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

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2018

or

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

Commission file number 001-38263

ALTAIR ENGINEERING INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

38-2591828
(I.R.S. Employer
Identification No.)

1820 East Big Beaver Road, Troy, Michigan
(Address of principal executive offices)

48083
(Zip Code)

248-614-2400

(Registrant's telephone number, including area code)

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

Class A Common Stock, \$0.0001 par value per share
(Title of each class)

The NASDAQ Stock Market LLC
(Name of exchange on which registered)

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

None
(Title of class)

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

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

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

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

Indicate by a check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in PART III of this Form 10-K, or any amendment to this Form 10-K.

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

Large accelerated filer
Non-accelerated filer

Accelerated filer
Smaller reporting company
Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

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

The aggregate market value of the voting and non-voting common stock held by non-affiliates of the registrant, based upon the closing sale price of a share of the registrant's Class A common stock on June 29, 2018, the last business day of the registrant's most recently completed second fiscal quarter, as reported on the NASDAQ stock market, was \$1.2 billion. Shares of the registrant's Class A common stock and Class B common stock held by each executive officer, director, and each other person who may be deemed to be an affiliate of the registrant, have been excluded from this computation. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

On February 15, 2019, there were 38,507,315 shares of the registrant's Class A common stock outstanding and 32,170,732 shares of the registrant's Class B common stock outstanding.

Documents Incorporated By Reference:

Portions of the registrant's Proxy Statement relating to the 2019 Annual Meeting of Stockholders, scheduled to be filed with the Securities and Exchange Commission within 120 days after the end of the registrant's fiscal year ended December 31, 2018, are incorporated by reference into Part III of this Annual Report on Form 10-K.

ALTAIR ENGINEERING INC.
Annual Report on Form 10-K for the Fiscal Year Ended December 31, 2018
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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This annual report on Form 10-K contains forward-looking statements made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 under Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Forward-looking statements include statements with respect to our beliefs, plans, objectives, goals, expectations, anticipations, assumptions, estimates, intentions and future performance, and involve known and unknown risks, uncertainties and other factors, which may be beyond our control, and which may cause our actual results, performance or achievements to be materially different from future results, performance or achievements expressed or implied by such forward-looking statements. All statements other than statements of historical fact are statements that could be forward-looking statements. You can identify these forward-looking statements through our use of words such as “may,” “can,” “anticipate,” “assume,” “should,” “indicate,” “would,” “believe,” “contemplate,” “expect,” “seek,” “estimate,” “continue,” “plan,” “point to,” “project,” “predict,” “could,” “intend,” “target,” “potential” and other similar words and expressions of the future.

There are a number of important factors that could cause the actual results to differ materially from those expressed in any forward-looking statement made by us. These factors include, but are not limited to:

- our ability to acquire new customers because of the difficulty in predicting our software sales cycles;
- reduced spending on product design and development activities by our customers;
- our dependence on annual renewals of our software licenses;
- our ability to maintain or protect our intellectual property;
- our ability to retain key executive members;
- our ability to internally develop new inventions and intellectual property;
- our ability to successfully integrate and realize the benefits of our past or future strategic acquisitions or investments;
- demand for our software by customers other than simulation engineering specialists and in additional industry verticals;
- acceptance of our business model by investors;
- our ability to integrate companies that we have acquired or may acquire in the future;
- our susceptibility to factors affecting the automotive and financial services industries where we derive a substantial portion of our revenues;
- the accuracy of our estimates regarding expenses and capital requirements;
- our susceptibility to foreign currency risks that arise because of our substantial international operations; and
- the significant quarterly fluctuations of our results.

The foregoing does not represent an exhaustive list of matters that may be covered by the forward-looking statements contained herein or risk factors that we are faced with that may cause our actual results to differ from those anticipated in our forward-looking statements. Please see “Risk factors” in this Annual Report on Form 10-K under Part I, Item 1A, for additional risks which could adversely impact our business and financial performance.

All forward-looking statements are expressly qualified in their entirety by this cautionary notice. You are cautioned not to place undue reliance on any forward-looking statements, which speak only as of the date of this report or the date of the document incorporated by reference into this report. We have no obligation, and expressly disclaim any obligation, to update, revise or correct any of the forward-looking statements, whether as a result of new information, future events or otherwise. We have expressed our expectations, beliefs and projections in good faith and we believe they have a reasonable basis. However, we cannot assure you that our expectations, beliefs or projections will result or be achieved or accomplished.

PART I

Item 1. Business

General

Altair Engineering Inc. (“Altair,” the “Company,” “we,” “us” or “our”) is a global technology company providing software and cloud solutions in the areas of product design and development, high performance cloud computing, and data intelligence. We enable organizations across broad industry segments to compete more effectively in a connected world while creating a more sustainable future.

Our simulation-driven approach to innovation is powered by our broad portfolio of high-fidelity and high-performance physics solvers. Our integrated suite of software optimizes design performance across multiple disciplines encompassing structures, motion, fluids, thermal management, electromagnetics, system modeling, and embedded systems, while also providing data intelligence and true-to-life visualization and rendering. Our high-performance cloud computing solutions maximize the efficient utilization of complex compute resources and streamline the workflow management of compute-intensive tasks for applications including data intelligence, modeling and simulation, and visualization. Our data intelligence products include market leading data preparation, data science and visualization solutions that fuel engineering, scientific, and business decisions.

We believe a critical component of our success has been our company culture, based on our core values of innovation, envisioning the future, communicating honestly and broadly, seeking technology and business firsts, and embracing diversity. This culture is important because it helps attract and retain top people, encourages innovation and teamwork, and enhances our focus on achieving Altair’s corporate objectives.

Products

Rising expectations of end-market customers are causing expansion of the application of simulation and data intelligence across many industry verticals. Our engineering, simulation, and data intelligence software enables customers to enhance product performance, compress development time, and reduce costs. Altair’s thirty-year heritage is in solving some of the most challenging problems faced by engineers and scientists.

We believe we are unique in the industry for the depth and breadth of our engineering application software offerings combined with our domain expertise and proprietary technology for harnessing high-performance computing, or HPC and cloud infrastructures along with data intelligence.

Altair is a leading provider of modeling, visualization, and physics solver solutions with a broad portfolio of best-in-class technology across many engineering disciplines. Our simulation software offers manufacturing companies opportunities to achieve better, lower cost products with fewer physical prototypes and tests, and reduces the time required to bring products to market.

We are a leading provider of data intelligence technology for data preparation, management and analysis. Financial services organization, such as banks, credit unions, and health care companies, as well as finance departments in various industries, including manufacturing, use our software to capture disparate data streams and apply analytics to make more informed business decisions.

We are a leading provider of high-performance and cloud computing workflow tools which empower customers to explore designs and analyze data in ways not possible in traditional computing environments. Our customers include Universities, government agencies, manufacturers, pharmaceutical firms, weather prediction agencies, and electronics design companies.

Software Products

Altair’s software products represent a comprehensive, open architecture solution for simulation, data intelligence and cloud computing to empower decision making for improved product design and development, manufacturing, energy management and exploration, financial services, health care, and retail operations. We believe our products offer a comprehensive set of technologies to design and optimize high performance, efficient, innovative and sustainable products and processes in an increasingly connected world. Our products are categorized by:

- Design, Modeling & Visualization;
- Physics Simulation;
- Data Intelligence;
- High Performance Cloud Computing; and

- Internet of Things, or IoT.

Design, Modeling & Visualization

Altair’s design, modeling & visualization tools under the HyperWorks and solidThinking brands allow for advanced physics attributes to be modeled and rendered on top of object geometry in high fidelity. These tools are becoming more design-centric and relevant earlier in the development process. Our industrial & concept design tools generate early concepts to address requirements for ergonomics, aesthetics, performance, manufacturing feasibility, and cost. These tools are all driven by simulation and machine learning algorithms. We believe these products are emerging as a market force with the potential to eclipse traditional computer-aided design, or CAD.

Physics Simulation

At the core of Altair’s simulation software portfolios under the HyperWorks and solidThinking brands are mathematical software “solvers” that use advanced computational algorithms to predict physical performance. Optimization leverages these solvers to derive the most efficient solutions to meet desired complex multi-objective requirements.

Altair’s solvers are a comprehensive set of fast, scalable and reliable physics algorithms for complex problems in linear and non-linear mechanics, fluid dynamics, electromagnetics, motion, systems and manufacturing simulation.

Altair’s optimization technology combined with superior multi-physics and multi-domain simulation is a key differentiator and spans our product offering. We believe customers using our technologies gain a sustainable competitive advantage by developing better products in less time.

Data Intelligence

Altair’s data intelligence offering under the Knowledge Works brand includes market leading data preparation, data science and visualization solutions that fuel engineering, scientific, and business decisions. Our data preparation tools allow users to import, clean and organize structured and unstructured data for use in reporting and in data science applications. Our data science solutions allow users to develop machine learning work flows with best-in-class decision tree technology and scoring algorithms, and our visualization tools allow users to gain deep insights quickly with both live-streamed and historical data.

Today, Altair’s data intelligence tools are extensively used by banks, credit unions, health care, and other financial services organizations. They are also used in finance departments across many industries, including manufacturing.

There is growing demand for this technology in engineering to improve designs and processes, and to manage sensor data coming from live physical assets in the field. Going forward, development lifecycles will include digital replicas of complex processes, services and physical assets and systems, or what is known as “digital twins”. Use of digital twins will enable developers to integrate simulation and data intelligence to optimize product design and in-service operational performance. The convergence of simulation and machine learning is essential to creating better products, marketing them efficiently, and optimizing their in-service performance.

High-Performance Cloud Computing

Altair’s High-Performance Cloud Computing software applications, under the brand PBS Works, are designed to maximize the efficient utilization of complex compute resources and streamline the workflow management of compute-intensive tasks. Applications include data intelligence, modeling and simulation, and visualization in fields such as financial services, weather prediction, bio-informatics, electronic design analysis, product development and lifecycle management.

As predictive modeling and analysis are increasingly computationally intensive, and as computing environments become a mix of on-premise and cloud resources, Altair’s high-performance tools to manage and optimize where and when jobs are running are essential for customers and research organizations. Our powerful and easy to use solutions help IT administrators and business decision makers maximize throughput and minimize costs by leveraging sophisticated scheduling algorithms, enabling bursting to the cloud (or enabling applications to run on external data center resources to supplement internal data center capabilities), shifting workloads between different cloud providers depending on cost or resource availability and managing spot computing purchases.

Internet of Things

Altair offers tools under the SmartWorks brand to help customers develop connected products, including device enablement, data capture and management, edge computing, digital twins, data visualization, and predictive/ prescriptive analytics. Our software is used to design and optimize IoT devices and connectivity, and for modeling in-service product performance.

We believe Altair’s digital twin solutions are unique for their openness, usability, and ability to develop signal-based controls, mixed physics models, and electronics all within one environment and at varying levels of fidelity to support decision making in each stage of a product’s lifecycle. To support this, models need to be multi-disciplinary and may include mechanics, fluids, electronics, and software among other technical elements, and must encompass a scope of products ranging from components to IoT-enabled “systems of systems”. Varying degrees of fidelity aid the modeling process where computational requirements or data availability might otherwise prove to be obstacles.

We believe a key strength to Altair’s math and systems solutions is allowing development organizations to move seamlessly in this multi-discipline, multi-component, multi-detail space while integrating models from various authoring tools. With a broad range of multi-physics solvers based on an open-system approach, a strong set of model reduction techniques can be employed toward IoT-enabled product development which can then be carried forward into device management and application development.

Altair Partner Alliance

The Altair Partner Alliance, or APA, currently only available under the HyperWorks brand, provides access to a broad spectrum of complementary software products using customers’ existing HyperWorks Units, our units-based subscription licensing model which allows flexible and shared access to our offerings. They can download and use partner product applications on-demand. This constantly growing portfolio extends their simulation and design capabilities to help create better products faster.

Software products in the APA include technologies ranging from computational fluid dynamics and fatigue to manufacturing process simulation and cost estimation, with applications specific to industry verticals including marine, motorcycles, aerospace, chemicals, and architecture. Altair plans to continue to add valuable third-party software solutions to empower innovation with comprehensive enterprise analytic and data intelligence tools.

Software Related Services

To ensure customer success and deepen our relationships with them, we engage with our customers to provide services related to our software including consulting, training, and implementation services, especially when applying optimization and data science. Altair’s headquarters includes an industrial design studio, a prototype shop, and test facilities. We have expertise designing and working with controls, power electronics, traditional and composite structures, and total system level development in the automotive, aerospace, consumer products and other markets. Our team of data scientists is experienced with applications ranging from credit scoring to predictive analytics of physical assets.

Implementation and custom software services are available to help customers leverage their investment in Altair’s software to streamline workflows and solve specialized industry vertical engineering and business problems. We work closely with our clients to increase organizational efficiency and decision making by tailoring these solutions to a client’s own environment and processes.

We believe the unique combination of our broad industry domain knowledge and software expertise has enabled Altair to enhance and replace customers’ legacy applications, integrate our software applications with client business systems, develop clean-sheet designs or custom software solutions, and transform their product development and business processes.

Client Engineering Services

Altair provides Client Engineering Services, or CES, to support our customers with long-term ongoing expertise. This has the benefit of embedding us within customers, deepening our understanding of their processes, and allowing us to more quickly perceive trends in the overall market. Our presence at our customers’ sites helps us to better tailor our software products’ research and development, or R&D, and sales initiatives.

We operate our CES business by hiring engineers and data scientists for placement at a customer site for specific customer-directed assignments. We employ and pay them only for the duration of the placement.

We concentrate on placing simulation specialists, industrial designers, design engineers, materials experts, development engineers, manufacturing engineers and information technology specialists. As a leader in the simulation and data science technology markets, Altair attracts high caliber talent from around the world. CES is focused on placements that align strategically with customer usage of our software. We have a strong recruiting operation with sourcing specialists who identify, attract, vet, and hire technical professionals for our in-house and customer needs. We maintain a candidate database of over 80,000 highly qualified engineers, designers and data scientists. Our CES candidates and placed employees are valuable sources of talent acquisition for Altair’s other business segments.

Research and Development

Our research and development efforts are focused on enhancing the functionality, breadth and scalability of our software, addressing new use cases, and developing additional innovative simulation technologies. Timely development of new products is essential to maintaining our competitive position, and we release new versions of our software on a regular basis.

Customer feedback, combined with our roadmap, enables us to deliver long-term value and stay ahead of market trends. The majority of product enhancements and new capabilities added to our platform over the years have been developed internally, with acquisitions used to augment our capabilities with strategic technology.

From time-to-time, we incubate related technologies developed by our employees. For example, we developed and patented next-generation solid-state lighting technology as a result of an internal initiative. We commercialized this technology under our toggled subsidiary, which generated \$7.5 million in revenue for the year ended December 31, 2018. WEYV, a mobile application that brings our patented units-based business model to digital content distribution and delivery, was released commercially in December 2017.

Our research and development initiatives foster a culture of innovation within the organization, helping us attract and retain a highly motivated team. Altair's research and development team consists of approximately 1,050 people worldwide. We maintain research and development centers with specific technical expertise in several geographies throughout the Americas, Asia-Pacific, Europe, the Middle East and Africa.

Our research and development efforts relating to our software focus on five areas:

- **Design, Modeling & Visualization:** The graphical applications used to construct and visualize simulation models require continuous R&D in the areas of data structures, computational methods, graphics, geometric modeling, mesh generation, and user interface design. Altair's modeling tools are becoming more design-centric and are adopting some of the capabilities of traditional CAD while leveraging simulation and optimization technology to drive design decisions rather than just simulate designs. Specific areas of R&D include handling large scale models of highly detailed and complex products, developing new methods to derive design geometry from optimizations, and unifying the modeling environment for multi-physics simulation. Adapting modeling and visualization technology for cloud deployment is also an area of active development as is supporting virtual and augmented reality hardware. Simulation-driven design requires tools to generate early concepts addressing requirements for ergonomics, aesthetics, performance, and manufacturing feasibility. We believe these tools are emerging as a market force eclipsing traditional CAD, and are key to the democratization of simulation capabilities across large groups of designers and engineers who are not simulation specialists.
- **Physics Simulation:** At the core of Altair's simulation software portfolio are mathematical software "solvers" that use advanced computational algorithms to predict physical performance. Altair initially specialized in structural simulation, and now we continuously develop our portfolio of solvers to simulate fluid dynamics, high and low frequency electromagnetics, mechanical systems, electronic controls and more. Altair also invests to "couple" our solvers to simulate multiple physics domains simultaneously, and is considered a world leader in the development of optimization technology, which drives solvers to find solutions to complex multi-objective design problems. R&D is also conducted to leverage high-performance computing technology for these compute intensive applications. Solver and optimization development is conducted by researchers with advanced degrees in engineering, physics, computer science and mathematics.
- **Data Intelligence:** Altair's offering includes market leading data preparation, data science and visualization solutions that fuel engineering, scientific, and business decisions. We develop and release new software on a regular basis to support existing data intelligence customers with enhancements and other requested features and technologies for data preparation, data science and visualization. We continue to invest aggressively to evolve our best-in-class decision tree technology, scoring algorithms, streaming, and visualization. In addition, we are integrating all of our data intelligence capabilities into a modern, cloud-based solution to deliver a more unified user experience for our users. This solution includes important enterprise level capabilities such as security, data discovery, collaboration, and operationalization of user developed machine learning work flows to gain deep insights quickly.
- **High-Performance Cloud Computing:** Altair's High-Performance Cloud Computing software applications are designed to maximize utilization of complex compute resources and streamline the workflow management of compute-intensive tasks for applications such as data intelligence, modeling and simulation, and visualization in fields such as financial services, weather prediction, bio-informatics, electronic design analysis, product development and lifecycle management.

