash equivalents and restricted cash	$ 53,064	$ (86,667)	$ 243,529
Cash paid for interest	17,268	14,169	27,607
Cash paid for income taxes	10,141	8,595	12,278

Operating Activities

Our cash flows from operating activities primarily include net income (loss) adjusted for (i) non-cash items included in net income (loss), such as provisions for credit losses, depreciation and amortization, stock-based compensation, deferred taxes and other non-cash items and (ii) changes in the balances of operating assets and liabilities. Net cash provided by operating activities for the year ended December 31, 2022, was $92.5 million, compared to $60.4 million for the year ended December 31, 2021. The $32.2 million increase in cash from operating activities was primarily due to cash collected from higher revenues and more cash inflow from deferred revenues, partially offset by less cash used to pay for liabilities and increase in accounts receivables.

During the year ended December 31, 2021, operating activities provided cash of approximately $60.4 million. The $15.6 million increase in cash from operating activities compared to 2020 was primarily due to a decrease in cash paid in interest and taxes, partially offset by cash paid for accounts payable and accrued expense.

During the year ended December 31, 2020, operating activities provided approximately $44.8 million of cash and cash equivalents, primarily resulting from a net loss of $49.4 million, offset by $100.9 million of non-cash operating expenses inclusive of depreciation and amortization, amortization of debt issuance costs, equity-based compensation costs, and deferred income taxes. Changes in our operating assets and liabilities used cash and cash equivalents of approximately $6.7 million.

Investing Activities

Net cash used in investing activities for the year ended December 31, 2022, was $27.8 million, a decrease of $242.1 million, compared to $269.9 million for the year ended December 31, 2021. The change in investing activities was

primarily due to a $245.7 million decrease on cash used for business acquisitions, partially offset by cash utilized in capitalized development costs and capital expenditures to support our growth.

During the year ended December 31, 2021, investing activities used approximately $269.9 million of cash, an increase of $261.3 million, compared to $8.6 million in 2020. Cash used in investing activities was primarily for investing in business acquisitions, capitalized software development, and capital expenditures to support our growth.

During the year ended December 31, 2020, investing activities used approximately $8.6 million of cash, primarily for investing in capital expenditures and capitalized software development to support our growth.

Financing Activities

During the year ended December 31, 2022, financing activities used cash of approximately $7.4 million, compared to $123.4 million cash provided by financing activities in the same period of 2021. The $130.8 million decrease in cash provided from financing activities was primarily due to $133.4 million in proceeds received from stock offerings in 2021, partially offset by the increase on tax payment related to shares withheld for employee taxes in 2022.

During the year ended December 31, 2021, financing activities provided approximately $123.4 million, compared to $208.2 million in the same period of 2020. The $84.8 million decrease in cash from financing activities was primarily due to $183.0 million less proceeds from stock offerings in 2021 compared to 2020. The decrease was partially offset by $100.4 million decrease in payments on long-term debt in 2021.

During the year ended December 31, 2020, financing activities provided approximately $208.2 million of cash, primarily attributable to proceeds from issuance of common stock in connection with our IPO, partially offset by payments on long-term debt.

Indebtedness

Credit Facilities

We are a party to a Credit Agreement that originally provided for a $250.0 million senior secured term loan and commitments under a revolving credit facility in an aggregate principal amount of $20.0 million, with a sub-commitment for issuance of letters of credit of $10.0 million. The loans were originally scheduled to mature on August 14, 2024, with respect to the term loan thereunder, and August 14, 2022, with respect to the revolving credit facility thereunder.

In January 2018, we and the lenders amended the Credit Agreement to add incremental term loans in the amount of $25.0 million to be used for our general corporate purposes. Additionally, in April 2018, we and the lenders amended the Credit Agreement to (i) add incremental term loans in the amount of $40.0 million to be used for our general corporate purposes and (ii) provide a reduction of 50 basis points in the margin under the term loan. The terms of such incremental term loans were the same as the terms of our existing term loans, including in respect of maturity, and are considered an increase in the aggregate principal amount of the existing term loans outstanding under the Credit Agreement and are part of the existing term loan.

We entered into a third restated and amended loan agreement on June 17, 2021 (“Third Amendment”), which provides for, among other things, (i) the extension of the termination date applicable to the revolving credit commitments under the Credit Agreement to August 2025, (ii) the extension of the maturity date applicable to the term loans under the Credit Agreement to August 2026, and (iii) an increase of approximately $80.0 million in commitments available under the revolving line of credit (resulting in an aggregate amount of commitments of $100.0 million). The term loan under the Third Amendment has substantially the same terms as the existing term loans and revolving credit commitments. The Credit Agreement is collateralized by substantially all U.S. assets and stock pledges for the non-U.S. subsidiaries and contain various financial and nonfinancial covenants.

Borrowings under the Credit Agreement currently bear interest at a rate per annum equal to either (i) the Eurocurrency rate, with a floor of 0.00%, as adjusted for the reserve percentage required under regulations issued by the Federal Reserve

Board for determining maximum reserve requirements with respect to Eurocurrency funding, plus an applicable margin rate of 3.50% for the term loan and between 4.00% and 3.50% for revolving credit loans, depending on the applicable first lien leverage ratio, or (ii) an alternative base rate ("ABR"), with a floor of 1.00%, plus an applicable margin rate of 2.50% for the term loan or between 3.00% and 2.50% for revolving credit loans, depending on the applicable first lien leverage ratio (with the ABR determined as the greatest of (a) the prime rate, (b) the federal funds effective rate, plus 0.50)%, and (c) the Eurocurrency rate plus 1.00%.

Additionally, we are obligated to pay under the revolving credit facility (i) a commitment fee of between 0.50% and 0.25% per annum of the unused amount of the revolving credit facility, depending on the applicable first lien leverage ratio, (ii) customary letter of credit issuance and participation fees, and (iii) other customary fees and expenses of the letter of credit issuers.

All obligations under the Credit Agreement are unconditionally guaranteed by our wholly owned direct and indirect subsidiaries, subject to certain exceptions. All obligations under the Credit Agreement, and the guarantees of those obligations, are secured on a first lien basis, subject to certain exceptions, by substantially all of our assets and the assets of the other guarantors.

As of December 31, 2022, we had $297.5 million of outstanding borrowings on the term loan, and $100.0 million of availability under the revolving credit facility under the Credit Agreement, and outstanding letters of credit of $0.1 million under the Credit Agreement. As of December 31, 2022, we were in compliance with the covenants of the Credit Agreement.

Income Taxes

We recorded income tax expense of $4.0 million for the year ended December 31, 2022 and income tax expense of $9.9 million for the year ended December 31, 2021.

As of December 31, 2022, we had federal and state NOLs of approximately $1.8 million and $0.05 million, respectively, which are available to reduce future taxable income and expire between 2024 and 2036 and 2029 and 2040, respectively. We had federal and state R&D tax credit carryforwards of approximately $0.4 million and $0.1 million, respectively, to offset future income taxes, which expire between 2025 and 2042. We also had foreign tax credits of approximately $10.6 million, which will start to expire in 2027. These carryforwards that may be utilized in a future period may be subject to limitations based upon changes in the ownership of our stock in a future period. Additionally, we carried forward foreign NOLs of approximately $65.8 million which will start to expire in 2022, foreign research and development credits of $0.4 million which expire in 2029, and Canadian investment tax credits of approximately $3.5 million which expire between 2030 and 2040. Our carryforwards are subject to review and possible adjustment by the appropriate taxing authorities.

As required by Accounting Standards Codification (''ASC'') Topic 740, Income Taxes, our management has evaluated the positive and negative evidence bearing upon the realizability of our deferred tax assets, which are composed principally of NOL carryforwards, Section 174 carryforwards, investment tax credit carryforward, and foreign tax credit carryforwards. Management has determined that it is more likely than not that we will not realize the benefits of foreign tax credit carryforwards. At the foreign subsidiaries, management has determined that it is more likely than not that we will not realize the benefits of certain NOL carryforwards. As a result, a valuation allowance of $24.2 million is recorded at December 31, 2022.

Off-Balance Sheet Arrangements

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

Critical Accounting Policies and Estimates

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

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

Revenue Recognition

Application of GAAP related to the measurement and recognition of revenue requires us to make judgments and estimates. Specifically, complex arrangements with nonstandard terms and conditions may require significant contract interpretation to determine the appropriate accounting, including whether promised goods and services specified in an arrangement are distinct performance obligations. Revenue recognition is also impacted by our ability to determine when a contract is probable of collection and to estimate variable consideration. We consider various factors when making these judgments.

Our revenue is primarily derived from the sale of software products and delivery of consulting services. We recognize revenue when control of the promised good or service is transferred to the customer in an amount that reflects the consideration for which we are expected to be entitled in exchange for those services.

Consulting Service Revenues

The Company's primary professional services offering includes consulting services, which may be either strategic consulting services, reporting and analysis services, regulatory writing services, or any combination of the three. The Company's professional services contracts are either time-and-materials or fixed fee. Services revenues are generally recognized over time as the services are performed. Generally, these services are delivered to customers electronically. Revenue from time-and-material contracts is recognized on an output basis as labor hours are delivered and/or direct expenses are incurred. Revenues for fixed price services are generally recognized over time applying input methods to estimate progress to completion. Accordingly, the number of resources being paid for and varying lengths of time they are being paid for, determine the measure of progress.

Software Licenses

Software license revenue consists primarily of sales of software licenses downloaded and installed by our customers on their own hardware. The license period is generally one year or less and includes an insignificant amount of customer support to assist the customer with the software. Software license performance obligations are generally recognized upfront at the point in time when the software license has been delivered.

Software as a Service (SaaS) Revenues

SaaS revenues consists of subscription fees for access to, and related support for, the Company's cloud-based solutions. The Company typically invoices subscription fees in advance in annual installments. The invoice is initially deferred and revenue is recognized ratably over the life of the contract. The Company's software contracts do not typically include variable consideration, or options for future purchases that would not be similar to the original goods.

Software Services

Maintenance services agreements on perpetual licenses consist of fees for providing software updates and for providing technical support for software products for a specified term. Revenue allocated to maintenance services is recognized ratably over the contract term beginning on the delivery date of each offering. Maintenance contracts generally have a term of one year. While transfer of control of the software training and implementation performance obligations are over time, the services are typically started and completed within a few days. Due to the quick nature of the performance obligation from start to finish and the insignificant amounts, the Company recognizes any software training or implementation revenue at the completion of the service. Any unrecognized portion of amounts paid in advance for licenses and services is recorded as deferred revenue.

Arrangements with Multiple Performance Obligations

For contracts with multiple performance obligations, such as a software license plus software training, implementation, and/or maintenance/support, or in contracts where there are multiple software licenses, the Company determines if the products or services are distinct and allocates the consideration to each distinct performance obligation on a relative standalone selling price basis ("SSP"). The delivery of a particular type of software and each of the user licenses would be one performance obligation. Additionally, any training, implementation, or support and maintenance promises as part of the software license agreement would be considered separate performance obligations, as those promises are distinct and separately identifiable from the software licenses. The payment terms in these arrangements are less than one year such that there is no significant financing component to the transaction.

Goodwill and Other Intangible Assets

We assess goodwill for impairment at least annually, during the fourth quarter based on balances as of October 1st, and more frequently on an interim basis if we believe indicators of impairment exist. Goodwill is tested for impairment at the reporting unit level, which is one level below or the same as an operating segment. The application of an interim or the annual goodwill impairment test begins with the identification of reporting units, which requires judgment. We determined that we have four reporting units: the software reporting unit ("Software"), the SimCyp reporting unit ("SimCyp"), the Integrated Drug Development reporting unit ("IDD"), and the regulatory writing reporting unit ("Regulatory Writing"), which are within a single operating segment of the Company. The process of evaluating the potential impairment of goodwill is highly subjective and requires significant judgment. Our review of impairment starts with performing a qualitative assessment to determine whether events or circumstances lead to a determination that it is more-likely-than-not that the fair value of the reporting units are less than their carrying amounts.

Our qualitative assessment of the recoverability of goodwill considers various macroeconomic, industry-specific and company-specific factors. These factors include: (1) the nature of the business and the history of the Company and its reporting units from their inception; (2) the economic outlook in general and the condition and outlook of the industry in which the Company and its reporting units operate; (3) the financial condition of the Company and its reporting units; (4) the earnings capacity of the Company and its reporting units; (5) the dividend-paying capacity of the Company and its reporting units; (6) whether goodwill or other intangible value exists within the Company and/or its reporting units; (7) previous sales of the Company's and/or reporting units' stock and the size of the block of stock to be valued; and (8) the market prices of stocks of corporations engaged in the same or a similar line of business having their stocks actively traded in a free and open market, either on an exchange or over-the-counter. After assessing the totality of events and circumstances, if we determine that it is not more-likely-than-not that the fair values of our reporting units are less than their net book values, no further assessment is performed. If we determine that it is more-likely-than-not that the fair values of our reporting units are less than carrying value or if we elect to bypass the qualitative assessment, we proceed to a quantitative assessment or test of goodwill.

If a quantitative assessment of goodwill is required, the determination of the fair value of a reporting unit will involve the use of significant estimates and assumptions. Our quantitative goodwill impairment test uses both the income approach and the market approach to estimate fair value. The income approach is based on the discounted cash flow method that discounts forecasted future cash flows expected to be generated which are based on the Company's estimates of financial performance including revenues, adjusted EBITDA, taxes, and working capital and capital asset requirements. When

performing our market approach, we rely specifically on the guideline public company method. Our guideline public company method incorporates revenues and EBITDA multiples from publicly traded companies with operations and other characteristics similar to our entity. If the carrying amount of a reporting unit exceeds its fair value, an impairment loss is recognized in an amount equal to that excess, limited to the total amount of goodwill allocated to that reporting unit.

We performed the annual goodwill impairment analysis during the fourth quarter. The quantitative assessments resulted in no impairment as the estimated fair value of each reporting unit exceeded its carrying value.

Our other intangible assets primarily consist of customer relationship assets, software products acquired in acquisitions, tradenames, software development costs, and non-compete agreements. Other identifiable intangible assets with finite lives, such as software products acquired in acquisitions, non-compete agreements, tradenames, and customer relationship assets, are amortized over their estimated lives using either a straight-line method or a method based on pattern of expected economic benefit of the asset as follows: acquired software — three to ten years; non-compete agreements — two to five years; customer relationships — 11 to 16 years; and trademarks — 10 to 17 years. The Company evaluates finite intangible assets for impairment whenever events or changes in circumstances indicate that the carrying amount of the asset might not be recoverable. An impairment loss is recognized when estimated undiscounted future cash flows expected to result from the use of the asset are less than its carrying amount.

Software Development Costs

Software development costs are accounted for in accordance with ASC Subtopic 985-20 if the software is to be sold, leased or otherwise marketed, or by ASC Subtopic 350-40 if the software is for internal use. After the technological feasibility of the software has been established (for software to be marketed), or at the beginning of application development (for internal-use software), software development costs, which include primarily salaries and related payroll costs and costs of independent contractors incurred during development, are capitalized. Research and development costs incurred prior to the establishment of technological feasibility (for software to be marketed), or prior to application development (for internal-use software), are expensed as incurred. Software development costs are amortized on a product-by-product basis commencing on the date of general release of the products (for software to be marketed) or the date placed in service (for internal-use software).

Income Taxes

We are subject to the income tax laws and regulations of the many jurisdictions in which we operate. These tax laws and regulations are complex and involve uncertainties in the application to our facts and circumstances that may be open to interpretation. We account for uncertainty in income taxes using a two-step approach. The first step requires the Company to conclude that a tax position, based solely on its technical merits, is more likely than not to be sustained upon examination by a tax authority. The second step requires to measure the largest amount of benefit, determined on a cumulative probability basis, that is more likely than not to be realized upon ultimate settlement with tax authority. We recognize benefits for these uncertain tax positions in the period during which, based on all available evidence, we believe it is more likely than not (a likelihood of more than 50)% that the position will be sustained upon examination. This process is inherently subjective since it requires our assessment of the probability of future outcomes. We evaluate these uncertain tax positions on a quarterly basis, including consideration of changes in facts and circumstances.

On a quarterly basis, we also assess the likelihood that we will be able to recover our deferred tax assets against future sources of taxable income and reduce the carrying amounts of deferred tax assets by recording a valuation allowance if, based on the available evidence, it is more likely than not (a likelihood of more than 50)% that all or a portion of such assets will not be realized.

Business Acquisitions

When we acquire businesses, we allocate the purchase price to tangible assets and liabilities and identifiable intangible assets acquired at their acquisition date fair values. Any residual purchase price is recorded as goodwill.

We also estimate the fair value of any contingent consideration using Level 3 unobservable inputs. Our estimates of fair value are based upon assumptions believed to be reasonable but which are uncertain and involve significant judgments by management. We classified our contingent consideration as a liability in a recent acquisition and will remeasure the fair value of contingent liability quarterly until the contingency is resolved. The changes in fair value will be recognized in earnings in our consolidated statements of operations and comprehensive income (loss).

Recently Adopted and Issued Accounting Standards

We have reviewed all recently issued standards and have determined that, other than as disclosed in Note 2 to our consolidated financial statements appearing elsewhere in this annual report, such standards will not have a material impact on our consolidated financial statements or do not otherwise apply to our operations.

