**Risk Factors Comparison 2024-02-29 to 2023-03-01 Form: 10-K**

**Legend:** **New Text** ~~Removed Text~~ Unchanged Text Moved Text Section

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~~ **services** . ● • 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~~ **R & D** 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~~ **relationships** and the products and services we provide **. • We depend on key personnel and may not be able** to **retain these employees** ~~our~~ **or** ~~existing customers~~ **recruit additional qualified personnel, which could harm our business** . ● • **If our independent contractors are characterized as employees, we would be subject to adverse effects on our business and employment and withholding liabilities.** • 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. ● • **Issues relating to the use of artificial intelligence and machine learning in our products and services could adversely affect our business and operating results.** • 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 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. ● • **Our business may be subject to risks arising from natural disasters, epidemic diseases, pandemics and public health crises.** • 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. **• Our indebtedness** ~~● 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~~ **materially** ~~adverse~~ **adversely** ~~effect~~ **affect** ~~on~~ **our financial condition and our ability to operate** our business ~~and stock price~~ . ~~●~~ **• Restricted covenants governing our Credit Agreement may restrict our ability to pursue our business strategies. • Impairment of goodwill and other tangible assets may adversely impact future results of operations. •** Our ~~amended~~ **ability to use our NOLs** and ~~restated certificate of incorporation provides,~~ **R & D tax credits carryforwards to offset future taxable income may be** 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 20of America will be the sole and exclusive forums for~~ certain ~~stockholder litigation~~ - **limitations** ~~matters~~ **. • If our estimates or judgments relating to our critical accounting policies prove to be incorrect** , ~~which~~ **our results of operations** could **be adversely affected** ~~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** ~~IndustryDeceleration~~ -------- **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~~ **21** other regulatory authorities, who use them in assessing new drug applications. These licenses, which accounted for 0. ~~1~~ **2** % of our annual revenue in ~~2022~~ **2023** , 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~~ **action** 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, **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, ~~research and development~~ **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 ~~21area~~ -- **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~~ **R & D** 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~~ **R & D** 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~~ **R & D** 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~~ **R & D** 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~~ **R & D** 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~~ **R & D** 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 ~~22other~~ ~~--~~ **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~~ **R & D** 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 **the** 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 ~~BusinessOur~~ ~~---~~ **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~~ **R & D** 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~~ **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 ~~23difficulty~~ -- **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~~ **2023** , ~~380~~ **433** 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~~ **We structure the relationships with our independent contractors in a manner that we believe results in an independent contractor relationship, not an employee relationship. An independent contractor is generally distinguished** from ~~natural disasters and~~ **an** ~~epidemic diseases, including the ongoing COVID-19 pandemic~~ **employee by his or her degree of autonomy and independence in providing services** . ~~We may be subject to risks related to natural disasters~~ **A high degree of autonomy and independence is generally indicative of a contractor relationship, while a high degree of control is generally indicative of** ~~and~~ **an** ~~public health crises~~ **employment relationship. A further complicating factor is there is no single independent contractor test or standard which applies in every jurisdiction** , ~~such~~ **and the test in some jurisdictions is more stringent than in others. Although we believe that our independent contractors are properly characterized** as **independent contractors** ~~the ongoing global COVID-19 pandemic. The COVID-19 pandemic~~ , **individuals** ~~and the numerous variants that have emerged in the last two years~~ , **tax** ~~have had a significant and sustained negative impact on the global economy and a negative impact on many of our~~ - **or** ~~customers. Some of our customers have experienced or may in the~~ **other** ~~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 ~~.