Altair develops best-in-class HPC workload management technology for large scale, highly parallel job environments as well as solutions for chip design workloads which require massive numbers of jobs to be spawned and managed for relatively short durations on single core machines. We are exploring the application of the same technology developed for electronic design automation industry, or EDA, workloads to significantly impact financial technology, or fintech, computing as these compute environments have similar profiles.

We develop solutions for both CPU and GPU architectures and support all of the major computer vendors. This requires ongoing collaboration with hardware suppliers who depend on our solutions to make their products run efficiently for customers.

Much of our more recent R&D investments allow customers to easily move and manage workflows in hybrid compute environments of on-premise and cloud resources.

Altair's HPC development teams work closely with the simulation, data intelligence and IoT development teams to ensure that our overall technology portfolio interoperates effectively and shares a common infrastructure and user experience.

- **Internet of Things:** Altair offers tools to help customers develop connected products, including device enablement, data capture and management, edge computing, digital twins, data visualization, and predictive/ prescriptive analytics. Our software is used to design and optimize IoT devices and connectivity, and for modeling in-service product performance. We are investing to deliver an end-to-end solution for customers developing connected products. We believe our products operate well as a complete and integrated suite, and are open such that they are designed to work seamlessly with other IoT or data intelligence solutions in a disaggregated fashion.

Our digital twin platform supports product development for the IoT through a math-based programming environment, multi-disciplinary system modeling, and control system development, and is an important ongoing research and development effort. We support our own high-level matrix-based numerical computing language, as well as more commonly used general purpose programming languages, like Python and Tcl, in an interactive programming environment for all types of math operations. We expect to add more language and library support, broaden the math libraries, and integrate these products more deeply with Altair's other software.

In order to maintain and extend our technology leadership and competitive position, we intend to continue devoting significant effort to our research and development activities.

Sales

We serve customers in the product lifecycle management, simulation, data intelligence, and high-performance cloud computing markets. Our primary users are highly educated and technical engineers and data scientists.

HyperWorks and solidThinking

Under our HyperWorks brand, we engage with our enterprise customers through Altair's experienced direct sales force, especially in industries requiring highly engineered products, such as automotive, aerospace, heavy machinery, rail and ship design. Under our solidThinking brand, we are increasing our use of indirect channels to more efficiently address a broader set of customers in consumer products, electronics, energy and other industries.

Approximately 90% of our 2018 software revenue was generated through our direct global sales force. These sales teams interact with key decision makers, engage deeply with users of our products by leveraging a team of Altair's technical specialists, and work with user-group managers and executives to ensure they are maximizing the utility of our software solutions. We have been expanding our direct sales team including our inside sales operations aggressively to reach more customers and market verticals.

Our direct sales force is responsible for developing new customers, ensuring high recurring rates from our existing customers, and expanding the use of Altair and partner products within customers' environments through continuous training, support, and consulting engagements. Each of our field sales professionals are supported by technical specialists with deep knowledge of our products and the broader product development domain. We believe this approach differentiates Altair from our competitors, as our focus on establishing a strong working relationship with the user community has led to expanded usage of Altair and APA partner products. Our direct sales force is organized by geographic regions, consisting of Americas, EMEA, and APAC.

We leverage strong indirect sales channels especially in APAC and Eastern Europe and have been investing to extend our reseller relationships in all markets by offering a subset of our products focused on industrial design, concept engineering, manufacturing feasibility, and model-based design under solidThinking. solidThinking targets designers, engineers and architects at small and

medium enterprises. Approximately 10% of our 2018 software revenue was generated through our growing network of indirect channel partners and resellers.

Knowledge Works

There is segmentation in the data intelligence space by industry verticals where specific domain expertise is important for success. Altair's primary data intelligence customer base is banks, credit unions, health care, and other financial services organizations along with finance departments across most industries including manufacturing. As we cross sell into Altair traditional manufacturing customer accounts, we are targeting both the finance departments, leveraging the expertise of our financial markets sales and technical teams, as well as engineering departments looking to apply data intelligence to improve designs, manufacturing, and in-service operations. We intend to leverage our existing direct and indirect sales channels in order to support greater market opportunities.

High Performance Cloud Computing Solutions

Altair's HPC solutions are sold by our global strategic sales force with sales overlay support from Altair HPC sales specialists and application engineers. We have original equipment manufacturer, or OEM, arrangements for these solutions with most of the major hardware companies when they sell new computer systems. We believe these arrangements reduce competition, grow our market share and improve sales efficiency.

We offer Altair PBS Professional as both an open source and a commercial solution. Commercial sites generally license the commercial version along with support. However, many universities, government agencies and small commercial sites prefer the open source version as their work often needs to be freely available for societal benefit. Large government and research installations generally still purchase support and often pay for specific development.

Licensing

There are two licensing methods we employ to deliver our software solutions:

- Most products are available under our unique, patented units-based licensing model.
- A small subset of our products is available on a node-locked, or hardware specific, and named-user basis. This is especially true for our data intelligence solutions.

Altair pioneered a patented units-based subscription licensing model for software and other digital content. This units-based subscription licensing model allows flexible and shared access to our offerings, along with over 150 partner products. Our HyperWorks customers license a pool of units for their organizations giving individual users access to our entire portfolio of software applications as well as our growing portfolio of partner products. Our primarily mid-market solidThinking customers have access to a subset of the portfolio at a lower price point. We believe our units-based subscription licensing model lowers barriers to adoption, creates broad engagement, encourages users to work within our ecosystem, and increases revenue. This, in turn, helps drive our recurring software license rate which has been on average approximately 88% over the past five years. Each year approximately 60% of new software revenue comes from expansion within existing customers.

Marketing

Altair's global marketing team of approximately 70 people is focused on generating new business opportunities by driving awareness, deepening customer engagement, and developing content specific to technical fields and industry verticals. Our corporate marketing programs include social media, earned media, publications, blogs, white papers and case studies. Our regional marketing program supports working relationships with our user community through education, participation in local industry events, Altair technical conferences, and webinars.

We provide marketing support to our ecosystem of resellers and third-party technology partners on both a corporate and regional level.

In 2018 our online activities included approximately:

- 397,000 resource library video views;
- 39,000 self-service training sessions;
- 36,000 webinar registrations;
- 47,000 software downloads;
- 3.1 million website visitors; and

- 109,000 social media followers.

Approximately 8,300 users and prospects attended Altair's user conferences in 2018.

In order to continue to drive growth and extend our market position, we intend to continue to invest significant resources into our marketing initiatives.

Customers

As of December 31, 2018, we had tens of thousands of users across more than 8,000 customers worldwide. Our product lifecycle management, or PLM, customers are primarily large manufacturing enterprises, with a growing presence in small and mid-size companies and markets beyond manufacturing including Architecture/Engineering/Construction, or AEC, energy, life and earth sciences, and government entities. Our data intelligence customers include banks, credit unions, health care, and other financial services organizations along with finance departments across most industries including manufacturing.

Automotive and aerospace combined account for over 50% of our 2018 billings, including 15 out of 15 of the world's leading automotive manufacturers and 10 out of 10 of the world's leading aerospace manufacturers. Other important industries include heavy machinery, rail and ship design, energy, government, life and earth sciences, and consumer electronics. No single customer, nor any of our approximately 300 resellers and OEMs, accounted for more than 2% of our 2018 billings. In 2018, we generated 35%, 33% and 32% of our total billings from customers in the Americas, EMEA, and APAC, respectively. Billings consists of our total revenue plus the change in our deferred revenue, excluding deferred revenue from acquisitions during the period, and is discussed under *Key metrics* included in Part II, Item 6, Selected Financial Data of this Annual Report on Form 10-K.

For a summary of our financial information by geographic location, see Note 20 of Notes to consolidated financial statements in Item 15, Part IV of this Annual Report on Form 10-K, which is incorporated by reference.

Competition

The market for simulation software is highly fragmented but has been undergoing significant consolidation. Our primary competitors include Dassault Systèmes, Siemens, Ansys and MSC Software, a Hexagon company. All are large public companies, with significant financial resources. Dassault and Siemens have historically focused on CAD and product data management and have been investing in simulation software via acquisitions. Ansys and MSC are focused on simulation. In addition to these competitors, we compete with many smaller companies offering simulation software applications.

The market for data intelligence is large and generally very horizontal in nature. The company to whom Altair's data intelligence solutions are most often compared to is Alteryx, a publicly traded company. There are other competitors in the data preparation and data science markets including SAS and several who received significant venture capital infusions.

We believe the breadth and depth of Altair's software offering is unique and no single competitor addresses our entire solution set. The units model further extends this advantage with a growing APA marketplace of third party software.

Our simulation solutions including modeling, visualization and solvers are noted in the market for their ability to handle large and complex models. Our software applications deliver high performance and high scalability, including massive parallelization, which is extremely important in the high-end simulation market. Altair is a leader in integrating optimization technology across all our products, including multi-disciplinary applications.

We believe our solutions for data preparation are extremely strong and broadly adopted and have several unique capabilities including handling large, complex data sets coupled with our ability to intelligently import unstructured data. Our data science solutions are also considered easy to use and powerful. The market is converging toward integrated data prep and data science solutions, and we are well positioned for this future.

To ensure customer success and deepen our relationships with them, we engage with our customers to provide consulting, implementation services, training, and support, especially when applying optimization. We believe these services, combined with our ability to leverage HPC as the industry transitions to cloud computing, positions us for future success.

We compete on a variety of factors including the breadth, depth, performance, and quality of our technical solutions. We believe our patented units-based subscription licensing model provides us with a competitive advantage by lowering barriers to adoption, creating broad engagement, and encouraging users to work within our ecosystem.

Intellectual property

We believe that our intellectual property rights are valuable and important to our business. We actively protect our investment in technology through establishment and enforcement of intellectual property rights. We protect our intellectual property through a combination of patent, copyright, trademark and trade secret protections, confidentiality procedures, and contractual provisions. The nature and extent of legal protection associated with each such intellectual property right depends on, among other things, the type of intellectual property right and the given jurisdiction in which such right arises.

As of December 31, 2018, we have 209 issued patents and more than 76 published patent applications worldwide. These patents and patent applications seek to protect proprietary inventions relevant to our business. We intend to pursue additional patent protection to the extent we believe it would be beneficial and cost effective. Additionally, we are the registered holder of a variety of trademarks and domain names that include “Altair” and similar variations.

Nonetheless, our intellectual property rights may not be successfully asserted in the future or may be invalidated, circumvented or challenged. In addition, the laws and enforcement of the laws of various countries where our products are distributed do not protect our intellectual property rights to the same extent as United States laws. Our inability to assert or enforce our intellectual property rights could harm our business.

From time to time, we receive claims alleging infringement of a third party’s intellectual property rights, including patents. Disputes involving our intellectual property rights or those of another party have in the past and may in the future lead to, among other things, costly litigation, diversion of time, money and resources to develop or obtain non-infringing products, or delay product distribution. Any significant impairment of our core intellectual property rights could harm our business or our ability to compete.

Our products are licensed to users pursuant to signed license agreements or ‘click through’ agreements containing restrictions on use, duplication, disclosure, and transfer. Cloud based products and associated services are provided to users pursuant to online or signed terms of service agreements containing appropriate restrictions on access and use.

We are unable to measure the full extent to which piracy of our software products exists. We believe, however, that software piracy is and can be expected to be a persistent problem that negatively impacts our revenue and financial results. We believe that our predominant subscription based business model combined with the change from desktop to cloud based computing will shift the incentives and means by which software is pirated.

In addition, through various licensing arrangements, we receive certain rights to intellectual property of others. We expect to maintain current licensing arrangements and to secure additional licensing arrangements in the future, as needed and to the extent available on reasonable terms and conditions, to support continued development and sales of our products and services. Some of these licensing arrangements require or may require royalty payments and other licensing fees. The amount of these payments and fees may depend on various factors, including but not limited to: the structure of royalty payments, offsetting considerations, if any, and the degree of use of the licensed technology.

Employees

As of December 31, 2018, we had over 2,500 in-house employees and over 350 on-site Client Engineering Service employees globally. Over two-thirds of our employees are located in the United States, India, France, Germany and China. None of our employees in the United States are represented by a labor organization or are party to any collective bargaining arrangement. In certain of the European countries in which we operate, we are subject to, and comply with, local labor law requirements in relation to the establishment of works councils. We are often required to consult and seek the consent or advice of these works councils. We have never experienced a work stoppage and we believe our employee relations are good.

Acquisitions

We acquired 25 companies or strategic technologies since 1996, including 17 in the last four years. These acquisitions brought strategic IP assets, and approximately 300 developers with expertise in disciplines ranging from electronics, material science, crash and safety to industrial design and rendering. Products which are commercially available as a result of these acquisitions include Click2Extrude, Altair PBS Professional, Radioss, Evolve, Acusolve, SimLab, Embed, Click2Cast, Multi-scale Designer, FEKO, FLUX, WinProp, Thea Render, Modeliis, SmartWorks, ESAComp, SimSolid, Monarch, Knowledge Studio and Panopticon.

Our 2018 acquisitions include the following:

- *Datawatch*: In December 2018, we acquired Datawatch Corporation, a provider of data intelligence software with market leading enterprise data preparation, predictive analytics and visualization solutions that fuel business analytics

- *Simsolid*: In October 2018, we acquired Simsolid, a company with software technology that works on full-fidelity CAD assemblies to provide fast, accurate, and robust structural simulation without requiring geometry simplification, cleanup, or meshing.
- *FluiDyna*: In May 2018, we acquired Germany-based FluiDyna GmbH, a renowned developer of NVIDIA CUDA and GPU-based Computational Fluid Dynamics, or CFD, and numerical simulation technologies in whom Altair made an initial investment in 2015. FluiDyna's simulation software products ultraFluidX and nanoFluidX have been available to Altair's customers through the APA and also offered as standalone licenses.
- *CANDI Controls*: In May 2018, we acquired all of the intellectual property assets of California-based CANDI Controls, Inc. and hired CANDI's experienced software and technology team into Altair's organization to strengthen and expand the scope of its IoT solution offerings. Founded in 2009 with significant start-up capital, CANDI developed a modern platform which supports multiple data protocols for edge gateway computers to communicate with a constellation of IoT devices.

For further information about our acquisitions, see Note 4 of the Notes to consolidated financial statements in Item 15, Part IV of this Annual Report on Form 10-K.

Seasonal variations

We have experienced and expect to continue to experience seasonal variations in the timing of customers' purchases of our software and services. Many customers make purchase decisions based on their fiscal year budgets, which often coincide with the calendar year. These seasonal trends materially affect the timing of our cash flows, as license fees become due at the time the license term commences based upon agreed payment terms that customers may not adhere to. As a result, new and renewal licenses have been concentrated in the first and fourth quarter of the year, and our cash flows from operations have been highest late in the first quarter and early in the second quarter of the succeeding fiscal year.

Backlog

We generally enter into single year term-based software licensing subscription contracts for our solutions. The timing of our invoices to the customer is a negotiated term and thus varies among our subscription contracts. For multi-year agreements, it is common to invoice an initial amount at contract signing followed by subsequent annual invoices. At any point in the contract term, there can be amounts that we have not yet been contractually able to invoice. As we generally enter into single year subscription contracts for our platform, backlog is not significant.

Segments

We have identified two reportable segments: Software and Client Engineering Services. For additional information about our reportable segments, see Note 20 of the Notes to consolidated financial statements in Item 15, Part IV of this Annual Report on Form 10-K, which is incorporated by reference.

Corporate information

We were incorporated in Michigan in 1985 and became a Delaware company in October 2017. Our principal executive offices are located at 1820 E. Big Beaver Road, Troy, Michigan 48083.

Unless the context otherwise requires, the terms "Altair," "the Company," "we," "us" and "our" in this Annual Report on Form 10-K refers to Altair Engineering Inc. and its subsidiaries. The Altair design logo and the marks "OptiStruct," "RADIOSS," "AcuSolve," "FEKO," "Flux," "WinProp," "Multiscale Designer," "HyperStudy," "HyperMesh," "HyperView," "SimLab," "HyperCrash," "HyperGraph," "Inspire," "solidThinking Evolve," "Thea Render," "Click2Cast," "Click2Extrude," "Click2Form," "Carriots," "solidThinking Compose," "solidThinking Activate," "solidThinking Embed," "Altair PBS Works," "Altair PBS Professional," "Altair PBS Cloud," "MotionView," "MotionSolve," "Altair PBS Access," "SimSolid," "Knowledge Studio," "Monarch," "Panopticon" and our other registered or common law trade names, trademarks or service marks appearing in this Annual Report on Form 10-K are our property.