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

Market risk is broadly defined as potential economic losses due to adverse changes in the fair value of a financial instrument. In the normal course of business, we are exposed to market risks, including foreign currency exchange rate risk and interest rate risk.

Foreign Currency Exchange Rate Risk

We are exposed to foreign currency exchange rate risk by virtue of our international operations. This risk arises because we use different currencies to recognize revenue and pay operating expenses. We derived 26% of our revenue for the year ended December 31, 2022 from operations outside of the United States. Our strategy for managing foreign currency risk relies on efforts to negotiate customer contracts to receive payment in the same currency used to pay expenses. As of December 31, 2022, we had no outstanding foreign currency forward contracts. Foreign currency exchange rate risk is evidenced in our consolidated financial statements through translation risk and transaction and re-measurement risk.

Translation Risk

We are exposed to movements in foreign currencies, predominately in U.S. dollars, pounds sterling, euros, or Japanese yen, with the majority in U.S. dollars. The vast majority of our contracts are entered into by our U.S. and U.K., E.U., and Japanese subsidiaries. Contracts entered into by our U.S. subsidiaries are almost always denominated in U.S. dollars. Contracts entered into by our other subsidiaries are generally denominated in U.S. dollars, pounds sterling, euros, or Japanese yen, with the majority in U.S. dollars. If the U.S. dollar had weakened 10% or strengthened 10% relative to the pound sterling, the euro, and the Japanese yen in the year ended December 31, 2022, income from operations would have been lower or higher by approximately $2.2 million, based on revenues and costs related to our foreign operations.

Changes in exchange rates between the applicable foreign currency and the U.S. dollar will affect the translation of foreign subsidiaries' financial results into U.S. dollars for purposes of reporting our consolidated financial results. The process by which we translate each foreign subsidiary's financial results to U.S. dollars is as follows:

- we translate statement of operations accounts at the exchange rates on the dates those transactions are recognized or the average exchange rates for the relevant monthly period;
- we translate balance sheet asset and liability accounts at the end of period exchange rates; and
- we translate equity accounts at historical exchange rates.

Translation of the balance sheet in this manner affects stockholders' equity through the foreign currency translation adjustment account. This account exists only in the foreign subsidiary's U.S. dollar balance sheet and is necessary to keep the foreign balance sheet, stated in U.S. dollars, in balance.

We report translation adjustments within accumulated other comprehensive loss as a separate component of stockholders' equity on our consolidated balance sheets. Gains or losses from translating amounts in foreign currencies are recorded in other comprehensive income (loss) on our consolidated statements of operations and comprehensive income (loss).

Transaction and Re-measurement Risk

We have currency risk resulting from the passage of time between the recognition of revenue, invoicing of customers under contracts, and the collection of payment. If a contract is denominated in a currency other than the subsidiary's functional currency, we recognize an unbilled services asset at the time of revenue recognition and a receivable at the time of invoicing for the local currency equivalent of the foreign currency invoice amount. Changes in exchange rates from the time we recognize revenue until the time the customer pays will result in our receiving either more or less in local currency than the amount that was originally invoiced. We recognize this difference as a foreign currency transaction gain or loss, as applicable.

We also have currency risk as a result of intercompany loans or other intercompany borrowings throughout our organization when such intercompany debt is denominated in a currency other than the subsidiary's functional currency. Changes in exchange rates from the time a subsidiary records the intercompany debt until the time the subsidiary pays the intercompany debt will result in a foreign currency transaction gain or loss. We record all foreign currency transaction and re-measurement gains and losses as other income (expense), net on the consolidated statement of operations and comprehensive income (loss). We do not have significant operations in countries considered highly inflationary.

Interest Rate Risk

We have borrowings under our Credit Agreement that bear interest at a rate per annum equal to either (a) the Eurocurrency rate, with a floor of 0.00%, as adjusted for the reserve percentage required under regulations issued by the Federal Reserve Board for determining maximum reserve requirements with respect to Eurocurrency funding, plus an applicable margin rate of 3.50% for the term loan and between 4.00% and 3.50% for revolving credit loans, depending on the applicable first lien leverage ratio, or (b) an alternative base rate ("ABR"), with a floor of 1.00%, plus an applicable margin rate of 2.50% for the term loan or between 3.00% and 2.50% for revolving credit loans, depending on the applicable first lien leverage ratio.

The ABR is determined as the greatest of (a) the prime rate, (b) the federal funds effective rate, plus 0.5% or (c) the Eurocurrency rate plus 1.0%. As of December 31, 2022, we had $297.5 million of outstanding borrowings on the term loan, no outstanding borrowings under the revolving credit facility and an outstanding letter of credit of $0.1 million under the Credit Agreement.

Each quarter basis point increase in the Eurocurrency rate would increase interest expense on our current variable rate debt by approximately $0.2 million for the year ended December 31, 2022. Our exposure to interest rate risk is minimized by our interest rate swaps. As of December 31, 2022, we recorded the fair value of our interest rate swaps in the amount of $8.4 million as a derivative asset included in prepaid expenses and other assets in our consolidated balance sheets.

Other Risk

Although we perform services for customers located in a number of jurisdictions, we have not experienced any material difficulties in receiving funds remitted from foreign countries. However, new or modified exchange control restrictions could have an adverse effect on our ability to repatriate cash to fund our operations and make principal and interest payments, when necessary.

Item 8. Financial Statements and Supplementary Data.

Certara, Inc.

Index to Consolidated Financial Statements

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Certara, Inc. and Subsidiaries

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Certara, Inc. and Subsidiaries (the Company) as of December 31, 2022, the related consolidated statements of operations and comprehensive loss, stockholders' equity and cash flows for the year ended December 31, 2022, and the related notes to the consolidated financial statements (collectively, the financial statements). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2022, and the results of its operations and its cash flows for the year ended December 31, 2022, in conformity with accounting principles generally accepted in the United States of America.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control — Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission in 2013, and our report dated March 1, 2023 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Basis for Opinion

These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with 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 the financial statements are free of material misstatement, whether due to error or fraud. Our audit included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audit provides 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 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 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 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.

Revenue recognition on the Company’s fixed price contract revenue

As described in Note 2 (r) to the consolidated financial statements, the Company performs professional services under fixed price contracts with the associated revenue recognized over time. For fixed price revenue contracts recognized over time, management utilizes the input method to measure estimated progress to completion.

We identified revenue recognition for fixed price contracts as a critical audit matter. The principal consideration for our determination that revenue recognition for fixed price contracts was a critical audit matter is that the measure of progress towards completion is based upon the hours incurred to date as a percentage of the total estimated hours and utilizes assumptions for future hours to complete the performance obligations, and those assumptions have significant estimation

uncertainty. A significant change in the assumptions could affect both the profitability of the contract and the amount of revenue and profit recognized in an accounting period. Given these factors, the related audit effort in evaluating management's judgments in determining the revenue recognition for fixed price contracts was challenging, subjective, and complex and required a high degree of auditor judgment.

Our audit procedures related to testing the existence, accuracy and completeness of the Company's fixed price contract revenue included the following, among others:

- We obtained an understanding of the relevant controls related to the existence, accuracy and completeness of fixed price contract revenue and tested such controls for design and operating effectiveness, including management review controls.

- We evaluated the reasonableness of management estimates of cost recognition by comparing costs incurred under completed contracts to the costs estimated by management at the inception of the customer agreement.

- We selected a sample of customer contracts and performed the following procedures:

    - We reviewed the terms in the customer contract and evaluated the appropriateness of management's application of their accounting policies, along with their use of estimates, to determine the revenue recognition conclusions are reasonable.

    - We evaluated management's estimated cost budget for each selection and compared the actual costs incurred to the amount recognized in accordance with management's accounting policies.

Valuation of Regulatory Writing Reporting Unit for Goodwill Impairment Testing

As described in Notes 2 (l) and 8 to the financial statements, as of December 31, 2022, the Company's consolidated goodwill balance was $717.8 million. The Company tests for impairment of goodwill at the reporting unit level annually as of the first day of the fourth quarter, or more frequently if events or circumstances indicate a potential impairment. During the year ended December 31, 2022, the impairment test was performed at the annual test date. The Company determines the fair value of the Regulatory Writing reporting unit using a combination of the income approach using the discounted cash flow method, which discounts forecasted future cash flows expected to be generated, and the market approach, using the guideline public company method, which utilizes information of comparable entities with similar operations and economic characteristics. To quantitatively measure goodwill impairment, the Company compares the fair value of the Regulatory Writing reporting unit to its carrying value. When determining the fair value of the Regulatory Writing reporting unit management makes significant estimates and assumptions, including revenue growth rates, projected operating margins, and discount rates for the income approach and comparable market data for the market approach.

We identified the valuation of the Regulatory Writing reporting unit for goodwill impairment testing as a critical audit matter given the significant estimates and assumptions management makes to determine the fair value of the Regulatory Writing reporting unit, we identified management's assumptions related to revenue growth rates, projected operating margins, discount rates and comparable market data utilized in the valuation of the Regulatory Writing reporting unit's quantitative test for goodwill impairment as a critical audit matter. Auditing the reasonableness of management's estimates and assumptions required a high degree of auditor judgment and an increased extent of effort, including the need to involve our fair value specialists.

Our audit procedures related to revenue growth rates, projected operating margins, discount rates and comparable market data utilized in the valuation of the Company's Regulatory Writing reporting unit included the following, among others:

- We obtained an understanding of the relevant controls related to the valuation of the Company's Regulatory Writing reporting unit and tested such controls for design and operating effectiveness, including management review controls.

- We evaluated the reasonableness of management's forecasted sales and expense growth rates by comparing actual results to management's historical forecasts.

- We evaluated the reasonableness of management's forecasts of sales growth rates by comparing the forecasts to (1) the historical results (2) internal communications to management and the Board of Directors, (3) external communications from analysts and investors, as applicable and (4) external market and industry data.

- We evaluated the reasonableness of management's selection of comparable entities with similar operations and economic characteristics.

- With the assistance of our valuation specialists, we evaluated the reasonableness of the Company's valuation methodology and significant assumptions by:

    - Evaluating the reasonableness of the discount rate and multiples of earnings of comparable companies by comparing the underlying source information to publicly available market data and verifying the accuracy of the calculations.

    - Evaluating the appropriateness of the valuation methods used by management and testing their mathematical accuracy.

Valuation of developed technology and contingent consideration related to the acquisition of Vyasa Analytics, LLC

As described in Note 5 to the consolidated financial statements, on December 28, 2022, the Company completed the acquisition of Vyasa Analytics, LLC ("Vyasa") which resulted in $13.1 million of intangible assets being recorded. Those intangible assets were comprised of developed technology of $11.4 million and other intangibles of $1.7 million. Fair values of the developed technology were estimated by management using an income approach that estimates discounted cash flows which are specifically attributable to an intangible asset.. Management's determination of the fair value of the developed technology included significant assumptions related to future expected cash flows from the developed technology and discount rates. As a result of the acquisition, the Company also recognized a contingent consideration liability of $19.8 million. Future payments of contingent consideration are based on achieving certain eligible revenue thresholds for each of the twelve-month periods ended December 31, 2023, 2024, and 2025, respectively. Potential payments range from $0 to $60.0 million over the three year period. The liability was valued using a valuation model that reflects the use of multiple probabilities.

We identified the valuation of developed technology and contingent consideration related to the acquisition of Vyasa Analytics, LLC as a critical audit matter given the significant judgment exercised by management when determining the valuation of developed technology, which in turn led to a high degree of auditor judgment, in performing procedures relating to management's significant assumptions related to the revenue growth rates and discount rates. Also, the audit effort involved the use of professionals with valuation skill and knowledge. The determination of the proper accounting treatment of the contingent consideration by management required judgment and the valuation is based, in part, on unobservable inputs that are sensitive to changes in the probability of achieving the thresholds and volatility assumptions. Given these factors, the related audit effort in evaluating management's judgments in determining the valuation of developed technology acquired and the contingent consideration due in the Vyasa acquisition was challenging, subjective, and complex and required a high degree of auditor judgment.

Our audit procedures related to the Company's valuation of the contingent consideration and developed technology in connection with the aforementioned acquisition included the following, among others:

- We obtained an understanding of the relevant controls related to the valuation of the contingent consideration liability and developed technology asset and tested such controls for design and operating effectiveness, including management review controls related to the development of significant assumptions.

- We evaluated the reasonableness of management's forecasts of sales by comparing the forecasts to (1) the historical results (2) internal communications to management and the Board of Directors, and (3) external market and industry data.

- With the assistance of our valuation specialists, we evaluated the reasonableness of the Company's valuation methodology and significant assumptions by:

    - Evaluating the reasonableness of the discount rates, volatility assumptions and the probability of certain financial forecast scenarios.

    - Testing the relevance and reliability of source information underlying the determination of the discount rates and volatility assumptions.

/s/ RSM US LLP

We have served as the Company's auditor since 2022.

Blue Bell, Pennsylvania
March 1, 2023

Report of Independent Registered Public Accounting Firm

Stockholders and the Board of Directors
Certara, Inc. and Subsidiaries

Opinion on the Internal Control Over Financial Reporting

We have audited Certara, Inc. and Subsidiaries (the Company) internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission in 2013. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission in 2013.We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheet of the Company as of December 31, 2022, the related consolidated statements of operations and comprehensive loss, stockholders' equity, and cash flows for the year ended December 31, 2022, and the related notes (collectively, the consolidated financial statements) and our report dated March 1, 2023, expressed an unqualified opinion.

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 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 U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, 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/ RSM US LLP

Blue Bell, Pennsylvania
March 1, 2023

Report Of Independent Registered Public Accounting Firm

Board of Directors and Stockholders
Certara, Inc.

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheet of Certara, Inc. and Subsidiaries (the "Company") as of December 31, 2021, and the related consolidated statements of operations and comprehensive loss, stockholders' equity, and cash flows for each of the years in the two-year period ended December 31, 2021, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021, and the results of their operations and their cash flows for each of the years in the two-year period ended December 31, 2021, in conformity with accounting principles generally accepted in the United States of America.

Change in Accounting Principle

As disclosed in Note 2 to the consolidated financial statements, the Company has changed its method of accounting for leases as of January 1, 2021 due to the adoption of Financial Accounting Standards Board Accounting Standards Codification Topic 842, *Leases*.

Basis for Opinion

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

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

/s/ CohnReznick LLP

We served as the Company's auditor from 2019 to 2021.

Tysons, Virginia
March 1, 2022

CERTARA, INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS

(IN THOUSANDS, EXCEPT PER SHARE AND SHARE DATA)	DECEMBER 31, 2022	2021
Assets		
Current assets:		
Cash and cash equivalents	$ 236,586	$ 185,797
Accounts receivable, net of allowances for credit losses of $1,250 and $262, respectively	82,584	69,555
Restricted cash	3,102	827
Prepaid expenses and other current assets	19,980	18,548
Total current assets	342,252	274,727
Other assets:		
Property and equipment, net	2,400	2,935
Operating lease right-of-use assets	14,427	12,634
Goodwill	717,743	703,371
Intangible assets, net of $217,705 and $169,329, respectively	486,782	511,823
Deferred income taxes	3,703	4,073
Other long-term assets	5,615	2,167
Total assets	$ 1,572,922	$ 1,511,730
Liabilities and stockholder's equity		
Current liabilities:		
Accounts payable	$ 7,533	$ 7,458
Accrued expenses	35,403	29,830
Current portion of deferred revenue	52,209	45,496
Current portion of long-term debt	3,020	3,020
Current operating lease liabilities	4,968	5,040
Other current liabilities	25	1,381
Total current liabilities	103,158	92,225
Long-term liabilities:		
Deferred revenue, net of current portion	2,815	1,531
Deferred income taxes	65,046	76,098
Operating lease liabilities, net of current portion	10,133	8,256
Long-term debt, net of current portion and debt discount	289,988	291,746
Other long-term liabilities	22,121	25
Total liabilities	493,261	469,881
Commitments and contingencies		
Stockholder's equity		
Preferred shares, $0.01 par value, 50,000,000 and no shares authorized as of December 31, 2022 and 2021, respectively, no shares issued and outstanding as of December 31, 2022 and 2021, respectively	—	—
Common shares, $0.01 par value, 600,000,000 shares authorized, 159,676,150 and 159,660,048 shares issued as of December 31, 2022 and 2021, respectively; 159,525,943 and 159,658,948 shares outstanding as of December 31, 2022 and 2021, respectively	1,596	1,596
Additional paid-in capital	1,150,168	1,119,821
Accumulated deficit	(60,873)	(75,604)
Accumulated other comprehensive loss	(8,230)	(3,926)
Treasury stock at cost, 150,207 and 1,100 shares at December 31, 2022 and 2021, respectively	(3,000)	(38)
Total stockholder's equity	1,079,661	1,041,849
Total liabilities and stockholder's equity	$ 1,572,922	$ 1,511,730

The accompanying notes are an integral part of the consolidated financial statements.