~~ **may in the future challenge our characterization of** ~~These~~ **these relationships. If regulatory authorities or state or federal courts were to determine that our independent contractors are employees, and not independent contractors, we would be required to withhold income taxes, to withhold and pay Social Security, Medicare and similar taxes and to pay unemployment** and other ~~adverse impacts on our customers and economic conditions~~ related **payroll taxes. We would also be liable** ~~to COVID-19 may cause our customers to delay or~~ **for** ~~cancel projects or significantly scale back their~~ **unpaid past taxes, subject to penalties and increased** ~~operations~~ - **operating costs moving forward. As a result, any determination that** ~~or~~ **our independent contractors are our employees** ~~research and development spending and limit the use of third parties, which~~ could have a material adverse effect on our business ~~. Public health crises~~ , **financial condition** ~~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, 24implementing 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~~ **and** effective avenue for developing new business..... software or other biosimulation tools may result **results** ~~in increased cost to us, delayed market acceptance~~ of **operations** ~~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 **AI** ~~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, **and** require us to increase our warranty provisions or incur the expense of litigation or substantial liability. ~~25If~~ **Artificial intelligence (AI) and machine learning technologies have been incorporated across our software and services portfolios providing opportunities to expand the number of data sources utilized, better predict outcomes, and streamline reporting. For example, we are using machine learning to automate and speed the process of biosimulation, and we have created an AI application to aid creating regulatory documents from scientific analyses and clinical data. We believe that AI predictive models will continue to enhance the accuracy and usefulness of biosimulation models and be utilized broadly across drug development and we plan to develop and incorporate additional AI technology in future products and services. As with many technological innovations, there are significant risks and challenges involved in maintaining and deploying these technologies, and there can be no assurance that the usage of such technologies will enhance our products or services or be beneficial to our business, including our efficiency and profitability. In addition, issues in the development and use of AI combined with an uncertain regulatory environment may result in reputational harm, liability, or other adverse consequences to our business operations. AI presents risks, challenges, and unintended consequences that could affect our adoption and use of this technology. AI technologies are complex and rapidly evolving. Further, bad actors around the world use increasingly sophisticated methods, including the use of AI, to engage in illegal activities involving the theft and misuse of personal information, confidential information, and intellectual property. While we aim to develop and use AI responsibly and attempt to identify and mitigate ethical and legal issues presented by its use, we may be unsuccessful in identifying and resolving issues before they arise. AI- related issues, deficiencies and / or failures could give rise to legal and regulatory actions, including with respect to proposed legislation regulating AI, damage our reputation or otherwise materially harm our business. 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; ~~and26 --~~ **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; ~~and27 --~~ **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 **to $ 354. 3 million for 2023** . 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 may not be able to successfully integrate the personnel, operations and technologies of the businesses** 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~~ **an** acquisition or preserve the operational synergies between our business units that we underwrite at the time of ~~the~~ **such** 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; ~~•~~ ~~28~~ ~~•~~ 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, **in 2023,** we **acquired Formedix Limited, which added a metadata repository and clinical data flow automation to our data platform. We** also ~~recently~~ acquired ~~Vyasa Analytics~~ **Applied Biomath** , ~~which provides~~ a ~~novel deep learning AI- powered platform for organizations~~ **company focused on quantitative systems pharmacology (QSP)** to ~~integrate~~ **expand** and **complement our existing QSP capabilities** ~~analyze content across enterprise data landscape~~ . The planned integration of ~~the~~ **these businesses** ~~Vyasa technology~~ into our existing ~~software products~~ - **product offerings** may be delayed or may not achieve ~~sufficient market acceptance to justify~~ the **expected** ~~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~~ **results** ~~, 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 **Total Available Market ("** 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, **2023 and** 2022 ~~and 2021~~, **27 % and** 26 ~~% and 29~~ %, respectively, of our revenues were transacted in foreign currencies, the majority of which included the British ~~pound~~ **Pound** ~~sterling~~ **Sterling**, the ~~euro~~ **Euro** and Japanese ~~yen~~ **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~~ **conflicts** between Russia and Ukraine **in Europe and Israel and Hamas in the Middle East** ~~poses~~ **pose** any immediate material impact to our business, if the conflict intensifies or expands beyond Ukraine **or Gaza**, 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 ~~29or~~ **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 ~~30financial~~ **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 **each of** the years ended December 31, **2023 and** 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. ~~31We~~ **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~~ **2023**, we had cash and cash equivalents of $ ~~236~~ **235**. ~~6~~ **0** 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~~ **2023** were $ ~~409~~ **402** . ~~0~~ **3** million compared to bookings of $ ~~341~~ **409** . ~~7~~ **0** million for the year ended December 31, ~~2021~~ **2022** . ~~Although~~ **While bookings decreased in 2023 compared to 2022,** an increase **or decrease** in bookings will generally