Available information

We file annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, proxy and information statements and amendments to reports filed or furnished pursuant to Sections 13(a), 14 and 15(d) of the Securities Exchange Act of 1934, as amended. The SEC also maintains a website at <http://www.sec.gov> that contains reports, proxy and information statements and other information regarding Altair Engineering Inc. and other companies that file materials with the SEC electronically. Copies of Altair's reports on Form 10-K, Forms 10-Q and Forms 8-K, may be obtained, free of charge, electronically through our internet website, <http://investor.altair.com> under the Financials tab.

Our website is www.altair.com. Investors and others should note that we announce material financial information to investors using press releases, SEC filings and public conference calls. The information contained on our website is not incorporated by reference into this Annual Report on Form 10-K or in any other report or document we file with the SEC.

Item 1A. Risk Factors

An investment in our Class A common stock involves a high degree of risk. You should carefully consider the risks and uncertainties described below, together with all the other information in this Annual Report on Form 10-K, including “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the consolidated financial statements and the related notes. If any of the following risks actually occurs, our business, reputation, financial condition, results of operations, revenue, and future prospects could be seriously harmed. Unless otherwise indicated, references to our business being seriously harmed in these risk factors will include harm to our business, reputation, financial condition, results of operations, revenue, liquidity and future prospects.

Risks relating to our business and industry

We have experienced significant revenue growth and we may fail to sustain that growth rate or may not grow in the future.

We were founded in 1985 and launched our first commercial software in 1990. Our growth has primarily been attributed to the increasing reliance of customers on our engineering and simulation technologies to enhance product performance, compress development time, and reduce costs. Revenue from our software segment has historically constituted a significant portion of our total revenue. Our revenue growth could decline over time as a result of a number of factors, including increasing competition from smaller entities and well-established, larger organizations, limited ability to, or our decision not to, increase pricing, contraction of our overall market, the manner in which the markets for our products, including our data intelligence products, evolve or our failure to capitalize on growth opportunities. Other factors include managing our global organization, revenues generated outside the United States that are subject to adverse currency fluctuations, uncertain international geopolitical landscapes and the acquisition of businesses which may grow more slowly than our business. Accordingly, we may not achieve similar growth rates in future periods, and you should not rely on our historical revenue growth as an indication of our future revenue or revenue growth.

If we cannot maintain our company culture of innovation, teamwork, and communication our business may be harmed.

We believe that a critical component to our success has been our company culture, which is based on our core values of innovation, envisioning the future, communicating honestly and broadly, seeking technology and business firsts, and embracing diversity. We have invested substantial time and resources in building a company embodying this culture. As we develop the infrastructure of a public company and continue to grow, we may find it difficult to maintain these valuable aspects of our corporate culture. Any failure to preserve our culture, or embed our culture in our acquired businesses, could negatively impact our future success, including our ability to attract and retain personnel, encourage innovation and teamwork, and effectively focus on and pursue our corporate objectives.

If our existing customers or users do not increase their usage of our software, or we do not add new customers, the growth of our business may be harmed.

Our software includes a multitude of broad and deep design, simulation, optimization, and analysis applications and functionalities.

Our future success depends, in part, on our ability to increase the:

- number of customers and users accessing our software;
- usage of our software to address expanding design, engineering, computing and analytical needs; and/or
- number of our applications and functionalities accessed by users and customers through our licensing model.

In addition, through our Altair Partner Alliance, or APA, our customers have access to additional software offered by independent third parties, without the need to enter into additional license agreements.

If we fail to increase the number of customers or users and/or application usage among existing users of our software and the software of our APA partners, our ability to license additional software will be adversely affected, which would harm our operating results and financial condition.

Our ability to acquire new customers is difficult to predict because our software sales cycle can be long.

Our ability to increase revenue and maintain or increase profitability depends, in part, on widespread acceptance of our software by mid- to large-size organizations worldwide. We face long, costly, and unpredictable sales cycles. As a result of the variability and length of the sales cycle, we have only a limited ability to forecast the timing of sales. A delay in or failure to complete sales could harm our business and financial results, and could cause our financial results to vary significantly from period to period. Our sales cycle varies widely, reflecting differences in potential customers' decision-making processes, procurement requirements, budget cycles and the specific software or products being purchased, and is subject to significant risks over which we have little or no control, including:

- longstanding use of competing products and hesitancy to change;
- customers' budgetary constraints and priorities;
- timing of customers' budget cycles;
- need by some customers for lengthy evaluations;
- hesitation to adopt new processes and technologies;
- length and timing of customers' approval processes; and
- development of software by our competitors perceived to be equivalent or superior to our software.

To the extent any of the foregoing occur, our average sales cycle may increase and we may have difficulty acquiring new customers.

Reduced spending on product design and development activities by our customers may negatively affect our revenues.

Our revenues are largely dependent on our customers' overall product design and development activities, particularly demand from mid- to large-size organizations worldwide and their supplier base. The licensing of our software is discretionary. Our customers may reduce their research and development budgets, which could cause them to reduce, defer, or forego licensing of our software. To the extent licensing of our software is perceived by existing and potential customers to be extraneous to their needs, our revenue may be negatively affected by our customers' delays or reductions in product development research and development spending. Customers may delay or cancel software licensing or seek to lower their costs. Deterioration in the demand for product design and development software for any reason would harm our business, operating results, and financial condition in the future.

Our business largely depends on annual renewals of our software licenses.

We typically license our software to our customers on an annual basis. In order for us to maintain or improve our operating results, it is important that our customers renew and/or increase the amount of software licensed on an annual basis. Customer renewal rates may be affected by a number of factors, including:

- our pricing or license term and those of our competitors;
- our reputation for performance and reliability;
- new product releases by us or our competitors;
- customer satisfaction with our software or support;
- consolidation within our customer base;
- availability of comparable software from our competitors;
- effects of global or industry specific economic conditions;
- our customers' ability to continue their operations and spending levels; and
- other factors, a number of which are beyond our control.

If our customers fail to renew their licenses or renew on terms that are less beneficial to us, our renewal rates may decline or fluctuate, which may harm our business.

We believe our future success will depend, in part, on the growth in demand for our software by customers other than simulation engineering specialists and in additional industry verticals.

Historically, our customers have been simulation engineering specialists. To enable concept engineering, driven by simulation, we make our physics solvers more accessible to designers by wrapping them in powerful simple interfaces. We believe our future success will depend, in part, on growth in demand for our software by these designers, which could be negatively impacted by the lack of:

- continued and/or growing reliance on software to optimize and accelerate the design process;
- adoption of simulation technology by designers other than simulation engineering specialists;
- continued proliferation of mobility, large data sets, cloud computing and IoT;
- our ability to predict demands of designers other than simulation engineering specialists and achieve market acceptance of our software or products within these additional areas and customer bases or in additional industry verticals; or
- our ability to respond to changes in the competitive landscape, including whether our competitors establish more widely adopted products for designers other than simulation engineering specialists.

If some or all of this software does not achieve widespread adoption, our revenues and profits may be adversely affected.

Our ability to grow our business may be adversely impacted by difficulties we may experience in integrating recent acquisitions or in integrating future acquisitions.

We believe that our recent acquisitions result in certain benefits, including expanding our portfolio of software and products and enabling us to better serve our customers' requests for data intelligence and simulation technology. However, to realize some of these anticipated benefits, the acquired businesses must be successfully integrated. The success of these acquisitions will depend in part on our ability to realize these anticipated benefits. We may fail to realize the anticipated benefits of these acquisitions for a variety of reasons, including the following:

- failure to successfully manage relationships with new or potential customers;
- failure of existing customers to accept new service and product offerings from us;
- revenue attrition in excess of anticipated levels;
- unanticipated incompatibility of technologies and systems;
- failure to leverage the increased scale of our business quickly and effectively;
- potential difficulties integrating and harmonizing financial reporting systems;
- the loss of key employees;
- failure to effectively coordinate sales and marketing efforts to communicate the capabilities of our enhanced portfolio of software and products;
- failure to combine product offerings and product lines quickly and effectively;
- failure to convert an increasing amount of new or acquired customer relationships revenue from perpetual to annual recurring revenue streams; or
- failure to effectively invest in further sales, marketing, and research and development efforts that lead to increased revenues.

We face significant competition, which may adversely affect our ability to add new customers, retain existing customers, and grow our business.

The market for CAE software is highly fragmented but has been undergoing significant consolidation. Our primary competitors in this market include Dassault Systèmes, Siemens, Ansys and MSC Software, a Hexagon company. Dassault and Siemens are large public companies, with significant financial resources, which have historically focused on CAD and product data management. More recently, these two companies have been investing in simulation software through acquisitions. Ansys and MSC are focused on CAE. In addition to these competitors, we compete with many smaller companies offering CAE software applications.

The market for data intelligence is large and generally very horizontal in nature. The company to whom Altair's data intelligence solutions are most often compared to is Alteryx, a publicly traded company. There are other competitors in the data preparation and data science markets including SAS and several who received significant venture capital infusions.

A significant number of companies have developed or are developing software and services that currently, or in the future may, compete with some or all of our software and services. We may also face competition from participants in adjacent markets, including two-dimensional, or 2D, and three-dimensional, or 3D, CAD, and broader PLM competitors and others that may enter our markets by leveraging related technologies and partnering with or acquiring other companies.

The principal competitive factors in our industry include:

- breadth, depth and integration of software;
- domain expertise of sales and technical support personnel;
- consistent global support;
- performance and reliability; and
- price.

Many of our current and potential competitors have longer-term and more extensive relationships with our existing and potential customers that provide them with an advantage in competing for business with those customers. They may be able to devote greater resources to the development and improvement of their offerings than we can. These competitors could incorporate additional functionality into their competing products from their wider product offerings or leverage their commercial relationships in a manner that uses product bundling or closed technology platforms to discourage enterprises from purchasing our applications.

Many existing and potential competitors enjoy competitive advantages over us, such as:

- larger sales and marketing budgets and resources;
- access to larger customer bases, which often provide incumbency advantages;
- broader global distribution and presence;
- greater resources to make acquisitions;
- the ability to bundle competitive offerings with other software and services;
- greater brand recognition;
- lower labor and development costs;
- greater levels of aggregate investment in research and development;
- larger and more mature intellectual property portfolios; and
- greater financial, technical, management and other resources.

These competitive pressures in our markets or our failure to compete effectively may result in fewer customers, price reductions, licensing of fewer units, increased sales and marketing expenses, reduced revenue and gross profits and loss of market share. Any failure to address these factors could harm our business.

Because we derive a substantial portion of our revenues from customers in the automotive industry, we are susceptible to factors affecting this industry.

Billings in the automotive industry increased for the year ended December 31, 2018 and accounted for approximately 45% of our 2018 billings. An adverse occurrence, including industry slowdown, recession, political instability, costly or constraining regulations, excessive inflation, prolonged disruptions in one or more of our automotive customers' production schedules or labor disturbances, that results in a significant decline in the volume of sales in this industry, or in an overall downturn in the business and operations of our customers in this industry, could adversely affect our business.

The automotive industry is highly cyclical in nature and sensitive to changes in general economic conditions, consumer preferences and interest rates. Any weakness in demand in this industry, the insolvency of a manufacturer or suppliers, or constriction of credit markets may cause our automotive customers to reduce their amount of software licensed or services requested or request discounts or extended payment terms, any of which may cause fluctuations or a decrease in our revenues and timing of cash flows.

Our quarterly results may fluctuate significantly and may not fully reflect the underlying performance of our business.

Our quarterly results of operations and our key metrics, including Billings, Adjusted EBITDA and Free Cash Flow, may vary significantly in the future. Period-to-period comparisons of our operating results may not be meaningful. The results of any one

quarter should not be relied upon as an indication of future performance. Our quarterly financial results and key metrics may fluctuate as a result of a variety of factors including:

- our ability to retain and/or increase sales to existing customers at various times;
- our ability to attract new customers;
- the addition or loss of large customers, including through their acquisitions or industry consolidations;
- the timing of recognition of revenues;
- the amount and timing of billings;
- the amount and timing of operating expenses and capital expenditures;
- the length of sales cycles;
- significant security breaches, technical difficulties or unforeseen interruptions to the functionality of our software;
- the number of new employees added;
- the amount and timing of billing for professional services engagements;
- the timing and success of new products, features, enhancements or functionalities introduced by us or our competitors;
- changes in our pricing policies or those of our competitors;
- changes in the competitive dynamics of our industry, including consolidation among competitors;
- the timing of expenses related to the development or acquisition of technology;
- any future charges for impairment of goodwill from acquired companies;
- extraordinary expenses such as litigation or other dispute-related settlement payments;
- the impact of new accounting pronouncements; and
- general economic conditions.

Billings have historically been highest in the first and fourth quarters of any calendar year and may vary in future quarters. This seasonality or the occurrence of any of the factors above may cause our results of operations to vary and our financial statements may not fully reflect the underlying performance of our business.

In addition, we may choose to grow our business for the long-term rather than to optimize for profitability or cash flows for a particular shorter-term period. If our quarterly results of operations fall below the expectations of investors or securities analysts, the price of our Class A common stock could decline and we could face lawsuits, including securities class action suits.

Seasonal variations in the purchasing patterns of our customers may lead to fluctuations in the timing of our cash flows.

We have experienced and expect to continue to experience seasonal variations in the timing of customers' purchases of our software and services. Many customers make purchase decisions based on their fiscal year budgets, which often coincide with the calendar year. These seasonal trends materially affect the timing of our cash flows, as license fees become due at the time the license term commences based upon agreed payment terms that customers may not adhere to. As a result, new and renewal licenses have been concentrated in the first and fourth quarter of the year, and our cash flows from operations have been highest late in the first quarter and early in the second quarter of the succeeding fiscal year.

In connection with the preparation of our consolidated financial statements in recent years, we and our independent registered public accounting firm identified material weaknesses in our internal control over financial reporting, one of which has not been remediated as of December 31, 2018. If we are not able to remediate the material weakness and otherwise maintain an effective system of internal control over financial reporting, the reliability of our financial reporting, investor confidence in us and the value of our common stock could be adversely affected.

As a public company, we are required to maintain internal control over financial reporting and to report any material weaknesses in such internal controls. Section 404 of SOX, or Section 404, requires that we evaluate and determine the effectiveness of our internal controls over financial reporting and, beginning with this annual report, provide a management report on internal control over financial reporting and a corresponding report by our independent auditors with respect to the effectiveness of our internal control over financial reporting. An independent assessment of the effectiveness of our internal control over financial reporting could detect problems that our management's assessment might not. A material weakness is a deficiency, or combination of deficiencies, in

internal control over financial reporting such that there is a reasonable possibility that a material misstatement of the company's annual or interim financial statements will not be prevented or detected and corrected on a timely basis.

In connection with the preparation of our fiscal years 2016, 2017 and 2018 financial statements, we and our independent registered public accounting firm identified a material weakness over the income tax process as of December 31, 2018. We determined that management's review controls over income taxes are not operating effectively to detect a material misstatement in the financial statements related to income tax accounting around acquisitions, as well as routine and non-routine transactions. Based on the material weakness described above, we have concluded that internal control over financial reporting was ineffective as of December 31, 2018. We have developed a remediation plan to address this material weakness. The plan includes enhancing our preparation and review procedures around income tax accounting, which includes supplementing our resources using an independent consultant with technical expertise in the tax accounting over acquisitions and routine and non-routine transactions.

In connection with the preparation of our fiscal years 2016 and 2017 financial statements, we and our independent registered public accounting firm identified a material weakness in our internal controls over the financial statement close process, which were not designed to be precise enough to detect a material error in the financial statements in a timely manner. Specifically, certain misstatements were either not identified by management or were not identified timely by management. We took steps to remediate this material weakness, by hiring additional personnel and increasing management review and oversight over the financial statement close process. In the fourth quarter of fiscal year 2018, we completed the testing of the design and operating effectiveness of the new procedures and controls. Management has concluded that this material weakness has been remediated as of December 31, 2018.

If our steps are insufficient to successfully remediate the material weakness in income taxes and otherwise establish and maintain an effective system of internal control over financial reporting, the reliability of our financial reporting, investor confidence in us and the value of our common stock could be materially and adversely affected. The process of designing and implementing internal control over financial reporting required to comply with Section 404 is time consuming, costly and complicated. We may discover other control deficiencies in the future, and we cannot assure you that we will not have a material weakness in future periods.

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

Effective internal control over financial reporting is necessary for us to provide reliable and timely financial reports and, together with adequate disclosure controls and procedures, are designed to reasonably detect and prevent fraud. Any failure to implement required new or improved controls, or difficulties encountered in their implementation could cause us to fail to meet our reporting obligations. Undetected material weaknesses in our internal control over financial reporting could lead to financial statement restatements and require us to incur the expense of remediation.

Fluctuations in foreign currency exchange rates could result in declines in our reported revenue and operating results.

As a result of our international activities, we have revenue, expenses, cash, accounts receivable and payment obligations denominated in foreign currencies including Euros, British Pounds Sterling, Indian Rupees, Japanese Yen, and Chinese Yuan. Foreign currency risk arises primarily from the net difference between non-United States dollar receipts from customers and non-United States dollar operating expenses. The value of foreign currencies against the United States dollar can fluctuate significantly, and those fluctuations may occur quickly. We cannot predict the impact of future foreign currency fluctuations.