CERTARA, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE INCOME (LOSS)

(IN THOUSANDS, EXCEPT PER SHARE AND SHARE DATA)	YEAR ENDED DECEMBER 31, 2022	2021	2020
Revenues	$ 335,644	$ 286,104	$ 243,530
Cost of revenues	132,577	111,616	100,765
Operating expenses:			
Sales and marketing	27,408	20,141	19,202
Research and development	28,205	20,379	19,644
General and administrative	71,773	79,539	88,482
Intangible asset amortization	41,429	38,715	37,414
Depreciation and amortization expense	1,731	2,135	2,443
Total operating expenses	170,546	160,909	167,185
Income (loss) from operations	32,521	13,579	(24,420)
Other expenses:			
Interest expense	(17,773)	(16,837)	(25,296)
Net other income (expense)	4,007	(117)	(465)
Total other expenses	(13,766)	(16,954)	(25,761)
Income (loss) before income taxes	18,755	(3,375)	(50,181)
Provision for (benefit from) income taxes	4,024	9,891	(784)
Net income (loss)	14,731	(13,266)	(49,397)
Other comprehensive income (loss)			
Foreign currency translation adjustment, net of tax of $(916), $195, $(277)	(10,490)	(5,154)	5,045
Change in fair value of interest rate swap, net of tax of $2,056, (16), $(384)	6,186	547	(1,135)
Reclassification of fair value of interest rate swap, net of tax of $0, $(765), $0	—	2,268	—
Total other comprehensive income (loss)	(4,304)	(2,339)	3,910
Comprehensive income (loss)	$ 10,427	$ (15,605)	$ (45,487)
Net income (loss) per share attributable to common stockholders:			
Basic	$ 0.09	$ (0.09)	$ (0.37)
Diluted	$ 0.09	$ (0.09)	$ (0.37)
Weighted average common shares outstanding:			
Basic	156,876,942	149,842,668	133,247,212
Diluted	159,354,394	149,842,668	133,247,212

The accompanying notes are an integral part of the consolidated financial statements.

CERTARA, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(IN THOUSANDS, EXCEPT SHARE DATA)	COMMON STOCK SHARES	COMMON STOCK AMOUNT	ADDITIONAL PAID-IN CAPITAL	ACCUMULATED DEFICIT	ACCUMULATED OTHER COMPREHENSIVE LOSS	TREASURY STOCK SHARES	TREASURY STOCK AMOUNT	TOTAL STOCKHOLDER'S EQUITY
Balance as of December 31, 2019	132,407,786	$ 1,324	$ 509,162	$ (12,941)	$ (5,497)	—	$ —	$ 492,048
Equity-based compensation awards	5,941,693	59	64,448	—	—	—	—	64,507
Repurchase of Parent Class B units	—	—	(1,079)	—	—	—	—	(1,079)
Capital contribution	—	—	250	—	—	—	—	250
Issuance of common stock upon initial public offering, net	14,630,000	146	311,747	—	—	—	—	311,893
Change in fair value of interest rate swap, net of tax	—	—	—	—	(1,135)	—	—	(1,135)
Net loss	—	—	—	(49,397)	—	—	—	(49,397)
Foreign currency translation adjustment, net of tax	—	—	—	—	5,045	—	—	5,045
Balance as of December 31, 2020	152,979,479	1,529	884,528	(62,338)	(1,587)	—	—	822,132
Equity-based compensation awards	(59,148)	—	29,483	—	—	—	—	29,483
Restricted stock units withheld for tax liability	—	—	(234)	—	—	—	—	(234)
Issuance common stock from public offerings, net	4,500,000	45	133,306	—	—	—	—	133,351
Common shares issued in connection with Pinnacle acquisition	2,239,717	22	72,738	—	—	—	—	72,760
Restricted stock withheld for tax liability	—	—	—	—	—	(1,100)	(38)	(38)
Change in fair value from interest rate swap, net of tax	—	—	—	—	547	—	—	547
Reclassification of fair value of interest rate swap, net of tax	—	—	—	—	2,268	—	—	2,268
Net loss	—	—	—	(13,266)	—	—	—	(13,266)
Foreign currency translation adjustment, net of tax	—	—	—	—	(5,154)	—	—	(5,154)
Balance as of December 31, 2021	159,660,048	1,596	1,119,821	(75,604)	(3,926)	(1,100)	(38)	1,041,849
Equity-based compensation expense, net of forfeiture	(421,624)	(4)	30,349	—	—	—	—	30,345
Restricted stock units withheld for tax liability	—	—	2	—	—	(138,038)	(2,766)	(2,764)
Common shares issued for employee share-based compensation	437,726	4	(4)	—	—	—	—	—
Restricted stock withheld for tax liability	—	—	—	—	—	(11,069)	(196)	(196)
Change in fair value from interest rate swap, net of tax	—	—	—	—	6,186	—	—	6,186
Net income	—	—	—	14,731	—	—	—	14,731
Foreign currency translation adjustment, net of tax	—	—	—	—	(10,490)	—	—	(10,490)
Balance as of December 31, 2022	159,676,150	$ 1,596	$ 1,150,168	$ (60,873)	$ (8,230)	(150,207)	$ (3,000)	$ 1,079,661

The accompanying notes are an integral part of the consolidated financial statements.

CERTARA, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS

(IN THOUSANDS)	YEAR ENDED DECEMBER 31, 2022	2021	2020
Cash flows from operating activities:			
Net income (loss)	$ 14,731	$ (13,266)	$ (49,397)
Adjustments to reconcile net loss to net cash provided by operating activities:			
Depreciation and amortization of property and equipment	1,731	2,135	2,443
Amortization of intangible assets	50,739	42,980	40,310
Amortization of debt issuance costs	1,540	1,531	1,520
(Recovery of) provision for credit losses	1,072	130	(53)
Loss on retirement of assets	169	351	19
Equity-based compensation expense	30,345	29,483	64,507
Unrealized loss on derivative	—	1,144	—
Deferred income taxes	(11,511)	(1,184)	(7,825)
Changes in assets and liabilities			
Accounts receivable	(15,009)	(10,066)	(3,932)
Prepaid and other assets	126	585	(8,257)
Accounts payable and accrued expenses	5,289	1,421	2,381
Deferred revenue	9,530	5,435	3,094
Change in other liabilities	3,791	(291)	—
Net cash provided by operating activities	92,543	60,388	44,810
Cash flows from investing activities:			
Capital expenditures	(1,430)	(1,143)	(863)
Capitalized software development costs	(11,099)	(7,759)	(7,074)
Business acquisitions, net of cash acquired	(15,308)	(261,020)	(675)
Net cash used in investing activities	(27,837)	(269,922)	(8,612)
Cash flows from financing activities:			
Capital contributions	—	—	250
Unit repurchase	—	—	(1,079)
Proceeds from issuance of common stock, net of underwriters' discounts and commissions	—	133,351	316,301
Proceeds from borrowings on long-term debt	—	89	—
Payments on long-term debt and finance lease obligations	(3,313)	(3,973)	(104,358)
Proceeds from line of credit	—	—	19,880
Payments on financing component of interest rate swap	(1,088)	(1,095)	—
Payments on line of credit	—	—	(19,880)
Payment of deferred offering costs	—	(1,767)	(2,900)
Payment of debt issuance costs	—	(2,942)	—
Payment of taxes on shares and units withheld for employee taxes	(2,962)	(272)	—
Net cash provided by (used in) financing activities	(7,363)	123,391	208,214
Effect of foreign exchange rate changes on cash, cash equivalents, and restricted cash	(4,279)	(524)	(883)
Net increase (decrease) in cash, cash equivalents, and restricted cash	53,064	(86,667)	243,529
Cash, cash equivalents, and restricted cash, at beginning of year	186,624	273,291	29,762
Cash, cash equivalents, and restricted cash, at end of year	$ 239,688	$ 186,624	$ 273,291
Supplemental disclosures of cash flow information			
Cash paid for interest	$ 17,268	$ 14,169	$ 27,607
Cash paid for taxes	$ 10,141	$ 8,595	$ 12,278
Supplemental schedule of noncash investing and financing activities			
Contingent liabilities established in connection with business acquisition	$ 19,813	$ —	$ —
Property and equipment controlled through capital lease obligations	$ —	$ —	$ 831
Deferred offering costs, accrued but not paid	$ —	$ —	$ 1,767
Operating right-of-use assets recognized upon adoption of ASC 842	$ —	$ 15,857	$ —
Operating lease liability recognized upon adoption of ASC 842	$ —	$ 16,809	$ —
Common shares issued in connections with the Pinnacle acquisition	$ —	$ 72,760	$ —

The accompanying notes are an integral part of the consolidated financial statements.

1. Description of Business

Certara, Inc. and its wholly-owned subsidiaries (together, the "Company") deliver software products and technology-driven services to customers to efficiently carry out and realize the full benefits of biosimulation in drug discovery, preclinical and clinical research, regulatory submissions and market access. The Company is a global leader in biosimulation, and the Company's biosimulation software and technology-driven services help optimize, streamline, or even waive certain clinical trials to accelerate programs, reduce costs, and increase the probability of success. The Company's regulatory science and market access software and services are underpinned by technologies such as regulatory submissions software, natural language processing, and Bayesian analytics. When combined, these solutions allow the Company to offer customers end-to-end support across the entire product life cycle. On October 1, 2020, the Company amended the certificate of incorporation of EQT Avatar Topco, Inc. to change the name of the Company to Certara, Inc.

The Company has operations in the United States, Australia, Canada, China, France, Germany, India, Italy, Japan, Luxembourg, Netherlands, Philippines, Poland, Portugal, Spain, Switzerland and the United Kingdom.

2. Summary of Significant Accounting Policies

(a) Basis of Presentation and Use of Estimates

The preparation of consolidated financial statements in conformity with U.S. generally accepted accounting principles ("GAAP") requires management to make estimates and assumptions that affect the reported amounts of assets, 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, among other estimates, assumptions used in the allocation of the transaction price to separate performance obligations, estimates towards the measure of progress of completion on fixed-price service contracts, the determination of fair values and useful lives of long-lived assets as well as intangible assets, goodwill, allowance for credit losses for accounts receivable, recoverability of deferred tax assets, recognition of deferred revenue, valuation of interest rate swaps, determination of fair value of equity-based awards and assumptions used in testing for impairment of long-lived assets. Actual results could differ from those estimates, and such differences may be material to the consolidated financial statements.

(b) Recently Issued Accounting Pronouncements

There have been no recent accounting pronouncements, changes in accounting pronouncements during 2022 that are significant to us.

(c) Adopted Accounting Guidance

In October 2021, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") 2021-08, "Business Combinations (Topic 805) - Accounting for Contract Assets and Contract Liabilities from Contracts with Customers", which requires that at the acquisition date, an acquirer should account for the related revenue contracts in accordance with ASC Topic 606, "Revenue from Contracts with Customers" ("Topic 606"), as if it had originated the contracts. Generally, this results in an acquirer recognizing and measuring the acquired contract assets and contract liabilities consistent with how they were recognized and measured in the acquiree's financial statements if the acquiree prepared financial statements in accordance with U. S. GAAP. For public business entities, the ASU is effective for fiscal years beginning after December 15, 2022, including interim periods within those fiscal years. Early adoption of the ASU is permitted. The Company early adopted ASU 2021-08 and has carried over the contract assets and liabilities from the 2021 business acquisitions into the Company's 2021 consolidated financial statements.

In December 2019, the FASB issued ASU 2019-12, "Simplifying the Accounting for Income Taxes" which removes certain exceptions related to the approach for intraperiod tax allocation, the methodology for calculating income taxes in an interim period and the recognition of deferred tax liabilities for outside basis differences. The Company adopted this guidance on January 1, 2021 on a prospective basis. The adoption of this guidance did not have an impact on the Company's consolidated financial statements.

In January 2017, the FASB issued ASU No. 2017-04, "Intangibles—Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment", which simplifies the subsequent measurement of goodwill and eliminated Step 2 test from goodwill impairment test. Step 2 required an entity to perform procedures that determine the fair value of its reporting units at the impairment testing date of its assets and liabilities following the procedure that would be required in determining the fair value of assets acquired and liabilities assumed in a business combination. Under the new guidance, an entity should perform its annual, or interim, goodwill impairment test by comparing the fair value of a reporting unit with it carrying amount. The Company adopted the standard as of December 31, 2021. The adoption of this guidance did not have a material impact on the Company's 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 amended the existing accounting standard for the measurement of credit losses. The new standard primarily requires using the current expected credit losses approach to measure and recognize credit losses of financial assets held at amortization cost. It replaces the existing incurred loss model with an expected loss model and requires using historical data and adjusting for current economic conditions, including reasonable and supportable forecasts to estimate credit losses to be expected. The Company adopted the standard as of December 31, 2021. The adoption of this guidance did not have a material impact on the Company's consolidated financial statements.

In February 2016, the FASB issued ASU 2016-02, "Leases (Topic 842)", which supersedes FASB Topic 840, "Leases (Topic 840)" and requires lessees to recognize most leases on the balance sheet with a corresponding right of use asset. Leases will be classified as financing or operating which will drive the expense recognition pattern. For lessees, the income statement presentation and expense recognition pattern for financing and operating leases is similar to the current model for capital and operating leases, respectively. Companies may elect to exclude short-term leases. The update also requires additional disclosures that will better enable users of financial statements to assess the amount, timing, and uncertainty of cash flows arising from leases. The Company adopted the new standard as of January 1, 2021, due to its loss of emerging growth company ("EGC") status, using the effective date transition method. As permitted under the effective date transition method, financial information and disclosure for periods prior to the date of initial application was not updated. An adjustment to opening accumulated deficits was not required in conjunction with the Company's adoption. The Company has elected not to reassess whether expired or existing contracts contain leases, nor did the Company reassess the classification of existing leases as of the adoption date. The Company did not use hindsight in the assessment of lease terms as of the effective date. For additional information, see Note 14 - Leases.

(d) Principles of Consolidation

The accompanying consolidated financial statements include the accounts of the Company and its wholly owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

(e) Fair Value Measurements

The Company follows Financial Accounting Standards Board ("FASB") Accounting Standards Update ("ASC") 820-10, "Fair Value Measurements" ("ASC 820-10"), which defines fair value, establishes a framework for measuring fair value in U.S. GAAP, and requires certain disclosures about fair value measurements.

ASC 820-10 defines fair value as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the most advantageous market for the asset or liability in an orderly transaction. Fair value measurement is based on a hierarchy of observable or unobservable inputs. The standard describes three levels of inputs that may be used to measure fair value.

Level 1 — Inputs to the valuation methodology are quoted prices available in active markets for identical securities as of the reporting date;

Level 2 — Inputs to the valuation methodology are other significant observable inputs, including quoted prices for similar securities, interest rates, credit risk etc. as of the reporting date, and the fair value can be determined through the use of models or other valuation methodologies; and

Level 3 — Inputs to the valuation methodology are unobservable inputs in situations where there is little, or no market activity of the securities and the reporting entity makes estimates and assumptions relating to the pricing of the securities including assumptions regarding risk.

If the inputs used to measure fair value fall in different levels of the fair value hierarchy, the hierarchy is based upon the lowest level of input that is significant to the fair value measurement. For the acquisitions noted in Note 5, the fair value measurement methods used to estimate the fair value of the assets acquired and liabilities assumed at the acquisition dates utilized a number of significant unobservable inputs of Level 3 assumptions. These assumptions included, among other things, projections of future operating results, implied fair value of assets using an income approach by preparing a discounted cash flow analysis, and other subjective assumptions.

Interest rate swaps are valued in the market using discounted cash flows techniques. These techniques incorporate Level 1 and Level 2 inputs. The market inputs are utilized in the discounted cash flows' calculation considering the instrument's term, notional amount, discount rate and credit risk. Significant inputs to the derivative instrument valuation model for interest rate swaps are observable in active markets and are classified as Level 2 in the hierarchy.

Contingent liabilities related to acquisitions are measured at fair value using Level 3 unobservable inputs. The Company's estimates of fair value are based upon assumptions believed to be reasonable but which are uncertain and involve significant judgments by management. Any changes in the fair value of these contingent liabilities are included in the earnings in the consolidated statements of operations and comprehensive income (loss).

The following table sets forth the assets and liabilities that were measured at fair value on a recurring and non-recurring basis by their levels in the fair value hierarchy at December 31, 2022:

	LEVEL 1	LEVEL 2	LEVEL 3	TOTAL
		(In thousands)		
Assets				
Money market funds	$ 100,999	$ —	$ —	$ 100,999
Interest rate swap assets	—	8,374	—	8,374
Total assets	$ 100,999	$ 8,374	$ —	$ 109,373
Liabilities				
Contingent liabilities	$ —	$ —	$ 19,813	$ 19,813
Total liabilities	$ —	$ —	$ 19,813	$ 19,813

The following table sets forth the assets that were measured at fair value on a recurring and non-recurring basis by their levels in the fair value hierarchy at December 31, 2021:

	LEVEL 1	LEVEL 2	LEVEL 3	TOTAL
		(In thousands)		
Assets				
Interest rate swap assets	$ —	$ 57	$ —	$ 57
	$ —	$ 57	$ —	$ 57

(f) Cash and Cash Equivalents and Restricted Cash

Cash equivalents include highly-liquid investments with maturities of three months or less from the date purchased. At times, cash balances held at financial institutions were in excess of the Federal Deposit Insurance Corporation's ("FDIC") insured limits; however, the Company primarily places its temporary cash with high-credit quality financial institutions. The Company has never experienced losses related to these balances and believes it is not exposed to any significant credit risk on cash.