result in an increase **or decrease** 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 ~~32particular~~ -- **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. **effective avenue for developing new business.If** ~~employees and cause extensive absences from work,which may delay the completion of internal projects and lower~~ our **scientists and** ~~consultant~~ **consultants are** ~~utilization rates.Even if we follow what we believe to be best practices,we may~~ not ~~be~~ able to **effectively communicate and interact with** ~~prevent the transmission of disease between employees.Any incidents of actual or~~ **our existing** ~~perceived transmission may expose us to liability claims~~ and ~~adversely~~ **potential customers remotely,a prolonged period of limited direct contact with customers could translate into reduced bookings and negatively** impact **our revenue generation** ~~employee productivity and morale~~ .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** Risks Related to Intellectual Property, Information Technology and Data ~~PrivacyWe~~ -- **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 **flexible work arrangements** ~~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. ~~33Our~~ **Some of 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~~ **R & D** 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, **cybersecurity threats are constantly evolving, are becoming more frequent and more sophisticated and are being made by groups of individuals with a wide range of expertise and motives, which increases the difficulty of detecting and successfully defending against them. Accordingly,** 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~~ -- **exposes us** 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 ~~34bring~~ -- **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 ~~35as~~ **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. **There is** ~~Recent legal developments in Europe have created complexity and~~ uncertainty regarding transfers of personal data from the EEA to the United States, **including regarding** ~~e. g., on July 16, 2020,~~ the ~~Court~~ **status and enforceability** 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 **Court of Justice of the European Union (** 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. ~~36We 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 ~~37technology~~ **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 ~~IndebtednessOur~~ **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~~ **2023**, we had $ ~~297~~ **294**. 5 million in total borrowings under our credit agreement, originally dated July 15, 2017, as amended (" Credit Agreement "). As of December 31, ~~2022~~ **2023**, 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. ~~38Servicing~~ -- **Servicing** our debt requires a significant amount of cash. For the years ended December 31, **2023 and** 2022 ~~and 2021~~, we used operating cash of $ **27. 4 million and $** 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 ~~39the~~ -- **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~~ **, which** 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 ~~ResultsImpairment~~ **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~~ **During the third**

**quarter** of **2023, we performed an interim goodwill impairment test, which resulted in a $ 47. 0 million goodwill impairment charge. For the year ended** December 31 **. As each of December 31** , **2023 and** 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~~ **2023** , we had federal and state NOLs of approximately $ 1. ~~8~~ **6** million and $ 0. ~~05~~ **04** million, respectively, which are available to reduce future taxable income and expire between ~~2024~~ **2035** 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~~ **3** million **and $ 0** ~~with indefinite carryover period~~ , **respectively,** ~~which are available~~ to offset future income taxes **, which expire between 2027 and 2028** . We also had foreign tax credits of approximately $ ~~10~~ **13** . ~~6~~ **8** million, which will start ~~to~~ **t, o** 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~~ **81** . **6** ~~8 million which began to expire in 2022, foreign research and development credits of $ 0. 4~~ million which will start to expire in **2024, foreign R & D credits of $ 0. 3 million which expire in** 2029, and Canadian investment tax credits of approximately $ 3. ~~5~~ **8** million which ~~will~~ expire **between** ~~if unused in years 2030~~ **2031** ~~through~~ **and** ~~2040~~ **2041** . 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~~ **2023** through December 31, ~~2022~~ **2023** and determined **no** ~~that an~~ ownership change ~~did not occur~~ **occurred** during this period. In addition, we ~~40determined~~ -- **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 ~~StockWe~~ -- **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~~ **2023** , shares controlled by Arsenal and our officers and directors in aggregate represented approximately ~~25~~ **24** . ~~3~~ **9** % of our outstanding common stock. Although Arsenal agreed with **us** ~~the Company~~ not to sell any of the shares acquired by EQT for a ~~2~~ **two** - year period (with certain limited exceptions or without ~~the~~ **our** ~~41written~~ -- **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~~ **2023** , a total of ~~19~~ **15** , ~~460~~ **454** , ~~378~~ **916** 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 **our** ~~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- ~~42outstanding~~ **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~~ **2023** , Arsenal owns or controls approximately 22. ~~8~~ **7** % 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. 43Our -- **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. 44General Risk FactorsOur 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. 45These 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~~ 