Strengthening of the United States dollar could cause our software to become relatively more expensive to some of our customers leading to decreased sales and a reduction in billings and revenue not denominated in United States dollars. A reduction in revenue or an increase in operating expenses due to fluctuations in foreign currency exchange rates could have an adverse effect on our financial condition and operating results. Such foreign currency exchange rate fluctuations may make it more difficult to detect underlying trends in our business and operating results.

We do not currently, and do not have plans to, engage in currency hedging activities to limit the risk of exchange rate fluctuations. In the future, we may use derivative instruments, such as foreign currency forward and option contracts, to hedge certain exposures to fluctuations in foreign currency exchange rates. The use of such hedging activities may not offset any or more than a portion of the adverse financial effects of unfavorable movements in foreign exchange rates over the limited time the hedges are in place, and the cost of those hedging techniques may have a significant negative impact on our operating results. The use of hedging instruments may introduce additional risks if we are unable to structure effective hedges with such instruments. If we are not able to successfully manage or hedge against the risks associated with currency fluctuations, our financial condition and operating results could be adversely affected.

If we fail to attract new or retain existing third party independent software vendors to participate in the APA, we may not be able to grow the APA program.

Our APA program allows our customers to use third party software that may be unrelated to our software, without the need to enter into additional license agreements. The APA program results in increased revenues through revenue sharing, and encourages users to stay within the Altair software ecosystem. If third party software providers are unwilling to join the APA on appropriate terms, including agreeing with our revenue share allocations, or if we are unable to retain our current APA participants, we may not be able to grow the APA program.

Licensing under our solidThinking brand is dependent on performance of our distributors and resellers.

We have historically licensed our software primarily through our direct sales force. Our solidThinking brand is primarily licensed through a network of distributors and resellers. If these distributors and resellers are unable to successfully adjust their sales methods to support our annual recurring licensing model, or become unstable, financially insolvent, or otherwise do not perform as we expect, our revenue growth derived from solidThinking could be negatively impacted.

If we fail to adapt to technology changes our software may become less marketable, less competitive, or obsolete.

Our success depends in part on our ability to:

- anticipate customer needs;
- foresee changes in technology, including to cloud-enabled hardware, software, networking, browser and database technologies;
- differentiate our software;
- maintain operability of our software with changing technology standards; and
- develop or acquire additional or complementary technologies.

We may not be able to develop or market new or enhanced software in a timely manner, which could result in our software becoming less marketable, less competitive, or obsolete.

We believe our long-term value as a company will be greater if we focus on growth, which may negatively impact our profitability in the near term.

Part of our business strategy is to focus on our long-term growth. As a result, our profitability may be lower in the near term than it would be if our strategy were to maximize short-term profitability. Expanding our research and development efforts, sales and marketing efforts, infrastructure and other such investments may not ultimately grow our business or cause higher long-term profitability. If we are ultimately unable to achieve greater profitability at the level anticipated by analysts and our stockholders, our Class A common stock price may decline.

Our research and development may not generate revenue or yield expected benefits.

A key element of our strategy is to invest significantly in research and development to create new software and enhance our existing software to address additional applications and serve new markets. Research and development projects can be technically challenging and expensive, and there may be delays between the time we incur expenses and the time we are able to generate revenue, if any. Anticipated customer demand for any software we may develop could decrease after the development cycle has commenced, and we could be unable to avoid costs associated with the development of any such software. If we expend a significant amount of resources on research and development and our efforts do not lead to the timely introduction or improvement of software that is competitive in our current or future markets, it could harm our business.

Our continued innovation may not generate revenue or yield expected benefits.

As a business focused on innovation, we expect to continue developing new software and products both internally and through acquisitions. These offerings may focus either on our existing markets or other markets in which we see opportunities. We may not receive revenue from these investments sufficient to either grow our business or cover the related development or acquisition costs.

If we lose our senior executives, we may be unable to achieve our business objectives.

We currently depend on the continued services and performance of James Scapa, our chief executive officer, and other senior executives. Many members of this executive team have served the Company for more than 15 years, with Mr. Scapa having served since our founding in 1985. Loss of Mr. Scapa's services or those of other senior executives could delay or prevent the achievement of our business objectives.

If we are unable to attract and retain key personnel, we may be unable to achieve our business objectives.

Our business is dependent on our ability to attract and retain highly skilled software engineers, salespeople, and support teams. There is significant industry competition for these individuals. We have many employees whose equity awards in our company are fully vested and may increase their personal wealth after giving effect to our offering, which could affect their decision to remain with the Company. Failure to attract or retain key personnel could delay or prevent the achievement of our business objectives.

Defects or errors in our software could result in loss of revenue or harm to our reputation.

Our software is complex and, despite extensive testing and quality control, may contain undetected or perceived bugs, defects, errors, or failures. From time to time we have found defects or errors in our software and we may discover additional defects in the future. We may not find defects or errors in new or enhanced software before release and these defects or errors may not be discovered by us or our customers until after they have used the software. We have in the past issued, and may in the future need to issue, corrective releases or updates of our software to remedy bugs, defects and errors or failures. The occurrence of any real or perceived bugs, defects, errors, or failures could result in:

- lost or delayed market acceptance of our software;
- delays in payment to us by customers;
- injury to our reputation;
- diversion of our resources;
- loss of competitive position;
- claims by customers for losses sustained by them;
- breach of contract claims or related liabilities;
- increased customer support expenses or financial concessions; and
- increased insurance costs.

Any of these problems could harm our business.

Acquisitions may dilute our stockholders, disrupt our core business, divert our resources, or require significant management attention.

Most of our software has been developed internally with acquisitions used to augment our capabilities. We may not effectively identify, evaluate, integrate, or use acquired technology or personnel from prior or future acquisitions, or accurately forecast the financial impact of an acquisition, including accounting charges.

After the completion of an acquisition, it is possible that our valuation of such acquisition for purchase price allocation purposes may change compared to initial expectations and result in unanticipated write-offs or charges, impairment of our goodwill, or a material change to the fair value of the assets and liabilities associated with a particular acquisition.

We may pay cash, incur debt, or issue equity securities to fund an acquisition. The payment of cash will decrease available cash. The incurrence of debt would likely increase our fixed obligations and could subject us to restrictive covenants or obligations. The issuance of equity securities would likely be dilutive to our stockholders. We may also incur unanticipated liabilities as a result of acquiring companies. Future acquisition activity may disrupt our core business, divert our resources, or require significant management attention.

Failure to protect and enforce our proprietary technology and intellectual property rights could substantially harm our business.

The success of our business depends, in part, on our ability to protect and enforce our proprietary technology and intellectual property rights, including our trade secrets, patents, trademarks, copyrights, and other intellectual property. We attempt to protect our intellectual property under trade secret, patent, trademark, and copyright laws. Despite our efforts, we may not be able to protect our proprietary technology and intellectual property rights, if we are unable to enforce our rights or if we do not detect unauthorized use of our intellectual property. It may be possible for unauthorized third parties to copy our technology and use information that we regard as proprietary to create products and services that compete with ours. Provisions in our licenses protect against unauthorized use, copying, transfer and disclosure of our technology, but such provisions may be difficult to enforce or are unenforceable under the laws of certain jurisdictions and countries. The laws of some countries do not protect proprietary rights to the same extent as the laws of the United States. Our international activities expose us to unauthorized copying and use of our technology and proprietary information.

We primarily rely on our unpatented proprietary technology and trade secrets. Despite our efforts to protect our proprietary technology and trade secrets, unauthorized parties may attempt to misappropriate, reverse engineer or otherwise obtain and use them. The contractual provisions that we enter into with employees, consultants, partners, vendors and customers may not be sufficient to prevent unauthorized use or disclosure of our proprietary technology or trade secrets and may not provide an adequate remedy in the event of unauthorized use or disclosure of our proprietary technology or trade secrets.

Policing unauthorized use of our technologies, software and intellectual property is difficult, expensive and time-consuming, particularly in countries where the laws may not be as protective of intellectual property rights as those in the United States and where mechanisms for enforcement of intellectual property rights may be weak. We may be unable to detect or determine the extent of any unauthorized use or infringement of our software, technologies or intellectual property rights.

From time to time, we may need to engage in litigation or other administrative proceedings to protect our intellectual property rights or to defend against allegations by third parties that we have infringed or misappropriated their intellectual property rights, including in connection with requests for indemnification by our customers who may face such claims. We have been approached and may be approached in the future by certain of our customers to indemnify them against third party intellectual property claims. Litigation and/or any requests for indemnification by our customers could result in substantial costs and diversion of resources and could negatively affect our business and revenue. If we are unable to protect and enforce our intellectual property rights, our business may be harmed.

Intellectual property disputes could result in significant costs and harm our business.

Intellectual property disputes may occur in the markets in which we compete. Many of our competitors are large companies with significant intellectual property portfolios, which they may use to assert claims of infringement, misappropriation or other violations of intellectual property rights against us, or our customers. Any allegation of infringement, misappropriation or other violation of intellectual property rights by a third party, even those without merit, could cause us to incur substantial costs defending against the claim, could distract our management from our business, and could cause uncertainty among our customers or prospective customers, all of which could have an adverse effect on our business or revenue.

Our agreements may include provisions that require us to indemnify others for losses suffered or incurred as a result of our infringement of a third party's intellectual property rights infringement, including certain of our employees and customers.

An adverse outcome of a dispute or an indemnity claim may require us to:

- pay substantial damages;
- cease licensing our software or portions of it;
- develop non-infringing technologies;
- acquire or license non-infringing technologies; and
- make substantial indemnification payments.

Any of the foregoing or other damages could harm our business, decrease our revenue, increase our expenses or negatively impact our cash flow.

Security breaches, computer malware, computer hacking attacks and other security incidents could harm our business, reputation, brand and operating results.

Security incidents have become more prevalent across industries and may occur on our systems. Security incidents may be caused by, or result in but are not limited to, security breaches, computer malware or malicious software, computer hacking, unauthorized access to confidential information, denial of service attacks, security system control failures in our own systems or from vendors we use, email phishing, software vulnerabilities, social engineering, sabotage and drive-by downloads. Such security incidents, whether intentional or otherwise, may result from actions of hackers, criminals, nation states, vendors, employees or customers.

We may experience disruptions, data loss, outages and other performance problems on our systems due to service attacks, unauthorized access or other security related incidents. Any security breach or loss of system control caused by hacking, which involves efforts to gain unauthorized access to information or systems, or to cause intentional malfunctions or loss, modification or corruption of data, software, hardware or other computer equipment and the inadvertent transmission of computer malware could harm our business.

In addition, our software stores and transmits customers' confidential business information in our facilities and on our equipment, networks and corporate systems. Security incidents could expose us to litigation, remediation costs, increased costs for security measures, loss of revenue, damage to our reputation and potential liability. Our customer data and corporate systems and security measures may be compromised due to the actions of outside parties, employee error, malfeasance, capacity constraints, a combination of these or otherwise and, as a result, an unauthorized party may obtain access to our data or our customers' data. Outside parties may attempt to fraudulently induce our employees to disclose sensitive information in order to gain access to our customers' data or our information. We must continuously examine and modify our security controls and business policies to address new threats, the use of new devices and technologies, and these efforts may be costly or distracting.

Because the techniques used to obtain unauthorized access, disable or degrade service, or sabotage systems change frequently or may be designed to remain dormant until a predetermined event and often are not recognized until launched against a target, we may be unable to anticipate these techniques or implement sufficient control measures to defend against these techniques. Though it is difficult to determine what harm may directly result from any specific incident or breach, any failure to maintain confidentiality, availability, integrity, performance and reliability of our systems and infrastructure may harm our reputation and our ability to retain existing customers and attract new customers. If an actual or perceived security incident occurs, the market perception of the effectiveness of our security controls could be harmed, our brand and reputation could be damaged, we could lose customers, and we could suffer financial exposure due to such events or in connection with remediation efforts, investigation costs, regulatory fines and changed security control, system architecture and system protection measures.

Adverse global conditions, including economic uncertainty, may negatively impact our financial results.

Global conditions, including the effects of the United Kingdom's exit from the European Union, or Brexit, dislocations in the financial markets or any negative financial impacts affecting United States corporations operating on a global basis as a result of tax reform or changes to existing trade agreements or tax conventions, could adversely impact our business in a number of ways, including longer sales cycles, lower prices for our software license fees, reduced licensing renewals, customer disruption or foreign currency fluctuations.

The long term effects of Brexit will depend on any agreements the United Kingdom makes to retain access to European Union markets either during a transitional period or more permanently. The measures could potentially disrupt some of the markets we serve and may cause those customers to closely monitor their costs and reduce their spending budget on our products and services. In addition, Brexit could lead to legal uncertainty and potentially divergent national laws and regulations as the United Kingdom determines which European Union laws to replace or replicate. Given the lack of comparable precedent, it is unclear what financial, trade and legal implications the withdrawal of the United Kingdom from the European Union will have on us.

The United Kingdom Financial Conduct Authority, or the FCA, has announced its intention to phase out LIBOR rates by the end of 2021. It is not possible to predict the effect of this change, or other reforms or the establishment of alternative reference rates in the United Kingdom or elsewhere. We currently expect that, as a result of any phase out of LIBOR, the interest rates under our loan agreement would be amended as necessary to provide for an interest rate that approximates the existing interest rate as calculated in accordance with LIBOR, but could result in an increase in the cost of our variable rate indebtedness.

During challenging economic times our customers may be unable or unwilling to make timely payments to us, which could cause us to incur increased bad debt expenses. Our customers may unilaterally extend the payment terms of our invoices, adversely affecting our short-term or long-term cash flows.

International operations expose us to risks inherent in international activities.

Operating in international markets requires significant resources and management attention and subjects us to regulatory, economic and political risks that are different from those in the United States. We face risks in doing business internationally that could adversely affect our business, including:

- the need to localize and adapt our software for specific countries, including translation into foreign languages and associated expenses;
- foreign exchange risk;
- import and export restrictions and changes in trade regulation, including uncertainty regarding renegotiation of international trade agreements and partnerships;
- sales and customer service challenges associated with operating in different countries;
- enhanced difficulties of integrating any foreign acquisitions;
- difficulties in staffing and managing foreign operations and working with foreign partners;
- different pricing environments, longer sales cycles, longer accounts receivable payment cycles, and collections issues;
- compliance challenges related to the complexity of multiple, conflicting and changing governmental laws and regulations, including the Foreign Corrupt Practices Act of 1977, or the FCPA, employment, ownership, tax, privacy and data protection laws and regulations;
- limitations on enforcement of intellectual property rights;
- more restrictive or otherwise unfavorable government regulations;
- increased financial accounting and reporting burdens and complexities;
- restrictions on the transfer of funds;
- withholding and other tax obligations on remittance and other payments made by our subsidiaries; and
- unstable regional, economic and political conditions.

Our inability to manage any of these risks successfully, or to comply with these laws and regulations, could reduce our sales and harm our business.

We may lose customers if our software does not work seamlessly with our customers' existing software.

Our customers may use our software, which in many instances has been designed to seamlessly interface with software from some of our competitors, together with their own software and software they license from third parties. If our software ceases to work seamlessly with our customers' existing software applications, we may lose customers.

Many of our customers use our software and services to design and develop their products, which when built and used may expose us to claims.

Many of our customers use our software and services, together with software and services from other third parties and their own resources, to assist in the design and development of products intended to be used in a commercial setting. To the extent our customers design or develop a product that results in potential liability, including product liability, we may be included in resulting litigation. We may be subject to litigation defense costs or be subject to potential judgments or settlement costs for which we may not be fully covered by insurance, which would result in an increase of our expenses.

We also license certain of our software on Altair branded computer hardware, which we acquire from original equipment manufacturers, which we refer to as OEMs, exposing us to potential liability for the hardware, such as product liability. To the extent this liability is greater than the warranty and liability protection from our OEM, we may incur additional expenses, which may be significant.

If we fail to educate and train our users regarding the use and benefits of our software, we may not generate additional revenue.

Our software is complex and highly technical. We continually educate and train our existing and potential users regarding the depth, breadth, and benefits of our software including through classroom and online training. If these users do not receive education and training regarding the use and benefits of our software, or the education and training is ineffective, they may not increase their usage of our software. We may incur costs of training directly related to this activity prior to generating additional revenue.

If we are unable to match engineers to open positions in our CES business or are otherwise unable to grow our CES business, our revenue could be adversely affected.

We operate our client engineering services business by hiring engineers and data scientists for placement at a customer site for specific customer-directed assignments and pay them only for the duration of the placement. The success of this business is dependent upon our ability to recruit and retain highly skilled, qualified engineers to meet the requirements of our customers and to maintain ongoing relationships with these customers. Under ASC 606, our CES business constituted approximately 12% of our total revenues for the year ended December 31, 2018. Under ASC 605, our CES business constituted approximately 15% and 14% of our total revenues for the years ended December 31, 2016 and 2017, respectively. Some of our customers operate their engineering personnel needs through managed service providers, or MSPs. A significant percentage of the engineers we place, either directly or through MSPs, are with U.S.-based customers and are citizens of countries other than the United States. In the event these engineers are unable to enter into, or remain in, the United States legally, we may be unable to match engineers with the appropriate skill sets matched to open customer positions. If we are unable to attract highly skilled, qualified engineers because of competitive factors or immigration laws, or otherwise fail to match engineers to open customer positions, our revenue may be adversely affected.