Restricted cash represents cash that is reserved to provide for a Company credit card program and unexpended restricted grant funds. The restricted cash balance was $3,102 and $827 at December 31, 2022 and 2021, respectively.

As of December 31, 2022 and 2021, the carrying values reflected in the consolidated balance sheets reasonably approximate the fair values of cash and cash equivalents and restricted cash due to the short-term maturity of these items.

The following table provides a reconciliation of cash and cash equivalents and restricted cash reported within the consolidated balance sheets to the amounts presented in the consolidated statements of cash flows:

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Cash and cash equivalents	$ 236,586	$ 185,797
Restricted cash, current	3,102	827
Total cash and cash equivalents, and restricted cash	$ 239,688	$ 186,624

(g) Accounts Receivable

Accounts receivable includes current outstanding invoices billed to customers. Invoices are typically issued with net 30-days to net 90-days terms upon delivery of product or upon achievement of billable events for service-based contracts. Unbilled receivables relate to the Company's rights to consideration for performance obligations satisfied but not billed at the reporting date on contracts. Unbilled receivables are billed and transferred to customer accounts receivable when the rights become unconditional. The carrying amount of accounts receivable is reduced by a valuation allowance.

The Company estimates the expected credit losses for accounts receivables using historical loss data adjusted for current economic conditions, including reasonable and supportable forecasts to estimate the relative size of credit losses to be expected. The Company generally writes off a receivable or records a specific allowance for credit losses if the Company determines that the receivable is not collectible. Allowances for credit losses of $1,250 and $262 were provided in the accompanying consolidated financial statements as of December 31, 2022 and 2021, respectively.

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Trade receivables	$ 72,238	$ 60,167
Unbilled receivables	11,309	9,071
Other receivables	287	579
Allowances for credit losses	(1,250)	(262)
Accounts receivable, net	$ 82,584	$ 69,555

The following is the allowance rollforward of credit losses for the Company's accounts receivable as of December 31, 2022 and 2021.

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Beginning balance	$ 262	$ 132
Provision for credit losses	1,009	215
Charge-offs, net of recoveries	(21)	(85)
Ending balance	$ 1,250	$ 262

(h) Property and Equipment

Property and equipment are stated at cost, less accumulated depreciation and amortization.

Depreciation and amortization is provided using the straight-line method over the estimated useful lives of the assets, which range from three to ten years for computer and office equipment, the shorter of the useful lives of the improvement or the life of the related lease term for leasehold improvements, and one to three years for purchased software. The Company seeks to match the book useful life of assets to the expected productive lives. Assets deemed to be impaired or no longer productive are written down to their net realizable value. The Company reviews long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying value of the asset may not be recoverable. If such events or changes in circumstances are present, an impairment loss would be recognized if the sum of the expected future net cash flows is less than the carrying amount of the asset. An impairment loss would be recorded for the excess of the carrying value of the asset over the estimated fair value. There was no impairment of property and equipment for the years ended December 31, 2022, 2021, and 2020.

(i) Leases

The Company determines if a contract contains a lease at contract inception and whether its classification as either an operating or finance lease at lease commencement. The Company's current portfolio includes operating leases of real estate and capital leases of equipment. The Company records a lease liability, as of the lease commencement date, in an amount equal to the present value of future fixed payments over the lease term. Options to extend or terminate a lease are considered in the lease term to the extent that the option is reasonably certain of exercise. A right-of-use ("ROU") asset is recorded in an amount equal to the corresponding lease liability adjusted for prepayments, initial directs costs and lease incentives, if applicable. The Company has elected not to recognize ROU assets and lease liabilities for short-term leases of real estate with a lease term of 12 months or less.

The Company generally uses its incremental borrowing rate in determining the present value of future payments as the rate implicit in the lease is unknown. The incremental borrowing rate represents the rate of interest that the Company would expect to pay on a collateralized basis to borrow an amount equal to the lease payments under similar terms.

Fixed lease payments on operating leases are recognized on a straight-line basis over the lease term, while variable payments are recognized in the period incurred. Variable lease payments include real estate taxes and charges for other non-lease services due to lessors that are not dependent on an index or rate. The Company's real estate contracts may include fixed consideration attributable to both lease and non-lease components, including non-lease services provided by the lessor, which are accounted for as a single fixed minimum payment. ROU assets under finance leases are depreciated in a manner similar to other property and equipment.

(j) Software Development Costs

Software development costs are accounted for in accordance with FASB ASC Subtopic 985-20 if the software is to be sold, leased or otherwise marketed, or by FASB ASC Subtopic 350-40 if the software is for internal use. After the

technological feasibility of the software has been established (for software to be marketed), or at the beginning of application development (for internal-use software), software development costs, which include primarily salaries and related payroll costs and costs of independent contractors incurred during development, are capitalized. Research and development ("R&D") costs incurred prior to the establishment of technological feasibility (for software to be marketed), or prior to application development (for internal-use software), are expensed as incurred. Software development costs are amortized on a product-by-product basis commencing on the date of general release of the products (for software to be marketed) or the date placed in service (for internal-use software). During the years ended December 31, 2022, 2021 and 2020, costs of $11,119, $7,759, and $7,074, respectively, were capitalized related to software development activities. Software development costs for software to be marketed are amortized using the straight-line method over its estimated useful life, which is typically three years. The Company reviews capitalized software for impairment whenever events or changes in circumstances indicate that the carrying value of the asset may not be recoverable. If such events or changes in circumstances are present, an impairment loss would be recognized if the sum of the expected future net cash flows is less than the carrying amount of the asset. An impairment loss would be recorded for the excess of the carrying value of the asset over the estimated fair value. There was no impairment of software development costs for the years ended December 31, 2022, 2021, and 2020.

(k) Debt Issuance Costs

Debt issuance costs are capitalized and amortized over the term of the related debt using the effective interest rate method. Amortization of debt issuance costs is included in interest expense within the consolidated statements of operations and comprehensive income (loss). The unamortized amount is included as an offset against long-term debt on the consolidated balance sheets. Debt issuance costs related to line-of-credit arrangements are capitalized and are included in other long-term assets on the consolidated balance sheets. The capitalized costs are amortized ratably over the term of the line-of-credit arrangement. The amortization costs are included in interest expense within the consolidated statements of operations and comprehensive income (loss), regardless of whether there are any outstanding borrowings on the line-of-credit arrangement.

(l) Goodwill and Other Intangible Assets

The Company has four reporting units – Software reporting unit ("Software"), SimCyp reporting unit ("SimCyp"), Integrated Drug Development reporting unit ("IDD"), and Regulatory Writing reporting unit ("Regulatory Writing") which are within a single operating segment of the Company. Goodwill is tested for impairment at the reporting unit level, which is one level below or the same as an operating segment. When testing goodwill for impairment, the Company performs a qualitative assessment to determine whether events or circumstances lead to a determination that it is more-likely-than-not that the fair values of the reporting units are less than their carrying amounts. If the Company determines that it is not more-likely-than-not that the fair values of the reporting units are less than their carrying values, no further assessment is performed. If the Company determines that it is more-likely-than-not that the fair values of the report units are less than carrying value, the Company proceeds to perform a quantitative goodwill impairment test. If the result of the quantitative test shows that the carrying amount of reporting units exceeds its fair values, an impairment loss is recognized in an amount equal to that excess, limited to the total amount of goodwill allocated to that reporting unit.

For the years ended December 31, 2022, 2021, and 2020, the Company performed quantitative assessments of goodwill. The most recent assessment was performed on October 1, 2022. The quantitative assessments resulted in no impairment as the estimated fair value of each reporting unit exceeded its carrying value. Accordingly, no impairment loss was recorded for the years ended December 31, 2022, 2021, and 2020.

Other identifiable intangible assets with finite lives, such as software products acquired in acquisitions, non-compete agreements, tradenames and customer relationship assets, are amortized over their estimated useful lives using either a straight-line method or a method based on pattern of expected economic benefit of the asset as follows: acquired software — 3 to 14 years; non-compete agreements — 2 to 5 years; customer relationships — 11 to 16 years; and trademarks — 10 to 17 years. The Company evaluates finite intangible assets for impairment whenever events or changes in circumstances indicate that the carrying amount of the asset might not be recoverable. An impairment loss is recognized when estimated undiscounted future cash flows expected to result from the use of the asset are less than its carrying amount.

There were no impairment charges related to intangible assets for the years ended December 31, 2022, 2021, and 2020.

(m) Foreign Currency Translation

Generally, the functional currency of the Company's international subsidiaries is the local currency of the country in which they operate. The Company translates the assets and liabilities of its non-U.S. dollar functional currency subsidiaries into U.S. dollars using exchange rates in effect at the end of each reporting period. Revenue and expenses for these subsidiaries are translated using average exchange rates prevailing during the period. Gains and losses from these translations are recognized as a cumulative translation adjustment and included as a separate component in accumulated other comprehensive loss within the consolidated statement of stockholders' equity.

For transactions that are not denominated in the local functional currency, the Company remeasures monetary assets and liabilities at exchange rates in effect at the end of each reporting period. Foreign currency transaction gains and losses are included net within comprehensive gain or loss in the consolidated statements of operations and comprehensive income (loss) and resulted in foreign currency gains (losses) of $3,166, $175, and $(715) for the years ended December 31, 2022, 2021, and 2020, respectively.

(n) Derivative Instruments

In the normal course of business, the Company is subject to risk from adverse fluctuations in interest rates. The Company has chosen to manage this risk through the use of derivative financial instruments that consist of interest rate swap contracts. Counterparties to these contracts are major financial institutions. The Company is exposed to credit loss in the event of nonperformance by these counterparties. The Company does not use derivative instruments for trading or speculative purposes. The objective in managing exposure to market risk is to limit the impact on cash flows. To qualify for hedge accounting, the interest rate swaps must effectively reduce the risk exposure that they are designed to hedge. In addition, at inception of a qualifying cash flow hedging relationship, the underlying transaction or transactions must be, and be expected to remain, probable of occurring in accordance with the related assertions.

FASB ASC 815, "Derivatives and Hedging," requires the Company to recognize all derivatives on the balance sheet at fair value. The Company may enter into derivative contracts such as interest rate swap contracts that effectively convert portions of the Company's floating rate debt to a fixed rate, which serves to mitigate interest rate risk. The Company's objectives in using interest rate swaps are to add stability to interest expense and to manage its exposure to interest rate movements. Interest rate swaps designated as cash flow hedges involve the receipt of variable-rate amounts from a counterparty in exchange for the Company making fixed-rate payments over the life of the agreements without exchange of the underlying notional amount.

The Company had entered into an interest rate swap agreement in May 2022 that pays fixed, receives variable to modify the interest rate characteristics of term loan debt from variable to fixed in order to reduce the impact of changes in future cash flows due to market interest rate changes. The swap agreement has a notional amount of $230,000, a fixed rate of 2.8% and a termination date of August 31, 2025. At December 31, 2022, the interest swap had a fair value of $8,374 and the fair value recognized in accumulated other comprehensive income was $8,374.

The Company also had an interest rate swap agreement for a notional amount of $230,000 that fixed the interest rate at 2.1%, non-inclusive of the fixed credit spread through May 31, 2022. On August 31, 2021, the Company entered into an amendment to the interest rate swap agreement. The amended interest rate swap agreement does not in its entirety meet the definition of a derivative instrument because of its off market fixed rate at inception and is deemed to be a hybrid instrument with a financing component and an embedded at-the-market derivative. Such embedded derivative is bifurcated and accounted for separately. At inception, the financing component of $1,966 was recorded at amortized cost. The embedded at-the-market derivative was designated and qualified as a cash flow hedge of interest rate risk for a notional amount of $230,000 that fixed the interest rate at 1.2757%, non-inclusive of the fixed credit spread. Due to an other-than-insignificant financing element on a portion of such hybrid instrument, the cash flows associated with this hybrid instrument were classified as financing activities in the condensed consolidated statements of cash flows. The interest rate swap matured on May 31, 2022. At December 31, 2022, the Company did not record any amounts for the financing component and fair value of the interest rate swap in the consolidated balance sheets. The Company reclassified $3,033 of

accumulated comprehensive loss to interest expense in the consolidated statements of operation and comprehensive loss in the second quarter of 2021 due to hedge ineffectiveness.

Excluding the amount reclassified, interest expense on derivative instruments recognized in the Company's consolidated statements of operations and comprehensive income (loss) were $25, $726, and $1,573 for the years ended December 31, 2022, 2021, and 2020, respectively.

The Company uses derivatives to manage certain interest exposures and designated all the derivatives as cash flow hedges. The Company records derivatives at fair value on its consolidated balance sheets. Changes in the fair value of derivatives designated as cash flow hedges are recorded as a component of accumulated other comprehensive income (loss). Those amounts are reclassified into interest expenses in the same period during which the hedged transactions impact earnings.

The notional amounts and fair values, locations of derivative instruments in the consolidated balance sheets as of December 31 were as follows:

Interest rate swap derivative designated as cash flow hedging instruments:	2022	2021
	(In thousands)	
Notional amounts	$ 230,000	$ 230,000
Prepaid expenses and other current assets	$ 4,638	$ 57
Other long-term assets	$ 3,736	$ —

The net amount of deferred gains related to derivative instruments designated as cash flow hedges that is expected to be reclassified from accumulated other comprehensive gains into earnings over the next twelve months is $4,670.

(o) Warranty

The Company includes an assurance commitment warranting the application software products will perform in accordance with written user documentation and the agreements negotiated with customers. Since the Company does not customize its applications software, warranty costs are insignificant and expensed as incurred.

(p) Earnings per Share

Basic earnings per common share is computed by dividing the net earnings by the weighted-average number of shares outstanding during the reporting period, without consideration for potentially dilutive securities. Diluted earnings per share is computed by dividing the net earnings attributable to stockholders by the weighted-average number of shares and dilutive securities outstanding during the period.

(q) Income Taxes

The Company accounts for income taxes under the asset and liability method. Under this method, the amount of taxes currently payable or refundable is accrued, and deferred tax assets and liabilities are recognized for the estimated future tax consequences attributable to differences between the financial reporting and tax basis of existing assets and liabilities. Deferred tax assets also include realizable tax losses and tax credit carryforwards.

The deferred tax assets may be reduced by a valuation allowance, which is established when it is more likely than not that some portion or all of the deferred tax assets will not be realized. In addition, management is required to evaluate all available evidence, both positive and negative, when making its judgment to determine whether to record a valuation allowance for a portion, or all, of its deferred tax assets. Deferred tax assets and liabilities are measured using enacted income tax rates in effect for the year in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in income tax rate is recognized in the period that includes the enactment date.

Uncertainty in Income Taxes

The Company accounts for uncertainty in income taxes using a two-step approach. The first step requires the Company to conclude that a tax position, based solely on its technical merits, is more likely than not to be sustained upon examination by a tax authority. The second step requires the Company to measure the largest amount of benefit, determined on a cumulative probability basis, that is more likely than not to be realized upon ultimate settlement with tax authority. The Company recognizes the effect of income tax positions only if those positions are more likely than not of being sustained. Changes in recognition or measurement are reflected in the period in which the change in judgment occurs. Further, the benefit to be recorded in the consolidated financial statements is the amount most likely to be realized assuming a review by the tax authorities having all relevant information and applying current conventions. The Company's policy is to recognize interest and penalties related to income tax positions taken as a component of the provision for income taxes.

The Company assessed its uncertain tax positions and determined that a liability of $2,818 and $1,059 was required to be recorded for uncertain tax positions as of December 31, 2022 and 2021, respectively. Uncertain tax positions relate primarily to federal and state R&D credits. The Company's policy is to recognize interest and penalties as a component of the provision for income taxes. For December 31, 2022 and 2021, the Company recognized interest of $0.1 million of interest and no penalties. For December 31, 2021 the Company recognized neither interest or penalties. The Company does not anticipate any significant changes to its uncertain tax positions during the next twelve months. U.S. federal income tax returns are generally subject to examination for a period of three years after the filing of the return. However, the Internal Revenue Service can audit the NOLs generated in respective years in the years that the NOLs are utilized. State income tax returns are generally subject to examination for a period of three to six years after the filing of the respective tax return. The state impact of any federal changes remains subject to examination by various states for a period of up to one year after formal notification to the states. Foreign income tax returns are generally subject to examination based on the tax laws of the respective jurisdictions.

(r) Revenue Recognition

In accordance with Accounting Standards Codification Topic 606 ("ASC Topic 606"), “Revenue from Contracts with Customers”, the Company determines revenue recognition through the following steps:

i. Identification of the contract, or contracts, with a customer

ii. Identification of the performance obligations in the contract

iii. Determination of the transaction price

iv. Allocation of the transaction price to the performance obligations in the contract

v. Recognition of revenue when, or as, the Company satisfies a performance obligation

The Company’s revenue consists of fees for perpetual and term licenses for its software products, post- contract customer support (referred to as maintenance), software as a service (“SaaS”), and professional services including training and other revenue. 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 following describes the nature of the Company’s primary types of revenues and the revenue recognition policies as they pertain to the types of transactions the Company enters into with its customers.