Our sales to government agencies and their suppliers may be subject to reporting and compliance requirements.

Our customers include agencies of the various governments, including, but not limited to the United States, and their suppliers of products and services. These customers may procure our software and services through various governments' mandated procurement regulations. Because of governmental reporting and compliance requirements, we may incur unexpected costs. Government agencies and their suppliers may have statutory, contractual or other legal rights to terminate contracts for convenience or due to a default, and any such termination may adversely affect our future operating results.

We may require additional capital to support our business, which may not be available on acceptable terms.

We expect to continue to make investments in our business, which may require us to raise additional funds. We may raise these funds through either equity or debt financings. Issuances of equity or convertible debt securities may significantly dilute stockholders and any new equity securities could have rights, preferences and privileges superior to those holders of our Class A common stock. In addition to the restrictions under our current credit agreement, any future debt financings could contain restrictive covenants relating to our capital raising activities and other financial and operational matters, which may make it more difficult for us to obtain additional capital, manage our business and pursue business opportunities, including potential acquisitions.

We may not be able to obtain additional financing on terms favorable to us. If we are unable to obtain adequate financing or financing on terms satisfactory to us when we require it, our ability to continue to support our growth, develop new software or add capabilities and enhancements to our existing software and respond to business challenges could be significantly impaired, and our business may be adversely affected.

Our loan agreements contain operating and financial covenants that may restrict our business and financing activities.

Our credit agreement, as amended, provides for an initial aggregate commitment amount of \$150 million, with a sublimit for the issuance of letters of credit of up to \$5 million and a sublimit for swing line loans of up to \$5 million and matures on October 18, 2022 (the "2017 Credit Agreement"). Our 2017 Credit Agreement is unconditionally guaranteed by us and all existing and subsequently acquired controlled domestic subsidiaries. It is also collateralized by a first priority, perfected security interest in, and mortgages on, substantially all of our tangible assets. The 2017 Credit Agreement contains operating financial restrictions and covenants, including liens, limitations on indebtedness, fundamental changes, limitations on guarantees, limitations on sales of assets and sales of receivables, dividends, distributions and other restricted payments, transactions with affiliates, prepayment of indebtedness and limitations on loans and investments in each case subject to certain exceptions. In addition, the 2017 Credit Agreement contains financial covenants relating to maintaining a minimum interest coverage ratio of 3.0 to 1.0 and maximum leverage ratio of 3.0 to 1.0, as defined in the 2017 Credit Agreement. The restrictions and covenants in the 2017 Credit Agreement, as well as those contained in any future debt financing agreements that we may enter into, may restrict our ability to finance our operations and engage in, expand or otherwise pursue our business activities and strategies. Our ability to comply with these covenants and restrictions may be affected by events beyond our control, and breaches of these covenants and restrictions could result in a default under the loan agreement and any future financing agreements that we may enter into.

We operate internationally and must comply with employment and related laws in various countries, which may, in turn, result in unexpected expenses.

We are subject to a variety of domestic and foreign employment laws, including those related to safety, discrimination, whistle-blowing, privacy and data protection, employment of unauthorized or undocumented employees, classification of employees, wages, statutory benefits, and severance payments. Such laws are subject to change as a result of judicial decisions or otherwise, and there can be no assurance that we will not be found to have violated any such laws in the future. Such violations could lead to the assessment of significant fines against us by federal, state or foreign regulatory authorities or to the award of damages claims, including severance payments, against us in judicial or administrative proceedings by employees or former employees, any of which would reduce our net income or increase our net loss.

Changes in government trade, immigration or currency policies may harm our business.

We operate our business globally in multiple countries that have policies and regulations relating to trade, immigration and currency, which may change. Governments may change their trade policies by withdrawing from negotiations on new trade policies, renegotiating existing trade agreements, imposing tariffs or imposing other trade restrictions or barriers. Any such changes may result in:

- changes in currency exchange rates;
- changes in political or economic conditions;
- import or export licensing requirements or other restrictions on technology imports and exports;
- laws and business practices favoring local companies;
- changes in diplomatic and trade relationships;
- modification of existing or implementation of new tariffs;
- imposition or increase of trade barriers; or
- establishment of new trade or currency restrictions.

Any of these changes, changes in immigration policies, government intervention in currency valuation or other government policy changes may adversely impact our ability to sell software and services, which could, in turn, harm our revenues and our business. We are headquartered in the United States and may be particularly impacted by changes affecting the United States.

Our use of open source technology could impose limitations on our ability to commercialize our software.

We use open source software in some of our software and expect to continue to use open source software in the future. Although we monitor our use of open source software to avoid subjecting our software to conditions we do not intend, we may face allegations from others alleging ownership of, or seeking to enforce the terms of, an open source license, including by demanding release of the open source software, derivative works, or our proprietary source code that was developed using such software. These allegations could also result in litigation. The terms of many open source licenses have not been interpreted by United States courts. There is a risk that these licenses could be construed in a way that could impose unanticipated conditions or restrictions on our ability to commercialize our software. In such an event, we may be required to seek licenses from third parties to continue commercially offering our software, to make our proprietary code generally available in source code form, to re-engineer our software or to discontinue the sale of our software if re-engineering could not be accomplished on a timely basis, any of which could adversely affect our business and revenue.

The use of open source software subjects us to a number of other risks and challenges. Open source software is subject to further development or modification by anyone. Others may develop such software to be competitive with or no longer useful by us. It is also possible for competitors to develop their own solutions using open source software, potentially reducing the demand for our software. If we are unable to successfully address these challenges, our business and operating results may be adversely affected, and our development costs may increase.

We currently open source certain of our software and may open source other software in the future, which could have an adverse effect on our revenues and expenses.

We offer our open matrix language, or OML, source code and a portion of our Altair PBS workload management software in an open source version to generate additional usage and broaden user-community development and enhancement of the software. We offer related software and services on a paid basis. We believe increased usage of open source software leads to increased purchases of these related paid offerings. We may offer additional software on an open source basis in the future. There is no assurance that the incremental revenues from related paid offerings will outweigh the lost revenues and incurred expenses attributable to the open sourced software.

Our revenue mix may vary over time, which could harm our gross margin and operating results.

Our revenue mix may vary over time due to a number of factors, including the mix of term-based licenses and perpetual licenses. Due to the differing revenue recognition policies applicable to our term-based licenses, perpetual licenses and professional services, shifts in the mix between subscription and perpetual licenses from quarter to quarter, or increases or decreases in revenue derived from our professional engineering services, which have lower gross margins than our software services, could produce substantial variation in revenues recognized even if our billings remain consistent. Our gross margins and operating results could be harmed by changes in revenue mix and costs, together with other factors, including: entry into new markets or growth in lower margin markets; entry into markets with different pricing and cost structures; pricing discounts; and increased price competition. Any one of these factors or the cumulative effects of certain of these factors may result in significant fluctuations in our gross margin and operating results. This variability and unpredictability could result in our failure to meet internal expectations or those of securities analysts or investors for a particular period. If we fail to meet or exceed such expectations for these or any other reasons, the market price of our common stock could decline.

The estimates of market opportunity and forecasts of market growth included in our periodic reports or other public disclosures may prove to be inaccurate, and even if the market in which we compete achieves the forecasted growth, our business could fail to grow at similar rates, if at all.

Market opportunity estimates and growth forecasts included in our periodic reports or other public disclosures, including those we have generated ourselves, are subject to significant uncertainty and are based on assumptions and estimates that may not prove to be accurate. Even if the market in which we compete meets the size estimates and growth forecasted in our periodic reports or other public disclosures, our business could fail to grow for a variety of reasons, which would adversely affect our results of operations.

We are subject to governmental export and import controls that could impair our ability to compete in international markets due to licensing requirements and subject us to liability if we are not in compliance with applicable laws.

Our software, services and hardware are subject to export control and import laws and regulations. As a company headquartered in the United States we are subject to regulations, including the International Traffic in Arms Regulations, or ITAR, and Export Administration Regulations, or EAR, United States Customs regulations and various economic and trade sanctions regulations administered by the United States Treasury Department's Office of Foreign Assets Control, presenting further risk of unexpected reporting and compliance costs. Compliance with these regulations may also prevent and restrict us from deriving revenue from potential customers in certain geographic locations for certain of our technologies.

If we fail to comply with these laws and regulations, we and certain of our employees could be subject to substantial civil or criminal penalties, including the possible loss of export or import privileges, fines which may be imposed on us and responsible employees or managers and, in extreme cases, the incarceration of responsible employees or managers. Obtaining the necessary authorizations, including any required license, for a particular sale may be time-consuming, is not guaranteed and may result in the delay or loss of sales opportunities. In addition, changes in our software or changes in applicable export or import regulations may create delays in the introduction and sale of our software in international markets, prevent our customers with international operations from deploying our software or, in some cases, prevent the export or import of our software to certain countries, governments or persons altogether.

We incorporate encryption technology into portions of our software. Various countries regulate the import of certain encryption technology, including through import permitting and licensing requirements, and have enacted laws that could limit our ability to distribute our software or could limit our customers' ability to implement our software in those countries. Encrypted software and the underlying technology may also be subject to export control restrictions. Governmental regulation of encryption technology and regulation of imports or exports of encryption products, or our failure to obtain required import or export approval for our software, when applicable, could harm our international sales and adversely affect our revenue. Compliance with applicable regulatory requirements regarding the export of our software, including with respect to new releases of our software, may create delays in the introduction of our software in international markets, prevent our customers with international operations from deploying our software throughout their globally-distributed systems or, in some cases, prevent the export of our software to some countries altogether.

United States export control laws and economic sanction programs prohibit the shipment of certain software and services to countries, governments and persons that are subject to United States economic embargoes and trade sanctions, including, but not limited to, Iran, Cuba, North Korea, Syria and Sudan. Any violations of such economic embargoes and trade sanction regulations could have negative consequences, including government investigations, penalties and reputational harm.

Any change in export or import regulations, economic sanctions or related legislation, shift in the enforcement or scope of existing regulations, or change in the countries, governments, persons or technologies targeted by such regulations, could result in decreased use of our software by, or in our decreased ability to export or license our software to, existing or potential customers with international operations. Any decreased use of our software or limitation on our ability to export or license our software could adversely affect our business.

Our business is subject to a wide range of laws and regulations, and our failure to comply with those laws and regulations could harm our business.

Our business is subject to regulation by various federal, state, local and foreign governmental agencies, including agencies responsible for monitoring and enforcing employment and labor laws, workplace safety and environmental laws, privacy and data protection laws, financial services laws, anti-bribery laws, import and export controls, federal securities laws and tax laws and regulations. In certain foreign jurisdictions, these regulatory requirements may be more stringent than those in the United States. These laws and regulations are subject to change over time and thus we must continue to monitor and dedicate resources to ensure continued compliance. Non-compliance with applicable regulations or requirements could subject us to investigations, sanctions, mandatory product recalls, enforcement actions, disgorgement of profits, fines, damages, civil and criminal penalties or injunctions. If any governmental sanctions are imposed, or if we do not prevail in any possible civil or criminal litigation, our business, operating results, and financial condition could be materially adversely affected. In addition, responding to any action will likely result in a significant diversion of management's attention and resources and an increase in professional fees. Enforcement actions and sanctions could harm our business, operating results and financial condition.

If we or any of our employees violate the FCPA, the U.K. Bribery Act or similar anti-bribery laws we could be adversely affected.

The FCPA, the U.K. Bribery Act and similar anti-bribery laws generally prohibit companies and their intermediaries from authorizing, offering or providing, directly or indirectly, improper payments or benefits for the purpose of obtaining or retaining business to government officials, political parties and private-sector recipients. United States based companies are required to maintain records that accurately and fairly represent their transactions and have an adequate system of internal accounting controls. We operate in areas of the world that potentially experience corruption by government officials to some degree and, in certain circumstances, compliance with anti-bribery laws may conflict with local customs and practices. We cannot assure that our employees, resellers or distributors will not engage in prohibited conduct. If we are found to be in violation of the FCPA, the U.K. Bribery Act or other anti-bribery laws, we could suffer criminal or civil penalties or other sanctions.

Business interruptions could adversely affect our business.

Our operations and our customers are vulnerable to interruptions by fire, flood, earthquake, power loss, telecommunications failure, terrorist attacks, wars and other events beyond our control. A catastrophic event that results in the destruction of any of our critical business or information technology systems could severely affect our ability to conduct normal business operations, including system interruptions, reputational harm, delays in our software development, breaches of data security and loss of critical data.

We rely on our network and third-party infrastructure and applications, internal technology systems, and our websites for our development, marketing, operational support, hosted services and sales activities. If these systems were to fail or be negatively impacted as a result of a natural disaster or other event, our ability to deliver software and training to our customers could be impaired.

Our business interruption insurance may not be sufficient to compensate us fully for losses or damages that may occur as a result of these events, if at all.

Our reported financial results may be adversely affected by changes in accounting principles generally accepted in the United States.

GAAP are subject to interpretation by the Financial Accounting Standards Board, or FASB, the United States Securities and Exchange Commission, or the SEC, and various bodies formed to promulgate and interpret appropriate accounting principles. A change in these principles or interpretations could have a significant effect on our reported financial results for periods prior and subsequent to such change. We need to comply with the FASB issued Accounting Standards Update No. 2014-09, Revenue from Contracts with Customers (Topic 606). This standard outlines a single comprehensive model for entities to use in accounting for revenue arising from contracts with customers and supersedes most existing revenue recognition guidance under GAAP. The core principle of the guidance is that an entity should recognize revenue when it transfers promised goods or services to customers in an amount that reflects the consideration to which the Company expects to be entitled in exchange for those goods and services. We expect the timing of revenue recognition to be accelerated because we anticipate that license revenue will be recognized at a point in time, rather than over time, which was our practice. Generally, the license revenue component of an arrangement represents a significant portion of the overall fair value of a software arrangement.

The application of this new guidance has resulted in a change in the timing and pattern of revenue recognition, including the retrospective recognition of revenue in historical periods that may negatively affect our future revenue, comparable performance, reduce revenue visibility and increase quarterly variability in results, which, despite no change in associated cash flows, could have a material adverse effect on our net income (loss) in any particular period. The adoption of new standards has required enhancements or changes in our systems and will continue to require significant time and effort of our financial management team.

We cannot predict the impact of all of the future changes to accounting principles or our accounting policies on our consolidated financial statements going forward, which could have a significant effect on our reported financial results, and could affect the reporting of transactions completed before the announcement of the change. In addition, if we were to change our critical accounting estimates, including those related to the recognition of license revenue and other revenue sources, our operating results could be significantly affected.

If our goodwill or intangible assets become impaired, we may be required to record a significant charge to earnings, which could harm our business.

Under GAAP, we review our intangible assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Goodwill is required to be tested for impairment at least annually. As of December 31, 2018, and 2017, respectively, we had \$210.8 million and \$62.7 million of goodwill and \$69.8 million and \$24.5 million of other intangible assets—net. An adverse change in market conditions, particularly if such change has the effect of changing one of our critical assumptions or estimates, could result in a change to the estimation of fair value that could result in an impairment charge.

We have significant deferred tax assets in the United States, which we will not use in future taxable periods.

As of December 31, 2018 and 2017, we had gross deferred tax assets, or DTAs, of \$92.6 million and \$73.6 million, respectively, primarily related to net operating loss carryforwards, tax credits, share-based compensation, deferred revenue, and capitalized research and development expenses. We are entitled to a United States federal tax deduction when non-qualified stock options, or NSOs, are exercised. In connection with our IPO, a significant number of NSOs were exercised resulting in a tax deduction for United States income tax purposes. This deduction, in conjunction with our other expected deferred tax asset reversals, resulted in our needing to establish a valuation allowance for \$47.0 million in 2017 for the United States DTAs. Our ability to utilize any net operating losses or tax credits may be limited under provisions of the Internal Revenue Code of 1986, or the Code, if we undergo an ownership change after our IPO (generally defined as a greater than 50-percentage-point cumulative change, by value, in the equity ownership of certain stockholders over a rolling three-year period). We also inherited net operating losses, or NOLs, from the acquisition of Datawatch, which are subject to specific limitations on usage. We may or may not be able to realize the benefits of the acquired NOLs due to a number of factors, including those enumerated above. We may also be unable to realize our tax credit carryforwards prior to their expiry.

If our global tax methodology is challenged our tax expense may increase.

As a global business headquartered in the United States, we are required to pay tax in a number of different countries, exposing us to transfer pricing and other adjustments. Transfer pricing refers to the methodology of allocating revenue and expenses for tax purposes to particular countries. Taxing authorities may challenge our transfer pricing methodology, which if successful could increase our professional expenses and result in one-time or recurring tax charges, a higher worldwide effective tax rate, reduced cash flows, and lower overall profitability of our operations.