Consulting Service Revenues

The Company’s primary professional services offering includes consulting services, which may be either strategic consulting services, reporting and analysis services, regulatory writing services, or any combination of the three. The Company’s professional services contracts are either time-and-materials or fixed fee. Services revenues are generally recognized over time as the services are performed. Generally, these services are delivered to customers electronically.

Revenue from time-and-material contracts is recognized on an output basis as labor hours are delivered and/or direct expenses are incurred. Revenues for fixed price services are generally recognized over time applying input methods to estimate progress to completion. Accordingly, the number of resources being paid for and varying lengths of time they are being paid for, determine the measure of progress.

Software Licenses

Software license revenue consists primarily of sales of software licenses downloaded and installed by our customers on their own hardware. The license period is generally 1 year or less and includes an insignificant amount of customer support to assist the customer with the software. Software license performance obligations are generally recognized upfront at the point in time when the software license has been delivered.

Software as a Service (SaaS) Revenues

SaaS revenues consists of subscription fees for access to, and related support for, the Company's cloud-based solutions. The Company typically invoices subscription fees in advance in annual installments. The invoice is initially deferred and revenue is recognized ratably over the life of the contract. The Company's software contracts do not typically include, variable consideration, or options for future purchases that would not be similar to the original goods.

Software Services

Maintenance services agreements on perpetual software consist of fees for providing software updates and for providing technical support for software products for a specified term. Revenue allocated to maintenance services is recognized ratably over the contract term beginning on the delivery date of each offering . Maintenance contracts generally have a term of one year. While transfer of control of the software training and implementation performance obligations are over time, the services are typically started and completed within a few days. Due to the quick nature of the performance obligation from start to finish and the insignificant amounts, the Company recognizes any software training or implementation revenue at the completion of the service. Any unrecognized portion of amounts paid in advance for licenses and services is recorded as deferred revenue.

Arrangements with Multiple Performance Obligations

For contracts with multiple performance obligations, such as a software license plus software training, implementation, and/or maintenance/support, or in contracts where there are multiple software licenses, the Company determines if the products or services are distinct and allocates the consideration to each distinct performance obligation on a relative standalone selling price basis ("SSP"). The delivery of a particular type of software and each of the user licenses would be one performance obligation. Additionally, any training, implementation, or support and maintenance promises as part of the software license agreement would be considered separate performance obligations, as those promises are distinct and separately identifiable from the software licenses. The payment terms in these arrangements are less than one year such that there is no significant financing component to the transaction.

Contract Balances

The timing of revenue recognition, billings and cash collections results in billed accounts receivable, unbilled receivables (contract assets), and customer advances and deposits (deferred revenue, contract liabilities) on the consolidated balance sheets. Amounts are billed as work progresses in accordance with agreed-upon contractual terms, either at periodic intervals (e.g., quarterly or monthly) or upon achievement of contractual milestones.

Contract assets relate to the Company's rights to consideration for performance obligations satisfied but not billed at the reporting date on contracts (i.e., unbilled revenue, a component of accounts receivable in the Consolidated Balance Sheets). Contract assets are billed and transferred to customer accounts receivable when the rights become unconditional. The Company typically invoices customers for term licenses, subscriptions, maintenance and support fees in advance with payment due before the start of the subscription term, ranging from one to three years. The Company records the amounts collected in advance of the satisfaction of performance obligations, usually over time, as a contract liability or deferred

revenue. Invoiced amounts for non-cancelable services starting in future periods are included in contract assets and deferred revenue. The portion of deferred revenue that will be recognized within 12 months is recorded as current deferred revenue, and the remaining portion is recorded as deferred revenue in the consolidated balance sheets.

Contract balances at December 31, 2022 and 2021 were as follows:

	YEAR ENDED DECEMBER 31,	
	2022	2021
	(In thousands)	
Contract assets	$ 11,309	$ 9,071
Contract liabilities	$ 55,024	$ 47,027

During 2022, the Company recognized revenue of $45,496 related to contract liabilities at December 31, 2021.

The unsatisfied performance obligation as of December 31, 2022 was approximately $120,794. We expect to recognize approximately $80,208 or 66.4% of this revenue over the next 12 months and the remainder thereafter.

Deferred Contract Acquisition Costs

Under ASC 606, sales commissions paid to the sales force and the related employer payroll taxes, collectively deferred contract acquisition costs, are considered incremental and recoverable costs of obtaining a contract with a customer.

The Company recognizes an asset for the incremental costs of obtaining a contract with a customer if the Company expects the benefit of those costs to be longer than one year. The Company has determined that certain sales incentive programs meet the requirements to be capitalized. The costs capitalized are primarily sales commissions for our sales force personnel. Capitalized costs to obtain a contract are amortized on a straight line basis over the expected period of benefit. Amortization of capitalized costs are included in sales and marketing expense in our consolidated statements of operations and comprehensive income (loss). Capitalized contract acquisition costs were $981 and $0 as of December 31, 2022 and 2021, respectively, and were included in prepaid expenses and other current assets in the consolidated balance sheets.

Grant Revenue

The Company receives grant funding for certain specific projects from time to time. These grants specify the funds provided are to be used exclusively to satisfy the deliverables outlined in the grant agreements. In these agreements, both involved parties receive and sacrifice approximately commensurate value so these are accounted for as exchange transactions and revenue is recognized according to ASC Topic 606. The grant funding is generally provided near contract inception so a contract liability is initially recorded and revenue is recognized as the performance obligations are satisfied over time.

Sources and Timing of Revenue

The Company's performance obligations are satisfied either over time or at a point in time. The following table presents the Company's revenue by timing of revenue recognition to understand the risks of timing of transfer of control and cash flows:

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
		(In thousands)	
Software licenses transferred at a point in time	$ 46,139	$ 40,167	$ 36,388
Software licenses transferred over time	69,327	46,658	37,075
Service revenues earned over time	220,178	199,279	170,067
Total	$ 335,644	$ 286,104	$ 243,530

(s) Equity-Based Compensation

The Company measures equity-based compensation at fair value and recognizes the expense over the vesting period. Forfeitures are recognized as they occur for all awards. The fair value of restricted stock, restricted stock units, performance stock units are determined by market price of our common stock on the date of grant. Compensation costs for our restricted stock, restricted stock units are recognized on a straight-line basis over the requisite service period. Performance stock units with graded vesting schedule are recognized using graded vesting attribution approach. Performance stock unit represents a right to receive a certain number of shares of common stock based on the achievement of corporate performance goals and continued employment during the vesting period. At each reporting period, we reassess the probability of the achievement of such corporate performance goals and any increase or decrease in equity-based compensation expense resulting from an adjustment in the estimated shares to be released is treated as a cumulative catch-up in the period of adjustment.

Compensation costs for our legacy Class B Units, issued by former parent company, that vested based on continued service requirements and the restricted stock into which they were exchanged are recognized on a straight-line basis over the requisite service period. Compensation costs for our restricted stock exchanged for our legacy Class B Units with performance vesting conditions are recognized using the accelerated attribution approach. Compensation costs for our restricted stock units are recognized on a straight-line basis over the requisite service period.

(t) Comprehensive Income (Loss)

FASB ASC 220, "Comprehensive Income," establishes standards for reporting of comprehensive income and its components (revenue, gains, and losses) in a full set of general-purpose financial statements. FASB ASC 220 requires that all components of comprehensive income, including net income, be reported in a financial statement that is displayed with the same prominence as other financial statements. Comprehensive income (loss) is defined as the change in equity during a period from transactions and other events and circumstances from non-owner sources. Net income (loss) and other comprehensive income (loss), including foreign currency translation adjustments, and changes in fair value of derivative instruments (interest rate swap agreements) designated as cash flow hedges, shall be reported to arrive at comprehensive (loss). Comprehensive income (loss) is displayed in the consolidated statements of operations and comprehensive income (loss).

The components of other comprehensive income (loss) consisted of the foreign currency translation adjustments totaling $(10,490), $(5,154) and $5,045, respectively, and the changes in fair value of interest rate swap (excluding $2,268 reclassification, net of tax in 2021), totaling $6,186, $547, and $(1,135) for the years ended December 31, 2022, 2021, and 2020, respectively.

(u) Reclassification

Certain previously reported amounts in the consolidated financial statements have been reclassified to conform to the current year presentation.

(v) COVID-19

Since the first quarter of 2020, the COVID-19 pandemic has posed a significant threat to public health as well as the global and U.S. economies. The continued spread of variants of COVID-19 may adversely impact our business, financial condition or results of operations as a result of increased costs, negative impacts to our workforce, or a sustained economic downturn. Although the economy has rebounded in many areas, the outlook for containing the outbreak is still highly uncertain. Given its ongoing and dynamic nature, it is difficult to predict the full impact of the COVID-19 outbreak on the global and US economy and our business.

3. Public Offerings and Other significant Shareholder Transactions

On December 11, 2020, the Company completed our initial public offering ("IPO"), pursuant to which the Company issued and sold 14,630,000 shares of common stock and certain selling stockholders, including former controlling shareholder,

EQT, sold 18,783,250 shares of our common stock (representing the full exercise of the underwriters' option to purchase additional shares), at a public offering price of $23.00 per share. The Company received net proceeds of $316,301, after deducting underwriters' discounts and commissions. In addition, $4,408 of legal, accounting and other offering costs, net of the tax effect of $259, incurred in connection with the sale of the Company's common stock in the IPO, were capitalized and offset against the proceeds received in the IPO.

The Company was party to a registration rights agreement with EQT AB and its affiliates ("EQT"), Arsenal Capital Partners, and certain other stockholders, dated December 10, 2020. That agreement was terminated following the sale of all of EQT's common shares in the Company to Arsenal on December 8, 2022. Arsenal and the Company entered into a new registration rights agreement, dated November 3, 2022 (the "Registration Rights Agreement"), which contains provisions that entitle Arsenal to certain rights to have their securities registered by the Company under the Securities Act. While the Registration Rights Agreement is in effect, Arsenal is entitled to (i) four "demand" registrations, (ii) one underwritten offering in any consecutive 90-day period and (iii) two underwritten offerings in any consecutive 360-day period, subject in each case to certain limitations. In addition, the Registration Rights Agreement provides that the Company will share certain expenses of Arsenal relating to such registrations and indemnify Arsenal against certain liabilities which may arise under the Securities Act.

On March 29, 2021, the Company completed an underwritten secondary public offering in which certain selling stockholders, including EQT, sold 11,500,000 shares of the Company's common stock, including 1,500,000 shares of common stock pursuant to the full exercise of the underwriters' option to purchase additional shares. The Company did not offer any common stock in this transaction and did not receive any proceeds from the sale of the shares of common stock by the selling stockholders. The Company incurred costs of $1,100, recorded in general and administrative expenses, in relation to the secondary public offering.

On September 13, 2021, the Company completed another public offering, at a public offering price of $31.00 per share, pursuant to which the Company sold 4,500,000 shares of its common stock, and certain selling stockholders sold 18,500,000 shares of the Company's common stock, including 3,000,000 shares of common stock pursuant to the full exercise of the underwriters' option to purchase additional shares. The Company received net proceeds of $134,096, after deducting underwriters' discounts and commissions. In addition, $745 of legal, accounting and other offering costs incurred in connection with the sale of the Company's common stock in the public offering, were capitalized and offset against the proceeds received.

On November 22, 2021, the Company completed another secondary public offering in which certain selling stockholders, including EQT, sold 10,000,000 shares of the Company's common stock. The Company did not offer any common stock in this transaction and did not receive any proceeds from the sale of the shares of common stock by the selling stockholders. The Company incurred costs of $644, recorded in general and administrative expenses, in relation to the secondary public offering.

On August 11, 2022, the Company completed a secondary public offering in which certain selling stockholders, including EQT, sold 7,000,000 shares of the Company's common stock. The Company did not offer any common stock in this transaction and did not receive any proceeds from the sale of the shares of common stock by the selling stockholders. The Company incurred costs of $596, recorded in general and administrative expenses, in relation to the secondary public offering.

On December 8, 2022, Arsenal acquired an aggregate of 29,954,521 shares of the Company's common stock from EQT at a price of $15.00 per share. In connection with this transaction, the Company entered into a letter agreement, effective December 8, 2022, with Arsenal providing that, subject to certain exceptions, Arsenal is prohibited from transferring the acquired shares until December 8, 2024. Also, in connection with the transaction, the Company entered into a stockholders agreement with Arsenal, effective December 8, 2022, which, among other things, grants certain conditional rights to Arsenal to nominate up to two directors to our Board.

4. Concentrations of Credit Risk

Financial instruments that potentially subject the Company to concentrations of credit risk have consisted principally of cash and cash equivalent investments and trade receivables. The Company invests available cash in bank deposits, investment-grade securities, and short-term interest-producing investments, including government obligations and other money market instruments. At December 31, 2022 and 2021, the investments were bank deposits and overnight sweep accounts. The Company has adopted credit policies and standards to evaluate the risk associated with sales that require collateral, such as letters of credit or bank guarantees, whenever deemed necessary. Management believes that any risk of loss is significantly reduced due to the nature of the customers and distributors with which the Company does business.

As of December 31, 2022 and 2021, no customer accounted for more than 10% of the Company's accounts receivable. For the years ended December 31, 2022, 2021, and 2020, no customer accounted for more than 10% of the Company's revenues.

5. Business Combinations

Acquisitions have been accounted for using the acquisition method of accounting pursuant to FASB ASC 805, "Business Combinations." Amounts allocated to the purchased assets and liabilities assumed are based upon the total purchase price and the estimated fair values of such assets and liabilities on the effective date of the purchase as determined by an independent third party. The results of operations have been included in the Company's results of operations prospectively from the date of acquisition.

Author! B.V.

On March 2, 2021, the Company completed a transaction which qualified as a business combination for a total consideration of $2,667. The business combination was not material to our consolidated financial statements. Based on the Company's purchase price allocation, approximately $1,200, $100 and $1,200 of the purchase price was assigned to customer relationships, non-compete agreements and goodwill, respectively.

Insight Medical Writing Limited

On June 7, 2021, the Company completed a transaction which qualified as a business combination for a total consideration of $15,197. The business combination was not material to our consolidated financial statements. Based on the Company's purchase price allocation, approximately $7,400 and $4,700 of the purchase price was assigned to customer relationships and goodwill, respectively.

Pinnacle 21, LLC

On October 1, 2021, the Company acquired 100% of the equity of Pinnacle. Pinnacle provides software and services for preparing clinical trial data for regulatory submission. The acquisition executes on the Company's strategy to invest in innovation to increase the use cases of biosimulation and grow adoption of Certara's end-to-end platform.

The acquisition of Pinnacle was accounted for as a purchase in accordance with ASC 805, "Business Combinations", which requires allocation of the purchase price to the estimated fair values of assets acquired and liabilities assumed in the transaction.

The following table summarizes the fair value of the consideration paid as well as the fair values of the assets acquired and liabilities assumed as of the date of the acquisition:

	Pinnacle (In thousands)
Fair value of consideration:	
Cash paid to sellers	$ 249,115
Cash paid to others and escrow	17,200
Unregistered shares of Certara, Inc. (2,239,717 shares)	72,760
Total consideration	$ 339,075
Assets acquired and liabilities assumed:	
Cash and cash equivalents	$ 19,409
Accounts receivable	2,925
Other current assets	619
Property and equipment	258
Deferred tax assets	2,907
Identifiable intangible assets:	
Trademark	15,800
Acquired software	103,000
Customer relationships	24,600
Goodwill	180,947
Long-term deposits	34
Current liabilities	(794)
Current portion of deferred revenue	(10,630)
Net assets acquired	$ 339,075

The fair value of the unregistered shares given as part of the purchase consideration was determined based on the market price of Certara's common stock on the closing date less a 7% discount for lack of marketability.

The acquisition was structured as an asset acquisition for income tax purposes; therefore, the Company's tax basis in Pinnacle's identifiable assets reflects the fair value of consideration paid. However, the Company did not recognize tax basis in certain liabilities assumed at the acquisition date; resulting in deferred income taxes being recorded in purchase accounting.

The fair value of the intangible assets is based on significant inputs that are not observable in the market and, therefore, represent Level 3 measurements within the fair value measurement hierarchy. The fair value of the customer relationships (distributor method), trademarks (relief from royalty method) and developed technology (multi-period excess earnings method) was determined under the income approach.

Goodwill of $180,947 was recorded to reflect the excess of the purchase price over the estimated fair value of the net identifiable assets acquired, which is generally deductible for income tax purposes. The excess of the purchase prices over the fair values of the acquired business's net assets represent cost and revenue synergies specific to the Company, as well as non-capitalizable intangible assets, such as the employee workforces acquired, and has been allocated to goodwill.

The Company incurred $7,615 of transaction costs related to this acquisition, which are included in general and administrative expenses in the consolidated statement of operations and comprehensive loss for the year ended December 31, 2021.

The results of operations of the acquired business and the fair value of the acquired assets and liabilities assumed are included in the Company's consolidated financial statements with effect from the date of the acquisition. The Company's consolidated statement of operations and comprehensive loss for the year ended December 31, 2021 includes revenues of $6,129 and a net income of $380 which includes the effects of purchase accounting adjustments, primarily changes in amortization of intangible assets.

Integrated Nonclinical Development Solutions, Inc.

On January 3, 2022, the Company completed the acquisition for a total consideration of $8,048, which qualified as a business combination. The business combination was not significant to the Company's consolidated financial statements. Based on the Company's purchase price allocation, approximately $2,380, $1,040, $100, and $2,910 of the purchase price was assigned to customer relationships, developed technology, non-compete agreements, and goodwill, respectively.

Vyasa Analytics, LLC

On December 28, 2022, the Company completed the acquisition of Vyasa Analytics, LLC ("Vyasa"), a company that provides an AI powered, scalable deep learning software and analytics platform for organizations within healthcare and life sciences, higher education and state and local governments for total estimated consideration of $29,276. The business combination was not significant to the Company's consolidated financial statements.

The total estimated consideration includes a portion of contingent consideration that is payable over the next three years in a combination of 70% cash and 30% Certara common stock. Future payments of contingent consideration are based on achieving certain eligible revenue thresholds for each of the twelve-month periods ended December 31, 2023, 2024, and 2025, respectively. Potential payments range from $0 to $60,000 over the three years period. The fair value of the contingent consideration was estimated to be $19,813 as of the acquisition date.

Based on the Company's purchase price allocation, approximately $11,400, $1,500, $120, $80 and $16,589 of the purchase price was assigned to developed technology, customer relationships, trademarks, non-compete agreements and goodwill, respectively.

The consolidated financial statements include the operating results of each acquisition from the date of acquisition.

6. Prepaid expenses and other current assets and Other long-term assets

Prepaid and other current assets consisted of the following:

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Prepaid expenses	$ 8,389	$ 8,973
Income tax receivable	2,014	4,800
Research and development tax credit receivable	4,207	3,951
Current portion of interest rate swap asset	4,638	57
Other current assets	732	767
Prepaid expenses and other current assets	$ 19,980	$ 18,548

Other long-term assets consisted of the following:

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Long-term deposits	$ 1,150	$ 1,160
Interest rate swap asset - long term	3,736	—
Deferred financing cost	729	1,007
Total other long-term assets	$ 5,615	$ 2,167

7. Property and Equipment

Property and equipment consisted of the following:

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Computer and office equipment	$ 4,575	$ 5,955
Furniture	2,426	3,075
Purchased software for internal use	701	698
Leasehold improvements	1,345	1,762
Property and equipment	9,047	11,490
Less: Accumulated depreciation and amortization	(6,647)	(8,555)
Property and equipment, net	$ 2,400	$ 2,935

Depreciation and amortization expense were $1,731, $2,135, and $2,443 for the years ended December 31, 2022, 2021, and 2020, respectively.

8. Goodwill and Other Intangible Assets

The following table presents the Company's intangible assets (other than goodwill) and the related amortization:

	WEIGHTED AVERAGE AMORTIZATION PERIOD (IN YEARS)	DECEMBER 31, 2022			DECEMBER 31, 2021		
		GROSS CARRYING AMOUNT	ACCUMULATED AMORTIZATION	NET	GROSS CARRYING AMOUNT	ACCUMULATED AMORTIZATION	NET
		(In thousands)					
Acquired software	13.42	$ 138,157	$ (20,441)	$ 117,716	$ 127,123	$ (12,258)	$ 114,865
Capitalized software development costs	2.21	41,323	(26,139)	15,184	31,477	(20,137)	11,340
Non-compete agreements	1.00	1,543	(1,339)	204	1,391	(1,247)	144
Trademarks	14.36	56,603	(12,229)	44,374	56,483	(9,142)	47,341
Customer relationships	10.05	466,861	(157,557)	309,304	464,678	(126,545)	338,133
Total		$ 704,487	$ (217,705)	$ 486,782	$ 681,152	$ (169,329)	$ 511,823

Amortization expense for intangible assets was $50,739, $42,980, and $40,310 for the years ended December 31, 2022, 2021 and 2020, respectively. Amortization expense of $9,310, $4,265, and $2,896 was recorded in cost of revenues for the years ended December 31, 2022, 2021, and 2020, respectively.

The remaining amortization of $41,429, $38,715, and $37,414 was recorded in operating expenses for the years ended December 31, 2022, 2021, and 2020, respectively.

Based on the current amount of intangibles subject to amortization, the estimated annual amortization expense for each of the succeeding five years and thereafter is as follows:

	ACQUIRED SOFTWARE	CAPITALIZED SOFTWARE DEVELOPMENT COSTS	NON-COMPETE AGREEMENTS	TRADE NAMES	CUSTOMER RELATIONSHIPS	TOTAL
			(In thousands)			
2023	$ 10,264	$ 6,511	$ 77	$ 3,147	$ 31,447	$ 51,446
2024	10,034	5,394	40	3,147	31,447	50,062
2025	9,879	3,279	36	3,087	31,447	47,728
2026	9,736	—	36	3,087	31,447	44,306
2027	9,272	—	15	3,087	31,447	43,821
Thereafter	68,531	—	—	28,819	152,069	249,419
Total	$ 117,716	$ 15,184	$ 204	$ 44,374	$ 309,304	$ 486,782

Goodwill

The Company has not recognized any impairment charges for the years ended December 31, 2022, 2021, and 2020. A reconciliation of the change in the carrying value of goodwill is as follows:

	(In thousands)
Balance, December 31, 2020	**$** 518,592
Goodwill associated with 2021 business combinations	186,771
Foreign currency translation	(1,992)
Balance, December 31, 2021	703,371
Goodwill associated with 2022 business combinations	19,451
Foreign currency translation	(5,079)
Balance, December 31, 2022	**$** 717,743

9. Accrued Expenses and Other Long-Term Liabilities

Accrued expenses consist of the following:

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Accrued compensation	$ 29,518	$ 24,848
Legal and professional accruals	1,297	2,477
Interest payable	176	96
Income taxes payable	2,223	1,398
Accrued business acquisition liabilities	700	—
Other	1,489	1,011
Total accrued expenses	$ 35,403	$ 29,830

Other long-term liabilities consist of the following:

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Non-current finance lease liabilities	$ —	$ 25
Uncertain tax position liability	2,308	—
Contingent consideration	19,813	—
Total other long-term liabilities	$ 22,121	$ 25

10. Long-Term Debt and Revolving Line of Credit

Effective August 14, 2017, the Company entered into a credit agreement with lenders for a $250,000 term loan ("Credit Agreement"). The Credit Agreement is a syndicated arrangement with various lenders providing the financing. The $250,000 term loan is due to mature on August 14, 2024. The Company also entered into a $20,000 revolving line of credit with lenders with a sub-commitment for issuance of letters of credit of $10,000.

The Company and lenders entered into Amendment No. 1 to the Credit Agreement on January 25, 2018, where an additional tranche of $25,000 was added to the term loan. The amortization schedule of the new tranche was made coterminous with the rest of the term loan. There were no other changes to the terms of the Credit Agreement.

The Company and lenders entered into Amendment No. 2 to the Credit Agreement on April 3, 2018, where an additional tranche of $40,000 was added to the term loan. The amortization schedule of the new tranche was made coterminous with the rest of the term loan. There were no other changes to the terms of the Credit Agreement.

The Company and lenders entered into a third amended and restated loan agreement on June 17, 2021 ("Third Amendment"), which provides for, among other things, (i) the extension of the termination date applicable to the revolving credit commitments under the Credit Agreement to August 2025, (ii) the extension of the maturity date applicable to the term loans under the Credit Agreement to August 2026, and (iii) an increase of approximately $80,000 in commitments available under the revolving line of credit (resulting in an aggregate amount of commitments of $100,000). The term loan under the Third Amendment has substantially the same terms as the existing term loans and revolving credit commitments. The Credit Agreement is collateralized by substantially all U.S. assets and stock pledges for the non-U.S. subsidiaries and contain various financial and nonfinancial covenants.

As of December 31, 2022 and 2021, available borrowings under the revolving lines of credits were $100,000, respectively. Available borrowings under the revolving lines of credits of $100,000 as of December 31, 2022 and 2021, respectively, were reduced by $120 and $239 standby letter of credit issued to a landlord in lieu of a security deposit.

Borrowings under the Credit Agreement are subject to a variable interest rate at LIBOR plus a margin. The applicable margins are based on achieving certain levels of compliance with financial covenants.

The effective interest rate was 5.28% and 3.65% for the years ended December 31, 2022 and 2021, respectively, for the Credit Agreement. As discussed previously, the Company entered into interest rate swap agreements that fixed the interest rate.

Interest incurred on the Credit Agreement with respect to the term loan amounted to $15,803, $11,206, and $13,946 for the years ended December 31, 2022, 2021, and 2020, respectively. Accrued interest payable on the Credit Agreement with respect to the term loan amounted to $130 and $30 at December 31, 2022 and 2021, respectively, and is included in accrued expenses. Interest incurred on the Credit Agreement with respect to the revolving line of credit was $257, $163, and $483 for the years ended December 31, 2022, 2021, and 2020, respectively. There was $66 accrued interest payable on the revolving line of credit at December 31, 2022 and 2021.

Effective August 14, 2017, the Company entered into an unsecured credit agreement with another lender for a $100,000 term loan ("Loan Agreement"). The loan carried interest at 8.25% which was payable in semi-annual installments on January and July 15 through August 14, 2025, at which time all outstanding principal and interest were due. Under the Loan Agreement, the Company could voluntarily repay outstanding loans without premium or penalty. On July 15, 2020, the Company made a $20,000 prepayment on the loan, which reduced the amount outstanding to $80,000. On December 28, 2020, the Company repaid the remaining $80,000 aggregate principal amount owed under the Loan Agreement, including $3,000 of accrued interest. The Company's obligations under the Loan Agreement were discharged on that date. Interest incurred on the loan amounted to $0, $0, and $7,608 for the years ended December 31, 2022, 2021, and 2020, respectively.

Long-term debt consists of the following:

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Term loans	$ 297,470	$ 300,490
Revolving line of credit	—	—
Less: debt issuance costs	(4,462)	(5,724)
Total	293,008	294,766
Current portion of long-term debt	(3,020)	(3,020)
Long-term debt, net of current portion and debt issuance costs	$ 289,988	$ 291,746

The principal amount of long-term debt outstanding as of December 31, 2022, matures in the following years:

	2023	2024	2025	2026	TOTAL
			(In thousands)		
Maturities	$ 3,020	$ 3,020	$ 3,020	$ 288,410	$ 297,470

The Credit Agreement requires the Company to make an annual mandatory prepayment as it relates to the Company's Excess Cash Flow calculation. For the year ended December 31, 2022, the Company was not required to make a mandatory prepayment on the term loan. The Company is required to make a quarterly principal payment of $755 on the term loan each quarter starting from September 30, 2021.

The fair values of the Company's variable interest term loan and revolving line of credit are not significantly different than their carrying value because the interest rates on these instruments are subject to change with market interest rates.

11. Employee Benefit Plan

The Company established a defined contribution 401(k) plan covering all U.S. employees who are at least 21 years of age and who meet IRS requirements for plan eligibility. Employees may contribute to the plan up to 50% of their compensation, which may be further limited by law. In addition, employees who reached the age of 50 during the calendar years 2021, 2020, and 2019 are eligible to make an additional catch-up contribution as set annually by IRS guidelines. The Company matches employee contributions for a percentage of the employee's deferral, not to exceed the first 6% of each employee's compensation.

The Company also operates a Group Personal defined contribution plan ("Plan") covering all U.K. employees. Employees are auto enrolled in the plan who are at least 22 years of age and paid more than £10 a year, up to the State Pension Age. However, all employees who are between the ages of 16 and 75 can elect to join the Plan. Employees may contribute to their personal pension account and then convert that account into income at retirement. The Company contributes an additional 8% of salary for those employees who have registered for the Plan, which exceeds their duties under U.K. auto enrolment legislation.

Total 401(k) and Plan contributions made by the Company were $4,746, $4,138, and $3,342 for the years ended December 31, 2022, 2021, and 2020 respectively.

12. Commitments and Contingencies

Legal proceedings

The Company does not have any pending or threatened litigation which, individually or in the aggregate, would have a material adverse effect on the consolidated financial statements as of December 31, 2022.

Assurance-type warranty

The Company includes an assurance commitment warranting the application software products will perform in accordance with written user documentation and the agreements negotiated with customers. Since the Company does not customize its applications software, warranty costs are insignificant and expensed as incurred.

For information related to commitments for future minimum lease payments, please see Note 14 – Lease.

13. Equity-Based Compensation

The Company's equity-based compensation programs are intended to attract, retain and provide incentives for employees, officers and directors. The Company has the following stock-based compensation plans and programs.

Restricted Stock and related Class B Plan

Exchange

The majority of the Company's restricted stock awarded to its employees was originally issued in December 10, 2020 in exchange for the Class B Profits Interest Unit (the "Class B Units") of EQT Avatar Parent, L.P, which was former parent of the Company.

Prior to the Company's IPO, the Company's management participated in a 2017 Class B Profits Interest Unit Incentive Plan (the "Class B Plan"). The majority of the employee grant agreements for the Class B Units were comprised of 50% time-based vesting units ("Time-based Units") and 50% performance-based vesting units ("Performance-based Units").

The fair value of the Time-based Units that vested solely upon continued employment was measured at the grant date and was recognized as cost over the employee's requisite service period, which was generally five years. The expense related to the vesting of the Time-based Units was recorded on the Company's books because the Company directly benefited from the services provided by Class B Unit holders.

The grant date fair values of Class B Unit were determined based on the pricing models and valuation assumptions noted in the following table, shown at their weighted-average values:

	YEAR ENDED DECEMBER 31, 2020
Pricing model	Monte Carlo
Expected dividend yield	0.0 %
Risk-free interest rate[(1)]	0.3 %
Expected stock price volatility[(2)]	59 %
Expected exercise term (in years)[(3)]	2.3

(1) Based on the U.S. Treasury constant maturity interest rate whose term is consistent with the expected exercise term of our incentive units

(2) In projecting expected stock price volatility, we consider the historical volatility of the stock prices of comparable public companies.

(3) The Company estimates the expected life of incentive units based upon the timing of a potential liquidity event.

Equity-based compensation expense related to the Time-based Units was $2,776 for the years ended December 31, 2020. The Performance-based Units were not probable of vesting prior to the exchange of Class B Units for common shares, as such, no expense was recorded for these Units prior to the exchange date. As of December 31, 2020, there were no unrecognized compensation costs related to the Units as they had been exchanged for restricted stock.

Based on the stock price of $23.00 per share, on December 10, 2020, the Company issued 5,941,693 shares of restricted common stock to holders of unvested Class B Units in exchange for such unvested Class B Units. The total fair value of the restricted stock was $83,260. Because the service inception date preceded the grant date of the replacement awards, a catch up-adjustment of $56,487 was recorded at the modification date, based on the portion of the requisite service period that had elapsed since the original grant date for each tranche of the award. Considering the original awards contained performance conditions necessary to vest, the accelerated attribution approach was applied. The accelerated attribution approach results in cost being allocated to each of the tranches of the awards and recognized ratably over each tranche as if they were separate awards. Separately, upon completion of the offering, $3,912 of compensation cost was recognized related to our Chief Executive Officer's 853,001 performance-based Class B Units that automatically vested upon the IPO of the Company and were exchanged for 1,561,950 common shares of the Company.

Modification accounting was not required for the time-based vesting Class B Units for which the vesting conditions, classification and fair market value did not change as a result of the shares of restricted common stock that replaced them. The original grant date fair value will continue to be recognized on a straight-line basis. Modification accounting was required for the performance-based vesting Class B Units that were exchanged for time-based vesting restricted common stock, given the vesting conditions were changed. Such performance-vesting Class B Units that were improbable of vesting were remeasured based on the modification date fair value of the shares of restricted common stock replacing such Class B Units.

Restricted Stock

Unvested Class B Units were exchanged for restricted stock of the Company. Share based compensation for the restricted stock exchanged for the time-based Class B Units is recognized on a straight-line basis over the requisite service period of the award, which is generally five years. Equity-based compensation for the restricted stock exchanged for the performance-based Class B Units is recognized using the accelerated attribution approach.

In 2021, the Company granted 87,127 replacement shares of restricted stock in connection with the Pinnacle acquisition under which equity-based awards are outstanding. The fair value of the restricted stock awarded was initially determined based on the fair value of our common stock on the date of grant, then adjusted for time restrictions due to unregistered shares and lack of marketability. Total grant date fair value was $2,762. The restricted stock issued in 2021 generally has a three-year vesting period except for one holder whose shares vests equally on a monthly basis for two years. The Company exchanged 5,941,693 shares in 2020 and did not legally authorize or issue any restricted stock during the year ended December 31, 2022.

The weighted average grant date or exchange date fair values per share of restricted stock granted or exchanged during 2022, 2021 and 2020 were $17.07, $31.7, and $23.0, respectively. The total fair value of restricted stock vested during 2022, 2021 and 2020 was $46,401, $45,051 and $0, respectively.