Our tax expense could be impacted depending on the applicability of withholding and other taxes including taxes on software licenses and related intercompany transactions under the tax laws of jurisdictions in which we have business operations. Our future income taxes may fluctuate if there is a change in the mix of income in the applicable tax jurisdictions in which we operate. We are subject to review and audit by the United States and other taxing authorities. Any review or audit could increase our professional expenses and, if determined adversely, could result in unexpected costs.

Sales and use, value-added and similar tax laws and rates vary by jurisdiction. Any of these jurisdictions may assert that such taxes are applicable, which could result in tax assessments, penalties and interest.

New legislation or tax-reform policies that would change U.S. or foreign taxation of international business activities, including uncertainties in the interpretation and application of the 2017 Tax Cuts and Jobs Act, could materially affect our tax obligations and effective tax rate.

We are subject to income tax in the numerous jurisdictions in which we operate. Reforming the taxation of international businesses has been a priority for politicians, and a wide variety of potential changes have been proposed. Some proposals, several of which have been enacted, impose incremental taxes on gross revenue, regardless of profitability. Furthermore, it is reasonable to expect that global taxing authorities will be reviewing current legislation for potential modifications in reaction to the implementation of the 2017 Tax Cuts and Jobs Act (the “Tax Act”) in the U.S. Due to the large and expanding scale of our international business activities, any changes in the taxation of such activities may increase our worldwide effective tax rate and the amount of taxes we pay and seriously harm our business.

In the U.S., the Tax Act enacted on December 22, 2017 significantly affected U.S. tax law by changing how the U.S. imposes income tax on multinational corporations. The U.S. Department of Treasury has broad authority to issue regulations and interpretative guidance that may significantly impact how we will apply the law and impact our results of operations in the period issued.

The Tax Act requires complex computations not previously provided in U.S. tax law. As such, the application of accounting guidance for such items remain uncertain. Further, compliance with the Tax Act and the accounting for such provisions requires an accumulation of information not previously required or regularly produced. As additional regulatory guidance is issued by the applicable taxing authorities, as accounting treatment is clarified, and as we perform additional analysis on the application of the law, our effective tax rate could be materially different.

In addition to our software, we manufacture, distribute and sell products, which may expose us to product liability claims, product recalls, and warranty claims that could be expensive and harm our business.

We manufacture, distribute and sell products through two wholly owned subsidiaries, Altair Product Design, Inc., which we refer to as APD, and Ilumisys, Inc. doing business as toggled and which we refer to in this annual report as toggled. Generally, APD supports our customers with engineering and design services, which may include the fabrication of equipment and prototypes that are sold to businesses but not sold to consumers. From time to time, certain customers may contract directly with us for services similar to those provided by APD. toggled designs, sources through contract manufacturers, and assembles in our own facilities LED lighting and related products for sale to consumers and businesses.

To the extent these products do not perform as expected, cause injury or death or are otherwise unsuitable for usage, we may be held liable for claims, including product liability and other claims. A product liability claim, any product recalls or an excessive warranty claim, whether arising from defects in design or manufacture or otherwise could negatively affect our APD or toggled sales or require a change in the design or manufacturing process of these products, any of which may harm our reputation and business.

Failure to protect and enforce toggled’s proprietary technology and intellectual property rights could substantially harm toggled’s lighting business.

Part of the success of toggled’s lighting business depends on our ability to protect and enforce toggled’s proprietary rights, including its patents, trademarks, copyrights, trade secrets and other intellectual property rights. As of December 31, 2018, toggled had 168 issued patents and 41 published patent applications worldwide. We attempt to protect toggled’s intellectual property under patent, trademark, copyright, and trade secret laws. However, the steps we take to protect its intellectual property may be inadequate. We will not be able to protect toggled’s intellectual property if we are unable to enforce its rights or if we do not detect unauthorized use of its intellectual property. It may be possible for unauthorized third parties to copy toggled’s technology and use information that it regards as proprietary to create products that compete with toggled’s products. Some license provisions protecting against unauthorized use, copying, transfer and disclosure of toggled’s technology may be unenforceable under the laws of certain jurisdictions and foreign countries. Further, the laws of some countries do not protect proprietary rights to the same extent as the laws of the United States.

The process of obtaining patent protection is uncertain, expensive and time-consuming, and we may not be able to prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. In addition, issuance of a patent does not guarantee that we have an absolute right to practice our patented technology, or that we have the right to exclude others from practicing our patented technology. As a result, we may not be able to obtain adequate patent protection or to enforce our issued patents effectively.

From time to time, toggled enforces its patents and other intellectual property rights including through initiating litigation. Any such litigation could result in substantial costs and diversion of resources and could negatively affect toggled's business, operating results, financial condition and cash flows. If toggled is unable to protect toggled's intellectual property rights, its business, operating results and financial condition will be harmed.

Assertions by third parties of infringement or other violations by toggled of their intellectual property rights, or other lawsuits brought against toggled, could result in significant costs and substantially harm toggled's business.

Patent and other intellectual property disputes are common in the markets in which toggled competes. Some of toggled's competitors, own large numbers of patents, copyrights, trademarks and trade secrets, which they may use to assert claims of infringement, misappropriation or other violations of intellectual property rights against toggled or its customers. As the number of patents and competitors in this market increases, allegations of infringement, misappropriation and other violations of intellectual property rights may increase. Any allegation of infringement, misappropriation or other violation of intellectual property rights by a third party, even those without merit, could cause toggled to incur substantial costs and resources defending against the claim, which could have an adverse effect on toggled's business.

Some of our businesses may collect personal information and are subject to privacy laws.

Companies that collect personal information are required to comply with the privacy laws adopted by United States and various state and foreign governments, including member states of the European Union. These privacy laws regulate the collection, use, storage, disclosure and security of data, such as names, email addresses and, in some jurisdictions, Internet Protocol addresses, that may be used to identify or locate an individual, including a customer or an employee.

Our Company includes the WEYV business, a consumer music and content service, which in the course of providing its service directly to consumers, collects and stores consumer information. Currently we expect to operate WEYV only within the United States and are only subject to the United States privacy laws. To the extent we expand our WEYV offering beyond the United States we will need to comply with the privacy laws of every country in which we operate. Some of our other products may collect personal data and would also be subject to these privacy laws.

These laws and regulations may require us to implement privacy and security policies, permit end-customers to access, correct and delete personal information stored or maintained by us, inform individuals of security breaches that affect their personal information, and, in some cases, obtain individuals' consent to use personally identifiable information for certain purposes. Governments could require that any personally identifiable information collected in a country not be disseminated outside of that country. We also may find it necessary or desirable to join industry or other self-regulatory bodies or other information security, or data protection, related organizations that require compliance with their rules pertaining to information security and data protection. We may agree to be bound by additional contractual obligations relating to our collection, use and disclosure of personal, financial and other data. Our failure to comply with these privacy laws or any actual or suspected security incident may result in governmental actions, fines and non-monetary penalties, which may harm our business.

Additionally, California recently enacted legislation, the California Consumer Privacy Act, or the CCPA, which goes into effect in January 2020, with a lookback to January 2019, and places additional requirements on the handling of personal data. The CCPA also provides for civil penalties for violations, as well as a private right of action for data breaches that may increase data breach litigation. The potential effects of this legislation are potentially far-reaching and may require us to modify our data processing practices and policies and incur substantial costs and expenses in an effort to comply. Legislators have stated that they intend to propose amendments to the CCPA before it goes into effect, and it remains unclear what, if any, modifications will be made to this legislation or how it will be interpreted. We may also from time to time be subject to, or face assertions that we are subject to, additional obligations relating to personal data by contract or due to assertions that self-regulatory obligations or industry standards apply to our practices. Our failure to comply with these privacy laws or any actual or suspected security incident may result in governmental actions, fines and non-monetary penalties, which may harm our business.

Proposed or new legislation and regulations could significantly affect our business.

The new European General Data Protection Regulation, or GDPR, took effect in May 2018 and applies to all of our business conducted in Europe. The GDPR introduces a number of new obligations for subject companies and we will need to continue dedicating financial resources and management time to GDPR compliance in the coming months. The GDPR enhances the obligations placed on companies that control or process personal data including, for example, expanded disclosures about how personal data is to be used, new mechanisms for obtaining consent from data subjects, new controls for data subjects with respect to their personal data (including by enabling them to exercise rights to erasure and data portability), limitations on retention of personal data and mandatory data breach notifications. Additionally, the GDPR places companies under new obligations relating to data transfers and the security of the personal data they process. The GDPR provides that supervisory authorities in the European Union may impose administrative fines for certain infringements of the GDPR of up to EUR 20,000,000 or 4% of an undertaking's total, worldwide, annual turnover of the preceding financial year, whichever is higher. Individuals who have suffered damage as a result of a subject company's non-compliance with the GDPR also have the right to seek compensation from such company. Given the breadth of the GDPR, compliance with its requirements is likely to continue to require significant expenditure of resources on an ongoing basis, and there can be no assurance that the measures we have taken for the purposes of compliance will be successful in preventing breach of the GDPR. Given the potential fines, liabilities and damage to our reputation in the event of an actual or perceived breach of the GDPR, such a breach may have an adverse effect on our business and operations.

Catastrophic events may adversely affect our business

Our company is a highly automated business which relies on our network infrastructure and enterprise applications, cloud-based services, internal technology systems and website for development, marketing, operational, support and sales activities. A disruption or failure of these systems or in those of our external service providers, in the event of a major storm, earthquake, fire, telecommunications failure, cyber-attack, terrorist attack or other catastrophic event could cause system interruptions, reputational harm, delays in our product development and loss of critical data and could materially and adversely affect our ability to operate our business.

Risks related to ownership of our Class A common stock

An active public trading market for our Class A common stock may not be sustained.

Prior to our initial public offering in the fourth quarter of 2017, there had been no public market or active private market for trading shares of our Class A common stock. Our Class A common stock is listed on the Nasdaq Global Select Market under the symbol "ALTR." However, we cannot assure you that an active trading market will be sustained. The lack of an active market may impair your ability to sell your shares at the time you wish to sell them or at a price that you consider reasonable. The lack of an active market may also reduce the price of shares of Class A common stock. An inactive market may impair our ability to raise capital by selling shares and our ability to use our capital stock to acquire other companies or technologies. We cannot predict the prices at which our Class A common stock will trade.

The market price of our Class A common stock can be volatile.

The market price of our Class A common stock has fluctuated substantially since our IPO. Our market price may continue to fluctuate substantially depending on a number of factors, many of which are beyond our control and may not be related to our operating performance. These fluctuations could cause you to lose all or part of your investment in our Class A common stock, since you might not be able to sell your shares at or above the price you paid for our Class A common stock. Factors that could cause fluctuations in the market price of our Class A common stock include the following:

- price and volume fluctuations in the overall stock market from time to time, including as a result of trends in the economy as a whole;
- volatility in the market prices and trading volumes of technology stocks;
- changes in operating performance and stock market valuations of other technology companies generally, or those in our industries in particular;
- the expiration of market stand-off or contractual lock-up agreements and sales of shares of our Class A common stock by us or our stockholders;
- the volume of shares of our Class A common stock available for public sale;
- additional shares of our Class A common stock being sold into the market by our existing stockholders, or the anticipation of such sales, including sales of our Class A common stock upon exercise of outstanding options or upon conversion of our Class B common stock into shares of Class A common stock;

- failure of financial analysts to maintain coverage of us, changes in financial estimates by any analysts who follow our company, or our failure to meet these estimates or the expectations of investors;
- the financial projections we may provide to the public, any changes in these projections or our failure to meet these projections;
- announcements by us or our competitors of new software or new or terminated significant contracts, commercial relationships or capital commitments;
- public analyst or investor reaction to our press releases, other public announcements and filings with the SEC;
- rumors and market speculation involving us or other companies in our industry;
- actual or anticipated changes or fluctuations in our operating results;
- actual or anticipated developments in our business, our customers' businesses, or our competitors' businesses or the competitive landscape generally;
- litigation involving us, our industry or both, or investigations by regulators into our operations or those of our competitors;
- developments or disputes concerning our intellectual property or our solutions, or third party proprietary rights;
- announced or completed acquisitions of businesses or technologies by us or our competitors;
- new laws or regulations or new interpretations of existing laws or regulations applicable to our business;
- changes in accounting standards, policies, guidelines, interpretations or principles;
- any major changes in our management or our board of directors;
- general economic conditions and slow or negative growth of our markets; and
- other events or factors, including those resulting from war, incidents of terrorism or responses to these events.

In addition, the stock market in general, and the market for technology companies in particular, have experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of those companies. Broad market and industry factors may affect the market price of our Class A common stock, regardless of our actual operating performance. In the past, following periods of volatility in the overall market and the market prices of a particular company's securities, securities class action litigation has often been instituted against that company. We may become the target of this type of litigation in the future. Securities litigation, if instituted against us, could result in substantial costs and divert our management's attention and resources from our business.

We do not intend to pay dividends in the foreseeable future. As a result, your ability to achieve a return on your investment will depend on appreciation in the price of our Class A common stock.

We have never declared or paid any cash dividends on our Class A common stock. We currently intend to retain all available funds and any future earnings for use in the operation of our business and do not anticipate paying any dividends on our Class A common stock in the foreseeable future. Any determination to pay dividends in the future will be at the discretion of our board of directors. Consequently, your only opportunity to achieve a return on your investment in our company will be if the market price of our Class A common stock appreciates and you sell your shares at a profit. There is no guarantee that the price of our Class A common stock that will prevail in the market will ever exceed the price that you paid.

Our management team has limited experience managing a public company.

Most members of our management team have limited experience managing a publicly-traded company, interacting with public company investors, and complying with laws pertaining to public companies. Our management team may not successfully or efficiently manage our role as a public company subject to significant regulatory oversight and reporting obligations under the federal securities laws and the continuous scrutiny of securities analysts and investors. These obligations and constituents require significant attention from our senior management and may divert their attention away from the day-to-day management of our business, which could adversely affect our business, financial condition, and operating results.

We are incurring increased costs and devote additional management time as a result of operating as a public company.

As a public company, we are incurring legal, accounting and other expenses that we did not incur as a private company. We are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, or the Exchange Act, and are required to comply with the applicable requirements of the Sarbanes-Oxley Act of 2002, or SOX, and the Dodd-Frank Wall Street Reform and Consumer Protection Act, or Dodd-Frank, as well as rules and regulations subsequently implemented by the SEC and the Nasdaq Global Select Market, including the establishment and maintenance of effective disclosure and financial controls and changes in corporate governance practices.

As of December 31, 2018, we ceased to be an “emerging growth company”, as defined by the JOBS Act, which has the effect of expanding disclosure and other obligations applicable to us, including, but not limited to, enhanced disclosure obligations regarding executive compensation in our periodic reports and proxy statements and the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved, along with accelerated compliance with SOX and earlier implementation of certain changes in GAAP such as revenue recognition and leasing standards. Compliance with these requirements increases our legal and financial compliance costs and makes some activities more time consuming and costly. In addition, our management and other personnel need to divert attention from operational and other business matters to devote time to these public company requirements. In particular, we have incurred, and expect to continue to incur, additional expenses and have devoted, and expect to continue to devote, additional management effort toward ensuring compliance with the requirements of Section 404 of SOX, as a result of our ceasing to be an emerging growth company. Although we have already hired additional employees to help comply with these requirements, we may need to further expand our legal and finance departments in the future, which will increase our costs and expenses.

If we fail to maintain effective internal controls, we may not be able to report financial results accurately or on a timely basis, or to detect fraud, which could have a material adverse effect on our business or share price.

Effective internal controls are necessary for us to provide reasonable assurance with respect to our financial reports and to effectively prevent financial fraud. Pursuant to SOX, we are required to periodically evaluate the effectiveness of the design and operation of our internal controls. Internal controls over financial reporting may not prevent or detect misstatements because of inherent limitations, including the possibility of human error or collusion, the circumvention or overriding of controls, or fraud. If we fail to maintain an effective system of internal controls, our business and operating results could be harmed, and we could fail to meet our reporting obligations, which could have a material adverse effect on our business and our share price.

As a public company, we are required to maintain internal controls over financial reporting and to report any material weaknesses in such internal controls. Section 404 of SOX requires annual management assessments of the effectiveness of our internal controls over financial reporting beginning with this Annual Report. We have designed, implemented and tested the internal control over financial reporting required to comply with this obligation, which was and is time consuming, costly, and complicated. We have identified material weaknesses in our internal controls over financial reporting for the fiscal years ended December 31, 2016 and 2017, one of which has not been remediated as of our fiscal year 2018. If we identify material weaknesses in our internal control over financial reporting in the future or if we are unable to successfully remediate the identified material weaknesses or, if we are unable to comply with the requirements of Section 404 in a timely manner or assert that our internal control over financial reporting is effective, investors may lose confidence in the accuracy and completeness of our financial reports and the market price of our Class A common stock could be negatively affected, and we could become subject to investigations by the stock exchange on which our securities are listed, the SEC, or other regulatory authorities, which could require additional financial and management resources.

We cannot predict the impact our capital structure may have on our stock price.