A summary of the restricted stock in 2022 is shown below:

	SHARES	WEIGHTED-AVERAGE GRANT-DATE FAIR VALUE
Non-vested restricted stock as of December 31, 2021	3,910,722	$ 23.18
Granted	66,220	17.07
Vested	(2,020,065)	22.97
Forfeited	(487,844)	23.00
Cancelled	(66,220)	23.00
Non-vested restricted stock as of December 31, 2022	1,402,813	$ 23.27

The Company did not legally authorize or issue any restricted stock during the year ended December 31, 2022. During 2022, the Company modified an award for a recipient that resulted in 66,220 shares each assumed cancelled, granted, and forfeited. Net compensation expense reversed was $146. The shares of restricted stock vested includes 11,069 shares of common stock that were withheld on behalf of employees to satisfy the statutory tax withholding requirements.

Equity-based compensation expenses related to the restricted stock exchanged for performance-based Class B units were $2,537, $12,349 and $57,421 for the years ended December 31,2022, 2021 and 2020, respectively. At December 31, 2022, the total unrecognized equity-based compensation expenses related to outstanding restricted stock recognized using the accelerated attribution approach was $3,294. The unrecognized compensation expense for the category at December 31, 2022 is expected to be recognized over a weighted-average period of 21.0 months.

Equity-based compensation expenses related to the time-based restricted stock were $3,166, $3,104 and $167 for the years ended December 31, 2022, 2021 and 2020, respectively. At December 31, 2022, the total unrecognized equity-based compensation expenses related to outstanding restricted stock recognized using the straight-line attribution approach were $2,888. The unrecognized compensation expense for the category at December 31, 2022 is expected to be recognized over a weighted-average period of 25.7 months.

Equity-based employee compensation expenses related to the time-based restricted stock for the Pinnacle acquisition were $1,169 and $292 for the years ended December 31, 2022 and 2021, respectively. At December 31, 2022, the total unrecognized equity-based compensation expenses related to outstanding restricted stock recognized using the straight-line attribution approach was $1,301. The unrecognized compensation expense for the category at December 31, 2022 is expected to be recognized over a weighted-average period of 15.9 months.

2020 Incentive Plan

In order to align the Company's equity compensation program with public company practices, the Company's Board of Directors adopted and stockholders approved the 2020 Incentive Plan. The 2020 Incentive Plan allows for grants of non-qualified stock options, incentive stock options, restricted stock, restricted stock units ("RSUs"), and performance stock units ("PSUs") to employees, directors, officers, and consultants or advisors of the Company. The 2020 Incentive Plan allows for 20,000,000 shares (the "plan share reserve") of common stock to be issued. No more than the number of shares of common stock equal to the plan share reserve may be issued in the aggregate pursuant to the exercise of incentive stock options. The maximum number of shares of common stock granted during a single fiscal year to any non-employee director, taken together with any cash fees paid to such non-employee director during the fiscal year, may not exceed $1,000,000 in total value, except for certain awards made to a non-executive chair of our Board of Directors. At December 31, 2022, there was 19,460,378 shares reserved for future issuance.

The plan share reserve will be increased on the first day of each fiscal year beginning with the 2021 fiscal year and ending after the tenth anniversary of the effective date in an amount equal to the lesser of (i) the positive difference, if any, between (x) 4.0% of the outstanding common stock on the last day of the immediately preceding fiscal year and (y) the plan share reserve on the last day of the immediately preceding fiscal year and (ii) a lower number of shares of our common stock as determined by our board of directors.

Restricted Stock Units

Restricted stock units ("RSUs") represent the right to receive shares of the Company's common stock at a specified date in the future. During year ended December 2022, the Company granted 1,437,957 RSUs under the 2020 Incentive Plan that generally vest over an average three-year period. The fair value of the RSUs is based on the fair value of the underlying shares on the date of grant.

A summary of the Company's RSU activity is as follows:

	UNITS	WEIGHTED-AVERAGE GRANT DATE FAIR VALUE
Non-vested RSUs as of December 31, 2021	1,288,724	$ 29.28
Granted	1,437,957	21.98
Vested	(432,494)	28.66
Forfeited	(289,092)	25.61
Non-vested RSUs as of December 31, 2022	2,005,095	$ 24.71

The weighted average grant date fair values per share of restricted stock units granted during 2022 and 2021 were $21.98 and $29.19, respectively. The total fair value of restricted stock units vested during 2022 and 2021 were $12,395 and $569, respectively.

Equity-based compensation expense related to the RSUs was $19,012, $8,257 and $81 for the years ended December 31,2022, 2021, and 2020, respectively. At December 31, 2022, the total unrecognized equity-based compensation expense related to outstanding RSUs was $35,121, which is expected to be recognized over a weighted-average period of 23.1 months.

The number of RSUs vested in 2022 includes 138,038 shares that were withheld on behalf of employees to satisfy the statutory tax withholding requirements.

Performance Restricted Stock Units

Performance stock units ("PSUs") are issued under the 2020 Incentive Plan and represent the right to receive shares of the Company's common stock at a specified date in the future based on the satisfaction of various service conditions and the achievement of certain performance thresholds including year over year revenue growth and unlevered free cash flow growth.

Equity-based compensation for the PSUs is only recognized to the extent a threshold is probable of being achieved and is recognized using the accelerated attribution approach. The Company will continue to assess the probability of each condition being achieved at each reporting period to determine whether and when to recognize compensation cost. The following table presents a summary of activity on the PSUs for the period ended December 31, 2022.

	UNITS	WEIGHTED-AVERAGE GRANT DATE FAIR VALUE
Non-vested PSUs as of December 31, 2021	406,575	$ 27.35
Granted	361,147	22.25
Vested	(12,291)	24.83
Forfeited	(101,123)	31.22
Non-vested PSUs as of December 31, 2022	654,308	$ 23.99

The weighted average grant date fair values per share of performance stock units granted during 2022 and 2021 were $22.25 and $27.36, respectively. The total fair value of performance stock units vested during 2022 was $305. There were no PSU shares vested during 2021. The total fair value of performance stock units vested were $305 and $0 for the year ended December 31, 2022, 2021.

Equity-based compensation expense related to the PSUs was $4,462 and $5,481 for the year ended December 31, 2022 and 2021. At December 31, 2022, the total unrecognized equity-based compensation expense related to outstanding PSUs was $2,458, which is expected to be recognized over a weighted-average period of 15.5 months.

2020 Employee Stock Purchase Plan

On December 10, 2020, stockholders approved the 2020 Employee Stock Purchase Plan (the "Employee Stock Purchase Plan"). Under the Employee Stock Purchase Plan, employees, and those of the Company's subsidiaries, may purchase shares of common stock, during pre-specified offering periods. Named executive officers will be eligible to participate in the Employee Stock Purchase Plan on the same terms and conditions as all other participating employees. The maximum number of shares authorized for sale under the Employee Stock Purchase Plan is 1,700,000 shares.

Generally, all employees and those of the Company's subsidiaries will be eligible to participate in the Employee Stock Purchase Plan, except for employees who own 5% or more of the combined voting power or value of all issued and outstanding stock. Employees may contribute through payroll deductions of 1% to 15% of such employees' base compensation on each payroll date that falls within an offering period. Participants may not acquire rights to purchase more than $25 of common stock under the Employee Stock Purchase Plan for any calendar year. Common stock will be available for purchase for up to 27 months.

Shares will be purchased at a discounted per-share purchase price equal to 85% of the per-share closing price of the Company's common stock on the last day of the applicable offering period. As of December 31, 2022, no shares of common stock have been purchased under the Employee Stock Purchase Plan and no offering has been made to eligible employees under the Plan.

Equity-based compensation expense

The following table summarizes the components of total equity-based compensation expense included in the consolidated statements of operations and comprehensive income (loss) for each period presented:

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
		(In thousands)	
Cost of revenues	$ 7,494	$ 5,193	$ 8,805
Sales and marketing	2,091	2,204	7,390
Research and development	5,829	2,872	7,133
General and administrative expenses	14,931	19,214	41,179
Total	$ 30,345	$ 29,483	$ 64,507

The tax benefit related to compensation expense was $1,933 and $117 for the year ended December 31, 2022, and 2021. There were no tax benefits related to compensation expense for the year ended December 31, 2020.

14. Leases

The Company leases certain office facilities and equipment under non-cancelable operating and finance leases with remaining terms from one to seven years.

Operating lease ROU assets are included in other asset while finance lease ROU assets are included in Property and equipment, net in the consolidated balance sheets. With respect to operating lease liabilities, current operating lease

liabilities are included in current liabilities and non-current operating lease liabilities are included in long-term liabilities in the consolidated balance sheets. Current and non-current finance lease liabilities are included in other current liabilities and other long-term liabilities in the consolidated balance sheets.

The following table presents information about the operating and finance lease right-of-use assets and lease liabilities as well as lease term and discount rates:

Lease right-of-use assets, lease liabilities, lease term and discount rate:	December 31, 2022	December 31, 2021
	(In thousands)	
Lease right of use assets		
Operating leases	$ 14,427	$ 12,634
Financing leases	24	271
	$ 14,451	$ 12,905
Lease liabilities		
Current		
Operating leases	$ 4,968	$ 5,040
Financing leases	25	293
Noncurrent		
Operating leases	10,133	8,256
Financing leases	—	25
	$ 15,126	$ 13,614

Weighted-average remaining lease term (years):	For the year ended December 31, 2022	For the year ended December 31, 2021
Operating leases	3.9	3.63
Financing leases	0.08	1.08
Weighted-average discount rate:		
Operating leases	3.45 %	3.91 %
Financing leases	6.19 %	6.19 %

The components of total lease cost were as follows:

	December 31, 2022	December 31, 2021
	(In thousands)	
Operating lease cost	$ 4,978	$ 5,815
Short-term lease cost	729	404
Variable lease cost	191	744
Sublease income	(379)	(490)
Finance lease cost:		
Amortization of right-of-use assets	254	277
Interest on lease liabilities	11	29
Total lease cost	$ 5,784	$ 6,779

Supplemental cash flow and non-cash flow information was as follows:

	December 31, 2022	December 31, 2021
	(In thousands)	
Cash paid for amounts included in the measurement of lease liabilities		
Operating cash flows from finance leases	$ 11	$ 29
Operating cash flows from operating leases	$ 5,360	$ 6,105
Financing cash flows from finance leases	$ 293	$ 275
Right-of-use assets obtained in exchange for new and remeasured operating leases	$ 2,501	$ 520
Right-of-use assets obtained through acquisition	$ 129	$ 1,648

The following table summarizes by year the maturities of our minimum lease payments as of December 31, 2022.

	OPERATING LEASES	FINANCE LEASES
	(In thousands)	
Year ending December 31,		
2023	$ 4,935	$ 25
2024	4,113	—
2025	3,342	—
2026	2,129	—
2027	917	—
Thereafter	595	—
Total future lease payments	16,031	25
Less: imputed interest	(930)	—
Total	$ 15,101	$ 25

15. Segment data

Operating segments are defined as components of an enterprise about which separate financial information is available that is evaluated regularly by the chief operating decision maker ("CODM") in deciding how to allocate resources and in assessing performance.

The Company has determined that its chief executive officer ("CEO") is its CODM. The Company manages its operations as a single segment for the purpose of assessing and making operating decisions. The Company's CODM allocates resources and assesses performance based upon financial information at the consolidated level. Since the Company operates in one operating segment, all required financial segment information can be found in the consolidated financial statements.

The following table summarizes revenue by geographic area:

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
		(In thousands)	
Revenue[(1)]:			
Americas	$ 252,921	$ 205,377	$ 182,629
EMEA	57,002	56,410	42,844
Asia Pac	25,721	24,317	18,057
Total	$ 335,644	$ 286,104	$ 243,530

(1) Revenue is attributable to the countries based on the location of the customer

The following table summarizes property, plant and equipment, net by geographic area as of December 31, 2022 and 2021:

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Property, plant and equipment, net:		
Americas	$ 1,406	$ 1,903
EMEA	732	712
Asia Pac	262	320
Total	$ 2,400	$ 2,935

16. Income Taxes

The components of income (loss) before income taxes were as follows:

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
		(In thousands)	
Domestic	$ 9,456	$ (10,373)	$ (55,355)
Foreign	9,299	6,998	5,174
Total	$ 18,755	$ (3,375)	$ (50,181)

The components of provision for (benefit from) income taxes were as follows:

	DECEMBER 31,		
	2022	2021	2020
		(In thousands)	
Current tax provision			
Federal	$ 1,882	$ 451	$ 326
State and local	3,335	1,798	1,659
Foreign	10,318	8,826	4,634
Total current	15,535	11,075	6,619
Deferred tax benefit			
Federal	(6,788)	(4,416)	(3,620)
State and local	(2,190)	(1,156)	276
Foreign	(2,533)	4,388	(4,059)
Total deferred	(11,511)	(1,184)	(7,403)
Total provision (benefit)	$ 4,024	$ 9,891	$ (784)

The effective income tax rate was 21.46%, (293.06)%, and 1.56% for the years ended December 31, 2022, 2021 and 2020, respectively. The primary reconciling items between the statutory income tax rate of 21% and the effective income tax rate were as a result of the following:

	DECEMBER 31,					
	2022		2021		2020	
	(In thousands, except for percentage)					
Tax at U.S. federal statutory rate	$ 3,939	21.00 %	$ (709)	21.00 %	$ (10,538)	21.00 %
State taxes, net of federal benefit	967	5.16 %	226	(6.71)%	1,125	(2.24)%
Foreign rate differential	3,545	18.90 %	3,872	(114.72)%	2,296	(4.58)%
Permanent items	(1,227)	(6.54)%	(670)	19.84 %	(139)	0.28 %
Equity compensation	2,278	12.15 %	3,534	(104.70)%	13,562	(27.03)%
GIL TI inclusion	451	2.41 %	540	(16.00)%	932	(1.86)%
Tax credits	(6,427)	(34.27)%	(7,060)	209.19 %	(7,618)	15.18 %
Rate change	(605)	(3.23)%	5,256	(155.75)%	2,076	(4.14)%
Other adjustments	(4,554)	(24.28)%	3,131	(92.76)%	1,223	(2.43)%
Return to provision adjustments	(405)	(2.16)%	(66)	1.95 %	(103)	0.21 %
Valuation allowance	6,062	32.32 %	1,837	(54.40)%	(3,600)	7.17 %
Effective tax rate	$ 4,024	21.46 %	$ 9,891	(293.06)%	$ (784)	1.56 %

A portion of the Company's income was attributable to Madeira, Portugal which qualified for special tax programs authorized by the European Union (“EU”) and administered by the Portuguese Tax Authority (“PTA”). For the period of 2008 through 2011, the Company was subject to Madeira's income tax rate of 0%, for 2012 an income tax rate of 4% applied, for the period of 2013 through 2020 an income tax rate of 5% applied, for 2021 an income tax rate of 5% applied. During the current year, the EU disallowed the PTA’s interpretation of certain provisions of the Madeira Free Zone (“MFZ”) Regime III, with a lookback period of 10 years, which resulted in an increase to the tax rate applied to the Company’s income for the aforementioned years and for 2022.

The tax effects of temporary differences that give rise to deferred tax assets and liabilities are summarized as follows:

	DECEMBER 31,	
	2022	2021
	(In thousands)	
Deferred tax assets		
Accounts receivable	$ 279	$ 61
Accrued compensation	4,385	3,552
Accrued expenses	529	-
Deferred revenue	392	696
Net operating loss carryforwards	14,264	4,117
R&D credit carryforward	3,918	4,965
Foreign tax credits	12,131	15,054
Interest rate hedge	—	253
Equity based compensation	4,752	3,015
Other assets	189	380
Interest expense	103	224
Lease liability	3,136	2,944
Section 174	9,425	—
Total gross deferred tax asset	53,503	35,261
Less: Valuation allowance	(25,732)	(18,235)
Net deferred tax asset	27,771	17,026
Deferred tax liabilities		
Property, equipment, and other long-lived assets	(152)	(272)
Goodwill and intangible assets	(82,100)	(83,844)
Prepaid expenses	(1,820)	(1,968)
Accrued expenses	—	(184)
Deferred revenue	—	—
Interest rate hedge	(2,085)	—
Right-of-use (ROU) Asset	(2,957)	(2,783)
Total gross deferred tax liability	(89,114)	(89,051)
Net deferred tax liability	$ (61,343)	$ (72,025)

The net change in the total valuation allowance resulted in an increase of $7,497 in 2022 compared to an increase of $1,520 in 2021. The valuation allowance is determined separately for each jurisdiction. A U.S. valuation allowance was required against the foreign tax credit carryforward. At the foreign subsidiaries, the valuation allowance was primarily related to foreign net operating losses that, in the judgment of management, are not more likely than not to be realized.

In assessing the realizability of deferred tax assets, management considered whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible and carryforward attributes can be utilized. Management considered the reversal of deferred tax liabilities in making this assessment. Management believes it is more likely than not that the Company will realize the benefits of the deferred tax assets, net of the existing valuation allowance, at December 31, 2022.