In July 2017, S&P Dow Jones, a provider of widely followed stock indices, announced that companies with multiple share classes, such as ours, will not be eligible for inclusion in certain of their indices. As a result, our Class A common stock will likely not be eligible for these stock indices. Additionally, FTSE Russell, another provider of widely followed stock indices, has stated that it plans to require new constituents of its indices to have at least five percent of their voting rights in the hands of public stockholders. Many investment funds are precluded from investing in companies that are not included in such indices, and these funds would be unable to purchase our Class A common stock. We cannot assure you that other stock indices will not take a similar approach to S&P Dow Jones or FTSE Russell in the future. Given the sustained flow of investment funds into passive strategies that seek to track certain indexes, exclusion from indices could make our Class A common stock less attractive to investors. As a result, the market price of our Class A common stock could be adversely affected.

If financial or industry analysts do not publish research or reports about our business or if they issue inaccurate or unfavorable commentary or downgrade our Class A common stock, our stock price and trading volume could decline.

The trading market for our Class A common stock may be influenced by the research and reports that industry or financial analysts publish about us or our business. We do not control these analysts, or the content and opinions included in their reports. As a relatively new public company, we may be slow to attract research coverage, and the analysts who publish information about our Class A common stock still have relatively little experience with our company, which could affect their ability to accurately forecast our results and make it more likely that we fail to meet their estimates. If any of the analysts who cover us issue an inaccurate or unfavorable opinion regarding our stock price, our stock price would likely decline. In addition, the stock prices of many companies in the technology industry have declined significantly after those companies have failed to meet, or often times failed to exceed, the financial guidance publicly announced by the companies or the expectations of analysts. If our financial results fail to meet, or fail to significantly exceed, our announced guidance or the expectations of analysts or public investors, analysts could downgrade our Class A common stock or publish unfavorable research about us. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

Future sales of substantial amounts of our Class A common stock may cause our stock price to decline.

Future sales of a substantial number of shares of our Class A common stock, particularly sales by our directors, executive officers and significant stockholders could adversely affect the market price of our Class A common stock and may make it more difficult to sell Class A common stock at a time and price that you deem appropriate. As of December 31, 2018, we had an aggregate of 38,348,711 shares of Class A common stock and 32,170,732 shares of Class B common stock outstanding.

All of the shares of Class A common stock sold in our initial public offering and June 2018 follow-on public offering are freely tradable without restrictions or further registration under the Securities Act of 1933, as amended, or the Securities Act, except for any shares held by our affiliates as defined in Rule 144 under the Securities Act.

Shares held by directors, executive officers and other affiliates are subject to volume limitations under Rule 144 under the Securities Act and various vesting agreements.

We have registered the offer and sale of an aggregate of approximately 17,845,247 shares of Class A common stock that have been issued or reserved for future issuance under our equity compensation plans on a Form S-8 registration statement. These shares can be freely sold in the public market upon issuance, unless they are held by “affiliates,” as that term is defined in Rule 144 of the Securities Act. Additionally, the number of shares of Class A common stock available for grant and issuance under our 2017 Equity Incentive Plan is subject to an automatic annual increase on January 1 of each year beginning in 2018 by an amount equal to the lesser of (i) 3% of the number of shares of all classes of our common stock outstanding on December 31 of the preceding calendar year or (ii) a lesser number of shares of Class A common stock determined by our board of directors. We also intend to register the offer and sale of any shares of Class A common stock resulting from such increases. If the holders of these shares choose to sell a large number of shares, they could adversely affect the market price for our Class A common stock.

We may also issue shares of our Class A common stock or securities convertible into shares of our Class A common stock from time to time in connection with a financing, acquisition, investment or otherwise. Any such issuance could result in substantial dilution to our existing stockholders and cause the trading price of our Class A common stock to decline.

The dual class structure of our common stock has the effect of concentrating voting control with certain stockholders who hold shares of our Class B common stock, including our founders, certain of our directors and executive officers and affiliates, who hold in the aggregate approximately 90% of the voting power of our capital stock. This will limit or preclude your ability to influence corporate matters, including the election of directors, amendments of our organizational documents, and any merger, consolidation, sale of all or substantially all of our assets, or other major corporate transaction requiring stockholder approval.

Our Class B common stock has ten votes per share, and our Class A common stock has one vote per share. Our Class B stockholders, including our founders, certain of our directors and executive officers, and affiliates, hold, in the aggregate approximately 90% of the voting power of our capital stock. The ten-to-one voting ratio between our Class B and Class A common stock, results in the holders of our Class B common stock collectively controlling a majority of the combined voting power of our common stock and therefore being able to control all matters submitted to our stockholders for approval until 2029, or upon the occurrence of a triggering event at which time all shares of our Class B common stock will automatically convert into shares of our Class A common stock, or on an earlier date, as set forth in our Delaware certificate of incorporation.

This concentrated control will limit or preclude your ability to influence corporate matters for the foreseeable future, including the election of directors, amendments of our organizational documents, and any merger, consolidation, sale of all or substantially all of our assets, or other major corporate transaction requiring stockholder approval. In addition, this may prevent or discourage unsolicited acquisition proposals or offers for our capital stock that you may feel are in your best interest as one of our stockholders.

Future transfers by holders of our Class B common stock will generally result in those shares converting to Class A common stock, subject to the specific exceptions set forth in our Delaware certificate of incorporation, such as certain transfers effected for estate planning purposes and between or among our founders. The conversion of Class B common stock to Class A common stock will have the effect, over time, of increasing the relative voting power of those holders of Class B common stock who retain their shares in the long-term.

Certain provisions in our charter documents and Delaware law could prevent an acquisition of our company, limit attempts by our stockholders to replace or remove members of our board of directors or current management and may adversely affect the market price of our Class A common stock.

Our Delaware certificate of incorporation and bylaws contain provisions that could delay or prevent a change in control of our company that stockholders may consider favorable, including transactions in which stockholders might otherwise receive a premium for their shares. These provisions may also prevent or delay attempts by stockholders to replace or remove our current management or members of our board of directors. These provisions include:

- providing for a dual class common stock structure for 12 years following the completion of our IPO;
- providing for a classified board of directors with staggered three-year terms, which could delay the ability of stockholders to change the membership of a majority of our board of directors;
- authorizing our board of directors to issue shares of preferred stock and to determine the price and other terms of those shares, including preferences and voting rights, without stockholder approval;
- the requirement that a special meeting of stockholders may be called only by the chairman of our board of directors, our chief executive officer, our president, or a majority vote of our board of directors, which could delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors;
- requiring the affirmative vote of holders of at least 66 2 / 3 % of the voting power of all of the then outstanding shares of the voting stock, voting together as a single class, to adopt, amend, or repeal provisions of (i) our certificate of incorporation relating to the issuance of preferred stock without stockholder approval, voting rights of our Class A common stock and our Class B common stock, and management of our business, and (ii) our bylaws relating to the ability of stockholders to call a special meeting and amending our bylaws in their entirety, which may inhibit the ability of an acquirer to effect such amendments to facilitate an unsolicited takeover attempt;
- the ability of our board of directors, by majority vote, to amend our bylaws, which may allow our board of directors to take additional actions to prevent an unsolicited takeover and inhibit the ability of an acquirer to amend our bylaws to facilitate an unsolicited takeover attempt; and
- requiring advance notice procedures with which stockholders must comply to nominate candidates to our board of directors or to propose matters to be acted upon at a stockholders' meeting, which may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of us.

In addition, as a Delaware corporation, we are subject to Section 203 of the Delaware General Corporation Law. These provisions may prohibit large stockholders, in particular those owning 15% or more of our outstanding voting stock, from merging or combining with us for a certain period of time.

These and other provisions in our certificate of incorporation, our bylaws and under Delaware law could discourage potential takeover attempts, reduce the price that investors might be willing to pay for shares of our Class A common stock in the future and result in the market price being lower than it would be without these provisions.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our corporate headquarters are located in Troy, Michigan. We own our corporate headquarters facility consisting of 132,900 square feet of office space. In addition, we maintain 21 domestic offices some of which are subject to master leases or subleases with multiyear lease terms in Alabama, Arizona, California, Massachusetts, Michigan, New York, North Carolina, Texas, Virginia, Washington, and Wisconsin. We maintain an office in New York which is leased under an annual lease.

In 2016, we acquired an undeveloped parcel of land adjacent to our headquarters, which we expect to develop over the next few years.

We maintain 60 international offices in Australia, Austria, Brazil, Canada, China, Finland, France, Germany, Greece, India, Israel, Italy, Japan, Malaysia, Mexico, Philippines, Singapore, South Africa, South Korea, Spain, Sweden, Taiwan, the United Kingdom and Vietnam. We lease all of our international facilities and do not own any real property outside of the United States. We expect to add facilities as we grow our employee base and expand geographically. We believe that our facilities are adequate to meet our needs for the immediate future, and that, should it be needed, suitable additional space will be available to accommodate expansion of our operations.

Item 3. Legal Proceedings

From time to time, we may be subject to legal proceedings and claims in the ordinary course of business. We have received, and may in the future continue to receive, claims from third parties asserting, among other things, infringement of their intellectual property rights. Future litigation may be necessary to defend ourselves, our partners and our customers by determining the scope, enforceability and validity of third party proprietary rights, or to establish and enforce our proprietary rights. The results of any current or future litigation cannot be predicted with certainty and regardless of the outcome, litigation can have an adverse impact on us because of defense and settlement costs, diversion of management resources and other factors.

Swedish Tax Litigation

The Swedish Tax Authorities, or STA, have assessed tax, penalties and interest in the amount of \$6.7 million related to the acquisition of Panopticon AB by Datawatch Corporation, or Datawatch, in 2013 for the years 2013, 2014 and 2015. The STA, upon auditing the acquisition transaction, reached a conclusion that post acquisition, certain assets were removed from Sweden, triggering the tax obligation. The STA is also of the opinion that some services related to product development provided to the new parent company in the U.S. were performed by Panopticon AB at a price below market price triggering a tax obligation. Datawatch contested the findings by the STA throughout the audit process and is now contesting the STA position in the first level of administrative courts. An Administrative Court hearing had been set for January 2019; however, upon Altair acquiring Datawatch and engaging new Swedish tax counsel, the Administrative Court agreed to a short postponement. A new hearing date is expected to be established no earlier than May or June of 2019. This tax controversy is a long-standing tax matter related to a unique combination of complex tax laws and regulations coupled with unusual facts and circumstances for which there appears to be little or no precedence in prior case law in this jurisdiction. Ultimate resolution of this matter, which could be several years from this point, inclusive of applicable appellate procedures, will be based upon significant judgment and interpretation by the parties involved, especially as this matter progresses through the court process.

MSC Litigation

On July 5, 2007, MSC Software Corporation, or MSC, filed a lawsuit against us and certain of our named employees in the United States District Court for the Eastern District of Michigan, asserting, among other things, that we and certain of our employees misappropriated alleged trade secrets that certain of our employees breached contractual non-solicitation and confidentiality obligations owed to MSC and that we tortiously interfered with MSC's contractual relations with these employees. In April 2014, a jury returned a \$26.1 million verdict against us on three trade secrets claims and a tortious interference claim as well as against certain of our employees for breach of contractual obligations to MSC. In November 2014, this verdict was partially vacated except for damages of \$425,000 related to the employment matters, and the Court ordered a new trial on damages for the trade secrets claims. On December 13, 2017, the court granted Altair's motion for summary judgment and dismissed MSC's claim of trade secret misappropriation. On January 5, 2018, MSC filed a notice of appeal of the final judgment entered on December 13, 2017 and prior orders in this action to the Sixth Circuit Court of Appeals. On January 19, 2018, Altair filed a cross-appeal. The Sixth Circuit referred the case to mediation. On August 28, 2018, the parties filed stipulations of dismissal with both the District Court and the Court of Appeals. The matter is settled.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Market Information for Common Stock

Our Class A common stock began trading on the Nasdaq Global Select Market under the symbol “ALTR” on November 1, 2017. Prior to that date, there was no public trading market for our Class A common stock.

Our Class B common stock is not listed nor traded on any stock exchange.

Holders

As of February 15, 2019, there were 474 registered stockholders of record of our Class A common stock, 4 registered stockholders of record of our Class B common stock, and we believe a substantially greater number of beneficial owners who hold shares through brokers, banks or other nominees.

Dividends

We have never declared or paid any cash dividends on our common stock. We currently intend to retain all available funds and any future earnings for use in the operation of our business and do not anticipate paying any dividends on our common stock in the foreseeable future. The terms of our 2017 Credit Agreement also restrict our ability to pay dividends, and we may also enter into credit agreements or other borrowing arrangements in the future that will restrict our ability to declare or pay cash dividends on our capital stock. Any future determination regarding the declaration and payment of dividends, if any, will be at the discretion of our board of directors and will depend on then-existing conditions, including our financial condition, operating results, contractual restrictions, capital requirements, business prospects, and other factors our board of directors may deem relevant. There can be no assurance that any dividends will be paid in the future.

Use of Proceeds

Initial public offering

On October 31, 2017, the Registration Statement on Form S-1 (File No. 333-220710) for our initial public offering was declared effective by the SEC. On November 3, 2017 we closed the initial public offering and sold 9,865,004 shares of our Class A common stock at a public offering price of \$13.00 per share for an aggregate offering price of approximately \$128.2 million.

The remainder of the information required by this item regarding the use of our IPO proceeds has been omitted pursuant to SEC rules because such information has not changed since our last periodic report was filed.

Unregistered Sales of Equity Securities

On October 15, 2018, in connection with the acquisition of SIMSOLID Corporation, a Canadian corporation, or SIMSOLID, the Company issued to shareholders of SIMSOLID 145,000 shares of our Class A common stock and two convertible promissory notes convertible into an aggregate of 41,537 shares of our Class A common stock with a maturity date of October 16, 2021, or the Notes, and obligated itself to issue, pursuant to contractual covenants, an additional 103,463 shares of the Company’s Class A common stock. With respect to the shares issuable pursuant to the Notes, if the principal amounts of the Notes are converted on or after October 16, 2019, the holder of the Note is entitled to one-half of the total shares underlying such Note and if the principal amounts of the Notes are converted on or after October 16, 2020 the holder of the Note is entitled to the total shares underlying the Note. With respect to the shares issuable pursuant to the contractual covenants, or the Deferred Shares, one-half of such shares will be issued on October 16, 2019 and the remaining shares will be issued on October 16, 2020. The Deferred Shares are subject to acceleration in the event of a change of control of us, and therefore may be issued earlier than the dates stated above. The Deferred Shares are also subject to a reduction as a set-off to any indemnification obligations, and therefore all or a portion of the Deferred Shares may not be issued on the dates stated above or at all. The issuance of securities was exempt from registration under the Securities Act of 1933, as amended, or the Securities Act, pursuant to Section 4(a)(2) of the Securities Act. We relied on the written recipients of the shares as to their statuses as “accredited investors” as defined in Rule 501(a) of Regulation D.

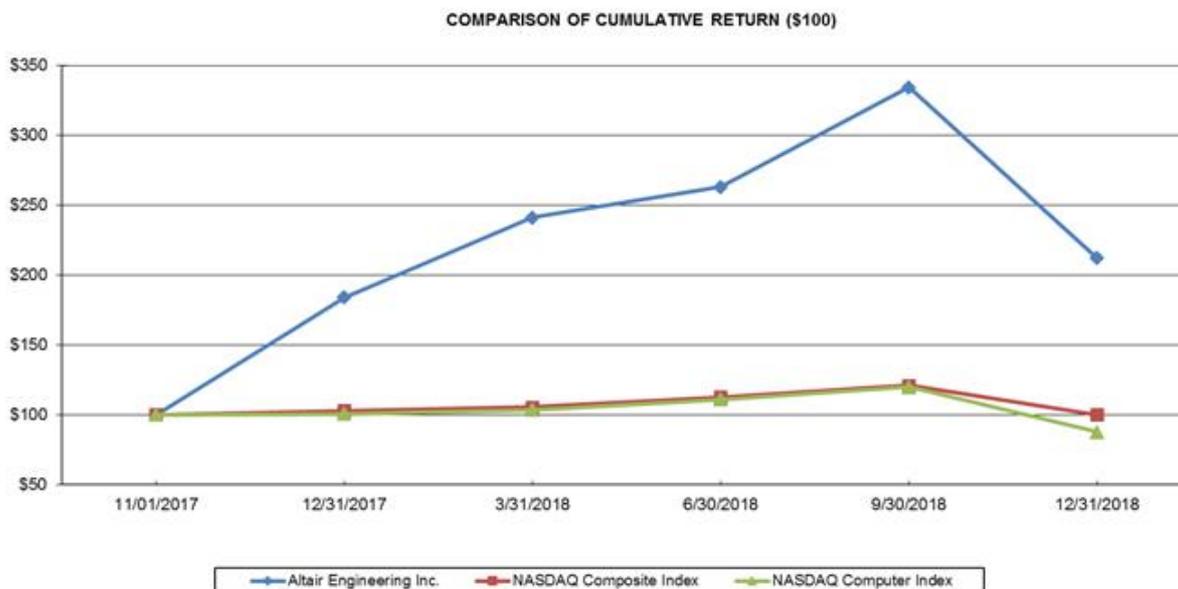
Performance Graph

The following shall not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or incorporated by reference into any of our other filings under the Securities Exchange Act of 1934, as amended, or the Securities Act .