At December 31, 2022, the Company has net operating loss carryforwards for federal income tax purposes of approximately $1,805 majority of which will expire if unused in years 2024 through 2036. The Company has net operating loss carryforwards for state income tax purposes of approximately $50, which will expire if unused in years 2029 through 2040. The Company has foreign net operating loss carryforwards of $65,805 which will expire if unused starting in 2022.

The Company has $395 of federal research and development credits that will expire if unused in years 2025 through 2042, $143 of California research and development credits with indefinite carryover period, and $363 of foreign research and development credits that will expire if unused starting in 2029. The Company has foreign tax credits of $10,607 that will

expire if unused in years 2027 through 2031, and also Canadian investment tax credits of $3,552 which will expire if unused in years 2030 through 2040.

The Company has net operating losses and tax credits that are subject to limitation under Internal Revenue Code Section 382 and Section 383 due to changes in ownership. The Company has analyzed the realizability of these tax attributes carried forward and have recorded deferred tax assets for the attributes that meet the more-likely-than-not realizability threshold.

Foreign undistributed earnings were considered permanently invested, therefore no provision for U.S. income taxes was accrued as of December 31, 2022 and 2021, with the exception of the withholding tax liability of $168 on the potential repatriation from Certara Canada Corporation.

The Company assessed its uncertain tax positions and determined that a liability of $2,818 and $1,059 was required to be recorded for uncertain tax positions as of December 31, 2022 and 2021, respectively. Uncertain tax positions relate primarily to federal and state R&D credits. The Company's policy is to recognize interest and penalties as a component of the provision for income taxes. For December 31, 2022 and 2021, the Company recognized interest of $0.1 million of interest and no penalties. For December 31, 2021 the Company recognized neither interest or penalties. The Company does not anticipate any significant changes to its uncertain tax positions during the next twelve months.

A reconciliation of the beginning and ending balance of unrecognized tax benefits is as follows:

	(In thousands)
Balance at December 31, 2020	**$ 897**
Additions for tax positions related to the current year	156
Additions for tax positions of prior years	6
Balance at December 31, 2021	**1,059**
Additions for tax positions related to the current year	205
Additions for tax positions of prior years	1,554
Balance at December 31, 2022	**$ 2,818**

The uncertain tax positions, exclusive of interest and penalties, were $2,818 and $1,059 as of December 31, 2022 and December 31, 2021, respectively, which also represents potential tax benefits that if recognized, would impact the effective tax rate.

U.S. federal income tax returns are generally subject to examination for a period of three years after the filing of the return. However, the Internal Revenue Service can audit the NOLs generated in respective years in the years that the NOLs are utilized. State income tax returns are generally subject to examination for a period of three to six years after the filing of the respective return. The state impact of any federal changes remains subject to examination by various states for a period of up to one year after formal notification to the states. Foreign income tax returns are generally subject to examination based on the tax laws of the respective jurisdictions.

The Company is subject to tax on Global Intangible Low-Taxed Income (GILTI) and has elected to account for GILTI as a current period expense.

17. Earnings per Share

Basic earnings per share is computed by dividing net income (loss) attributable to common stockholders by the weighted-average common shares outstanding for the period. Diluted net income (loss) per share is computed by dividing the net income (loss) attributable to stockholders by the weighted-average number of shares and dilutive potential common shares during the period.

	YEAR ENDED DECEMBER 31,		
	2022	2021	2020
	(In thousands, except per share and share data)		
Basic earnings per share			
Net income (loss) available to common shareholders	$ 14,731	$ (13,266)	$ (49,397)
Basic weighted-average common shares outstanding	156,876,942	149,842,668	133,247,212
Basic earnings per common share	$ 0.09	$ (0.09)	$ (0.37)
Diluted earnings per share			
Net income available to common shares	$ 14,731	$ (13,266)	$ (49,397)
Basic weighted-average common shares outstanding	156,876,942	149,842,668	133,247,212
Dilutive potential common shares	2,477,452 (1)	— (2)	— (2)
Diluted weighted-average common shares outstanding	159,354,394	149,842,668	133,247,212
Diluted earnings per common share	$ 0.09	$ (0.09)	$ (0.37)

(1) For the year ended December 31, 2022, the Company excluded certain potentially dilutive securities attributable to outstanding RSUs and RSAs from the computation of diluted EPS because the securities would have had an antidilutive effect.

(2) For the year ended December 31, 2021, and 2020, the Company excluded the restricted stock and restricted stock units from the calculation of diluted earnings per share that could potentially dilute earnings per share in the future because of the anti-dilutive effect of the reported net loss.

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

As of the end of the period covered by this Annual Report on Form 10-K, we performed an evaluation under the supervision and with the participation of management, including our Chief Executive Officer and our Chief Financial Officer, of the design and effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) or 15d-15(e) under the Securities Exchange Act of 1934 as amended (the "Exchange Act"). Based upon that evaluation, our Chief Executive Officer and Chief Financial Officer concluded, as of the end of the period covered by this Annual Report that our disclosure controls and procedures were effective at the reasonable assurance level to ensure that information required to be disclosed was recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and to provide reasonable assurance that information required to be disclosed in such reports is accumulated and communicated to the Company's management, including its Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as is defined in the Exchange Act. Internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external reporting purposes in accordance with GAAP and includes those policies and procedures that: (1) pertain to the maintenance of records that in reasonable detail accurately and fairly reflect our transactions and the dispositions of our assets; (2) provide reasonable assurance that our transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP and that our receipts and expenditures are being made only in accordance with appropriate authorizations; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on our consolidated financial statements.

Our management conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2022, based on the framework in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

As disclosed in the Management's Annual Report on Internal Control over Financial Reporting in Item 8 in our Annual Report on Form 10-K for the year ended December 31, 2021, during the fourth quarter of 2021, we identified a material weakness in internal control related to ineffective information technology general controls in the areas over a cloud-based software system that supports our project set-up and time submissions for services provided to our customers.

During 2022, management implemented its previously disclosed remediation plan that included: (i) Implement a more robust process for the onboarding, offboarding, and access rights modifications in the application environment to ensure appropriate provisioning of rights on a least privileged basis; (ii) Document the levels of privileged access roles with specific "allowed" capabilities warranting levels of access for specific roles; (iii) Implement a quarterly log review by business owners to ensure that no privileged account access was provided and removed outside of documented service requests; (iv) Implement a controlled process for application and system level changes in the application environment to ensure appropriate understanding of the changes on financial reporting; and (v) Strengthen ownership and reporting through the IT Governance Process currently in place which will serve as the mechanism to monitor the remediation update.

During the fourth quarter of 2022, we completed our testing of the operating effectiveness of the implemented controls and found them to be effective. As a result, we have concluded the material weakness has been remediated as of December 31, 2022.

Changes in Internal Control over Financial Reporting

Except for the changes in connection with our implementation of the remediation plan discussed above, there were no changes in our internal control over financial reporting (as such term is defined in Rules 13a-15(f) under the Exchange Act) during the quarter ended December 31, 2022 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

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.

We have adopted a Code of Conduct (the "Code of Conduct") applicable to all employees, executive officers and directors that addresses legal and ethical issues that may be encountered in carrying out their duties and responsibilities, including the requirement to report any conduct they believe to be a violation of the Code of Conduct. The Code of Conduct is available on our website, www.certara.com. The information available on or through our website is not part of this annual report. If we ever were to amend or waive any provision of our Code of Conduct that applies to our principal executive officer, principal financial officer, principal accounting officer or any person performing similar functions, we intend to satisfy our disclosure obligations with respect to any such waiver or amendment by posting such information on our internet website set forth above rather than by filing a Form 8-K.

The remaining information required under this item is incorporated herein by reference to our definitive proxy statement (the "Proxy Statement") pursuant to Regulation 14A under the Securities Exchange Act of 1934, as amended, which Proxy Statement is expected to be filed with Securities and Exchange Commission not later than 120 days after the close of our fiscal year ended December 31, 2022.

Item 11. Executive Compensation.

The information required by this item will be set forth in the Proxy Statement and is incorporated herein by reference.

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

The information required by this item will be set forth in the Proxy Statement and is incorporated herein by reference.

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

The information required by this item will be set forth in the Proxy Statement and is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services.

The information required by this item will be set forth in the Proxy Statement and is incorporated herein by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

(a) The following documents are filed as part of this Annual Report:

(1) Financial Statements

The financial statements filed as part of this Annual Report are included in Part II, Item 8 of this Annual Report.

(2) Financial Statement Schedules

Financial statement schedules have been omitted in this Annual Report because they are not applicable, not required under the instructions or the information requested is set forth in the financial statements or related notes thereto.

(3) List of Exhibits required by Item 601 of Regulation S-K

Incorporated by Reference

Exhibit Number	Exhibit Title	Form	File No.	Exhibit	iling Date
2.1	Agreement and Plan of Merger dated as of August 2, 2021, by and among Certara, Inc., Puma Merger Sub, LLC and Shareholder Representative Services LLC, as the Equityholder Representative thereunder	8-K	001-39799	2.1	3/5/2021
3.1	Amended and Restated Certificate of Incorporation of Certara, Inc.	S-8	333-251368	4.1	15/2020
3.2	Amended and Restated Bylaws of Certara, Inc.	S-8	333-251368	4.2	15/2020
4.1	Form of Stock Certificate for Common Stock	S-1/A	333-250182	4.1	03/2020
4.2	Description of Certara, Inc.'s Securities	10-K	001-39799	4.2	15/2021
10.1	Credit Agreement, dated as of August 15, 2017, among Certara Holdings, Inc. (f/k/a EQT Avatar Holdings, Inc.), Certara Holdco, Inc., Certara USA, Inc., EQT Avatar Intermediate, Inc., Jefferies Finance LLC, as Administrative Agent and Issuing Bank, Golub Capital LLC as Issuing Bank and each lender from time to time party thereto	S-1/A	333-250182	10.3	18/2020
10.2	First Amendment, dated as of January 24, 2018, to the Credit Agreement, among Certara Holdings, Inc. (f/k/a EQT Avatar Holdings, Inc.), Certara Holdco, Inc., Certara USA, Inc., EQT Avatar Intermediate, Inc., Jefferies Finance LLC, as Administrative Agent and Issuing Bank, Golub Capital LLC as Issuing Bank and each lender from time to time party thereto	S-1/A	333-250182	10.4	18/2020
10.3	Second Amendment, dated as of April 3, 2018, to the Credit Agreement, among Certara Holdings, Inc. (f/k/a EQT Avatar Holdings, Inc.), Certara Holdco, Inc., Certara USA, Inc., Certara Intermediate, Inc. (f/k/a EQT Avatar Intermediate, Inc.), Jefferies Finance LLC, as Administrative Agent and Issuing Bank, Golub Capital LLC as Issuing Bank and each lender from time to time party thereto	S-1/A	333-250182	10.5	18/2020

10.4	Third Amendment, dated as of June 17, 2021, to the Credit Agreement, among Certara Holdings, Inc., Certara Holdco, Inc., Certara USA, Inc., Certara Intermediate, Inc., Bank of America, N.A., as Administrative Agent for the lenders from time to time party thereto and collateral agent for the secured parties thereunder	8-K	001-39799	10.1	22/2021
10.5	Loan Guaranty, dated as of August 15, 2017, by and among the Loan Guarantors, as defined therein, and Jefferies Finance LLC, as Administrative Agent	S-1/A	333-250182	10.6	18/2020
10.6	Pledge and Security Agreement, dated as of August 15, 2017, by and among the Grantors, as defined therein, and Jefferies Finance LLC, as Agent	S-1/A	333-250182	10.7	18/2020
10.7	Loan Agreement, dated as of July 6, 2017, between Santo Holding (Deutschland) GmbH and Certara, Inc. (f/k/a EQT Avatar Topco, Inc.)	S-1/A	333-250182	10.8	18/2020
10.8*	Form of Indemnification Agreement between Certara, Inc. and directors and executive officers of Certara, Inc.	S-1/A	333-250182	10.9	25/2020
10.9*	Employment Agreement, dated as of May 14, 2019, by and among EQT Avatar Parent L.P., Certara USA, Inc. and William Feehery	S-1/A	333-250182	10.10	18/2020
10.10*	Employment Agreement, dated as of July 11, 2014, between Certara USA, Inc. and M. Andrew Schmick	10-K	001-39799	10.11	15/2021
10.11*	Employment Agreement, dated as of July 20, 2020, between Certara USA, Inc. and Leif E. Pedersen	10-K	001-39799	10.12	15/2021
10.12*	Employment Agreement, dated as of September 2, 2016, between D3 MEDICINE LLC, Certara USA, Inc. and Patrick Smith				
10.13*	Certara, Inc. 2020 Incentive Plan	S-1/A	333-250182	10.18	25/2020
10.14*	Form of Restricted Stock Unit Grant and Award Agreement (Certara, Inc. 2020 Incentive Plan)	10-K	001-39799	10.14	15-2021
10.15*	Form of Exchange Acknowledgement and Agreement	S-1/A	333-250182	10.19	03/2020
10.16*	Form of Stock Restriction Agreement	S-1/A	333-250182	10.20	03/2020
10.17*	Form of Performance Stock Unit Grant Notice and Agreement for Certara, Inc. 2020 Incentive Plan*	10-Q	001-39799	10.1	5/7/2021
10.18*	Certara, Inc. 2020 Employee Stock Purchase Plan	S-1/A	333-250182	10.21	25/2020
10.19*	Certara, Inc. Directors Deferral Plan	10-K	001-39799	10.18	15/2021
10.20*	Employment Agreement, dated September 26, 2018 between Certara UK Limited and Robert Aspbury	10-K	001-39799	10.21	3/1/2022
10.21*	Employment Agreement, dated January 23, 2019, by and between EQT Certara USA, Inc. and Justin Edge	S-1/A	333-250182	10.15	/8/2020
10.22	Letter Agreement, dated as of November 3, 2022, by and among Certara, Inc. and Arsenal Saturn Holdings LP	8-K	001-39799	10.1	/7/2022
10.23	Stockholders Agreement, dated as of November 3, 2022, by and among Certara, Inc. and the other parties thereto	8-K	001-39799	10.2	/7/2022
10.24	Registration Rights Agreement, dated as of November 3, 2022, by and among Certara, Inc. and the other parties thereto	8-K	001-39799	10.3	/7/2022

10.25*	Form of 2022 Performance Stock Unit Grant Notice and Agreement for Certara, Inc. 2020 Incentive Plan	10-Q	001-39799	10.1	5/5/2022
16.1	Letter from CohnReznick LLP to the Securities and Exchange Commission, dated March 30, 2022	8-K	001-39799	16.1	30/2022
21.1	Subsidiaries of the Registrant				
23.1	Consent of CohnReznick LLP				
23.2	Consent of RSM US LLP				
24.1	Power of Attorney (included in the signature page to this Annual Report)				
31.1	Certification of Principal Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002				
31.2	Certification of Principal Financial and Accounting Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002				
32.1	Certification of Principal Executive Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002+				
32.2	Certification of Principal Financial Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002+				
101.INS	XBRL Instance Document – the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document				
101.SCH	XBRL Taxonomy Extension Schema Document				
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document				
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document				
101.LAB	XBRL Taxonomy Extension Label Linkbase Document				
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document				
104	Cover Page Interactive Data File (formatted in Inline XBRL and contained in Exhibit 101)				

* Management contract or compensatory plan or arrangement.

\+ This certification is deemed not filed for purposes of Section 18 of the Exchange Act, or otherwise subject to the liability of that section, nor shall it be deemed incorporated by reference into any filing under the Securities Act or the Exchange Act.

** Certain schedules and exhibits have been omitted pursuant to Item 601(a)(5) of Regulation S-K. The registrant agrees to furnish a copy of any omitted schedule or exhibit to the SEC upon request; provided, however, that the registrant may request confidential treatment pursuant to Rule 24b-2 of the Exchange Act for any document so furnished.

Item 16. Form 10-K Summary.

None.

Signatures

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

CERTARA, INC.

Date: March 1, 2023

By: /s/ William F. Feehery
Name: William F. Feehery
Title: Chief Executive Officer
(Principal Executive Officer)

Date: March 1, 2023

By: /s/ M. Andrew Schemick
Name: M. Andrew Schemick
Title: Chief Financial Officer
(Principal Financial Officer)

KNOW ALL BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints William F. Feehery, M. Andrew Schemick and Richard M. Traynor and each of them, his or her true and lawful agent, proxy and attorney-in-fact, with full power of substitution and resubstitution, for him or her and in his or her name, place and stead, in any and all capacities, to sign any and all amendments to this Annual Report on Form 10-K, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them, or their or his substitutes, may lawfully do or cause to be done by virtue thereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title
/s/ William F. Feehery William F. Feehery	Chief Executive Officer and Director (Principal Executive Officer)
/s/ M. Andrew Schemick M. Andrew Schemick	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)
/s/ James E. Cashman III James E. Cashman III	Chairman
/s/ Eran Broshy Eran Broshy	Director
/s/ Cynthia Collins Cynthia Collins	Director
/s/ Rose Crane Rose Crane	Director

/s/ Nancy Killefer Nancy Killefer	Director
/s/ Stephen McLean Stephen McLean	Director
/s/ David Spaight David Spaight	Director
/s/ Matthew Walsh Matthew Walsh	Director