The graph below compares the cumulative total stockholder return on our Class A common stock with the cumulative total return on the Nasdaq Composite Index and the Nasdaq Computer Index. The graph assumes \$100 was invested at the market close on November 1, 2017, which was our initial trading day, in our Class A common stock, the Nasdaq Composite Index and the Nasdaq Computer Index.

Data for the Nasdaq Composite Index and the Nasdaq Computer Index assumes reinvestment of dividends. The offering price of our Class A common stock in our IPO, which had a closing stock price of \$18.31, was \$13.00 per share.

The comparisons in the graph below are based upon historical data and are not indicative of, nor intended to forecast, future performance of our Class A common stock.



Item 6. Selected Financial Data

The following tables summarize the consolidated financial data for our business. You should read this summary of consolidated financial data in conjunction with the “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and our consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K. The consolidated statements of operations data for the fiscal years ended December 31, 2018, 2017 and 2016, and the consolidated balance sheet data as of December 31, 2018 and 2017 are derived from our audited consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K. The consolidated statements of operations data for the fiscal year ended December 31, 2015, and the consolidated balance sheet data as of December 31, 2016 are derived from audited consolidated financial statements that are not included in this Annual Report on Form 10-K. Our historical results are not necessarily indicative of the results that may be expected in the future. The summary consolidated financial data in this section are not intended to replace our consolidated financial statements and the related notes, and are qualified in their entirety by the consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K.

(in thousands, except share data)	Year ended December 31,			
	2018 (1)	2017 (1)	2016 (1)	2015 (1)
Consolidated statements of operations data:				
Revenue:				
License	\$ 207,164			
Maintenance and other services	97,197			
Total software	304,361	\$ 244,817	\$ 223,818	\$ 205,567
Software related services	36,945	35,397	35,770	37,294
Total software and related services	341,306	280,214	259,588	242,861
Client engineering services	47,852	46,510	47,702	45,075
Other	7,221	6,609	5,950	6,193
Total revenue	396,379	333,333	313,240	294,129
Cost of revenue:				
License	16,119			
Maintenance and other services	29,655			
Total software (1)	45,774	36,360	31,962	27,406
Software related services	26,415	26,888	27,653	30,079
Total software	72,189	63,248	59,615	57,485
Client engineering services	38,979	38,131	38,106	36,081
Other	4,805	5,212	4,879	5,642
Total cost of revenue	115,973	106,591	102,600	99,208
Gross profit	280,406	226,742	210,640	194,921
Operating expenses:				
Research and development (2)	97,592	93,234	71,325	62,777
Sales and marketing (2)	80,277	79,958	66,086	63,080
General and administrative (2)	79,751	87,979	57,202	54,069
Amortization of intangible assets	7,739	5,448	3,322	2,624
Other operating income	(9,597)	(6,620)	(2,742)	(2,576)
Total operating expenses	255,762	259,999	195,193	179,974
Operating income (loss)	24,644	(33,257)	15,447	14,947
Interest expense	200	2,160	2,265	2,416
Other (income) expense, net	(2,580)	994	(520)	782
Income (loss) before income taxes	27,024	(36,411)	13,702	11,749
Income tax expense	13,309	62,996	3,539	818
Net income (loss)	\$ 13,715	\$ (99,407)	\$ 10,163	\$ 10,931
Income (loss) per share:				
Net income (loss) per share attributable to common stockholders, basic (2)	\$ 0.20	\$ (1.89)	\$ 0.21	\$ 0.23
Net income (loss) per share attributable to common stockholders, diluted (2)	\$ 0.18	\$ (1.89)	\$ 0.18	\$ 0.19
Weighted average shares outstanding:				
Weighted average number of shares used in computing net income (loss) per share, basic (3)	67,468	52,466	48,852	46,609
Weighted average number of shares used in computing net income (loss) per share, diluted (3)	74,878	52,466	57,856	58,709
Other financial information:				
Net cash provided by operating activities	\$ 36,230	\$ 16,091	\$ 21,385	\$ 10,838

- (1) The year ended December 31, 2018 has been reported under ASC 606, and the years ended December 31, 2017, 2016, and 2015, have been reported under ASC 605 and have not been adjusted under the modified retrospective approach. See Note 3 in the Notes to consolidated financial statements included elsewhere in this Annual Report on Form 10-K.
- (2) Includes stock-based compensation expense as follows:

(in thousands)	Year ended December 31,			
	2018	2017	2016	2015
Cost of revenue—software	\$ 31	\$ 350	\$ 22	\$ 44
Research and development	740	12,540	1,370	149
Sales and marketing	910	7,693	775	109
General and administrative	1,658	26,698	2,965	295
Total stock-based compensation expense	\$ 3,339	\$ 47,281	\$ 5,132	\$ 597

- (3) See Note 15 to our consolidated financial statements for an explanation of the method used to calculate basic and diluted net income (loss) per share attributable to common stockholders.

(in thousands)	As of December 31,		
	2018	2017	2016
Consolidated balance sheet data:			
Cash and cash equivalents	\$ 35,345	\$ 39,213	\$ 16,874
Working capital	\$ 26,276	\$ (53,575)	\$ (52,902)
Total assets	\$ 483,216	\$ 287,871	\$ 250,776
Deferred revenue, current and non-current	\$ 66,519	\$ 139,762	\$ 113,929
Debt	\$ 31,748	\$ 410	\$ 85,241
Total stockholders' equity (deficit)	\$ 286,782	\$ 60,591	\$ (34,653)

Key metrics

We monitor the following key non-GAAP, (United States generally accepted accounting principles), financial and operating metrics to help us evaluate our business, measure our performance, identify trends affecting our business, formulate business plans and make strategic decisions. In addition to our results determined in accordance with GAAP, we believe the following non-GAAP financial and operating metrics are useful in evaluating our operating performance.

Billings. Billings consists of our total revenue plus the change in our deferred revenue, excluding deferred revenue from acquisitions during the period. Given that we generally bill our customers at the time of sale but typically recognize a portion of the related revenue ratably over time, management believes that Billings is a meaningful way to measure and monitor our ability to provide our business with the working capital generated by upfront payments from our customers. While we believe that Billings provides valuable insight into the cash that will be generated from sales of our software and services, this metric may vary from period-to-period for a number of reasons including the impact of changes in foreign currency exchange rates and the potential impact of acquisitions. See the section entitled “Reconciliation of non-GAAP financial measures” for a reconciliation of Billings to revenue, the most directly comparable financial measure calculated in accordance with GAAP.

Our Billings were as follows:

(in thousands)	Year ended December 31,		
	2018	2017	2016
Billings	\$ 401,913	\$ 357,212	\$ 320,299

Adjusted EBITDA. We define Adjusted EBITDA as net income (loss) adjusted for income tax expense (benefit), interest expense, interest income and other, depreciation and amortization, stock-based compensation expense, restructuring charges, asset impairment charges and other special items as determined by management. We believe that Adjusted EBITDA is a meaningful measure of performance as it is commonly utilized by us and the investment community to analyze operating performance in our industry. See the section entitled “Reconciliation of non-GAAP financial measures” for a reconciliation of Adjusted EBITDA to net income (loss), the most directly comparable financial measure calculated in accordance with GAAP.

Our Adjusted EBITDA was as follows:

(in thousands)	Year ended December 31,		
	2018	2017	2016
Adjusted EBITDA	\$ 50,180	\$ 22,517	\$ 30,830

Free Cash Flow. Free Cash Flow is a non-GAAP financial measure that we calculate as cash flow provided by operating activities less capital expenditures. We believe that Free Cash Flow is useful in analyzing our ability to service and repay debt, when applicable, and return value directly to stockholders. See the section entitled “Reconciliation of non-GAAP financial measures” for a reconciliation of Free Cash Flow to net cash provided by operating activities, the most directly comparable financial measure calculated in accordance with GAAP.

Our Free Cash Flow was as follows:

(in thousands)	Year ended December 31,		
	2018	2017	2016
Free Cash Flow	\$ 29,571	\$ 8,569	\$ 11,941

Recurring Software License Rate. A key factor to our success is our recurring software license rate which we measure through billings, primarily derived from annual renewals of our existing subscription customer agreements. We calculate our recurring software license rate for a particular period by dividing (i) the sum of software term-based license billings, software license maintenance billings, and 20% of software perpetual license billings which we believe approximates maintenance as an element of the arrangement by (ii) the total software license, including all term-based subscriptions, maintenance and perpetual license billings from all customers for that period. For the years ended December 31, 2018, 2017 and 2016, our recurring software license rate was 89%, 89% and 90%, respectively.

These non-GAAP financial measures reflect an additional way of viewing aspects of our business that, when viewed with our GAAP results and the accompanying reconciliations to corresponding GAAP financial measures included in the tables below, may provide a more complete understanding of factors and trends affecting our business. These non-GAAP financial measures should not be relied upon to the exclusion of GAAP financial measures and are by definition an incomplete understanding of the Company and must be considered in conjunction with GAAP measures.

We believe that the non-GAAP measures disclosed herein are only useful as an additional tool to help management and investors make informed decisions about our financial and operating performance and liquidity. By definition, non-GAAP measures do not give a full understanding of the Company. To be truly valuable, they must be used in conjunction with the comparable GAAP measures. In addition, non-GAAP financial measures are not standardized. It may not be possible to compare these financial measures with other companies’ non-GAAP financial measures having the same or similar names. We strongly encourage investors to review our consolidated financial statements and the notes thereto in their entirety and not to rely on any single financial measure.

Reconciliation of non-GAAP financial measures

The following tables provide reconciliations of revenue to Billings, net income (loss) to Adjusted EBITDA and net cash provided by operating activities to Free Cash Flow:

Billings

(in thousands)	Year ended December 31,		
	2018	2017	2016
Revenue	\$ 396,379	\$ 333,333	\$ 313,240
Ending deferred revenue	66,519	139,762	113,929
Adoption of ASC 606 on beginning deferred revenue	82,909	—	—
Beginning deferred revenue	(139,762)	(113,929)	(106,516)
Acquisition related deferred revenue	(4,132)	(1,954)	(354)
Billings	\$ 401,913	\$ 357,212	\$ 320,299

Adjusted EBITDA

(in thousands)	Year Ended December 31,		
	2018	2017	2016
Net income (loss)	\$ 13,715	\$ (99,407)	\$ 10,163
Income tax expense	13,309	62,996	3,539
Stock-based compensation	3,339	47,281	5,132
Interest expense	200	2,160	2,265
Interest income and other ⁽¹⁾	4,883	(2,260)	(249)
Depreciation and amortization	14,734	11,747	9,980
Adjusted EBITDA	\$ 50,180	\$ 22,517	\$ 30,830

(1) Includes for the year ended December 31, 2018 a) nonrecurring costs from the acquisition of Datawatch of \$10.4 million, b) gain on the sale of a building of \$4.4 million and c) impairment charges for royalty contracts and trade names resulting in \$2.8 million of expense. Includes for the years ended December 31, 2018 and 2017, a non-recurring adjustment for a change in estimated legal expenses resulting in \$2.0 million of income in each year.

(in thousands)	Three months ended			
	ASC 606			
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018
Net income (loss)	\$ 24,684	\$ (1,080)	\$ 934	\$ (10,823)
Income tax expense	2,345	1,387	1,885	7,692
Stock-based compensation	216	434	563	2,126
Interest expense	16	45	31	108
Interest income and other ⁽¹⁾	(1,255)	536	(4,384)	9,986
Depreciation and amortization	3,543	3,982	3,370	3,839
Adjusted EBITDA	\$ 29,549	\$ 5,304	\$ 2,399	\$ 12,928

(1) Includes the following items:

- March 31, 2018 includes a non-recurring adjustment for a change in estimated legal expenses resulting in \$2.0 million of income and an impairment charge for royalty contracts resulting in \$0.9 million of expense.
- June 30, 2018 includes an impairment charge for royalty contracts resulting in \$0.9 million of expense.
- September 30, 2018 includes a gain on the sale of a building for \$4.4 million and an impairment charge for royalty contracts and trade names resulting in \$0.8 million of expense.
- December 31, 2018 includes a non-recurring costs from the acquisition of Datawatch of \$10.4 million and an impairment charge for royalty contracts resulting in \$0.2 million of expense.

Free Cash Flow

(in thousands)	Year ended December 31,		
	2018	2017	2016
Net cash provided by operating activities	\$ 36,230	\$ 16,091	\$ 21,385
Capital expenditures	(6,659)	(7,522)	(9,444)
Free Cash Flow	\$ 29,571	\$ 8,569	\$ 11,941

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

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our audited consolidated financial statements (and notes thereto) for the year ended December 31, 2018 included elsewhere in this Annual Report on Form 10-K. This discussion contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those discussed below. Factors that could cause or contribute to such differences include, but are not limited to, those identified below and those discussed in “Risk factors” and “Cautionary Note Regarding Forward-Looking Statements” included elsewhere in this Annual Report on Form 10-K.

Overview

We are a global technology company providing software and cloud solutions in the areas of product design and development, high performance computing, or HPC, and data intelligence. We enable organizations across broad industry segments to compete more effectively in a connected world while creating a more sustainable future.

Our simulation-driven approach to innovation is powered by our broad portfolio of high-fidelity and high-performance physics solvers. Our integrated suite of software optimizes design performance across multiple disciplines encompassing structures, motion, fluids, thermal management, electromagnetics, system modeling, and embedded systems, while also providing data intelligence and true-to-life visualization and rendering.

Altair’s software products represent a comprehensive, open architecture solution for simulation, data intelligence and cloud computing to empower decision making for improved product development, manufacturing, energy management and exploration, financial services, health care, and retail operations. We believe our products offer a comprehensive set of technologies to design and optimize high performance, efficient, innovative and sustainable products and processes in an increasingly connected world. Our products are categorized by:

- Design, Modeling & Visualization;
- Physics Simulation;
- Data Intelligence;
- High Performance Cloud Computing; and
- Internet of Things, or IoT.

Altair also provides client engineering services, or CES, to support our customers with long-term ongoing expertise. This has the benefit of embedding us within customers, deepening our understanding of their processes, and allowing us to more quickly perceive trends in the overall market. Our presence at our customers’ sites helps us to better tailor our software products’ research and development, or R&D, and sales initiatives.

Our business model

Altair pioneered a patented units-based subscription licensing model for software and other digital content. This units-based subscription licensing model allows flexible and shared access to our offerings, along with over 150 partner products. Our HyperWorks customers license a pool of units for their organizations giving individual users access to our entire portfolio of software applications as well as our growing portfolio of partner products. Our primarily mid-market solidThinking customers have access to a subset of the portfolio at a lower price point. We believe our units-based subscription licensing model lowers barriers to adoption, creates broad engagement, encourages users to work within our ecosystem, and increases revenue. This, in turn, helps drive our recurring software license rate which has been on average approximately 88% over the past five years. In each of the last three fiscal years, approximately 60% of new software revenue comes from expansion within existing customers.

Initial public offering

On November 3, 2017, we closed our initial public offering and sold 9,865,004 shares of our Class A common stock at a public offering price of \$13.00 per share for an aggregate offering price of approximately \$128.2 million. We received net proceeds of \$114.4 million, after deducting underwriting discounts, commissions and offering expenses.

Follow-on public offering

On June 11, 2018, we closed our follow-on public offering and sold 4,056,004 shares of our Class A common stock at a public offering price of \$35.00 per share for an aggregate offering price of approximately \$142.0 million. We received net proceeds of \$135.2 million, after deducting underwriting discounts, commissions and offering expenses.

The follow-on public offering also included the sale of 2,307,420 shares of Class A common stock by selling stockholders, giving effect to the conversion of 1,675,420 shares of Class B common stock into an equivalent number of shares of Class A common stock, and the exercise of 257,000 options to purchased Class A common stock. We did not receive any proceeds from the sale of shares of Class A common stock by the selling stockholders other than the \$0.5 million in proceeds from exercises of stock options by certain selling stockholders.

Factors affecting our performance

We believe that our future success will depend on many factors, including those described below. While these areas present significant opportunity, they also present risks that we must manage to achieve successful results. If we are unable to address these challenges, our business, operating results and prospects could be harmed. See Part I, Item 1A. – Risk Factors included elsewhere in this Annual Report on Form 10-K.

Seasonality and quarterly results

Our billings have historically been highest in the first and fourth quarters of any calendar year and may vary in future quarters. The timing of recording billings and the corresponding effect on our cash flows may vary due to the seasonality of the purchasing patterns of our customers. In addition, the timing of the recognition of revenue, the amount and timing of operating expenses, including employee compensation, sales and marketing activities, and capital expenditures, may vary from quarter-to-quarter which may cause our reported results to fluctuate significantly. In addition, we may choose to grow our business for the long-term rather than to optimize for profitability or cash flows for a particular shorter-term period. This seasonality or the occurrence of any of the factors above may cause our results of operations to vary and our financial statements may not fully reflect the underlying performance of our business.

Integration of recent acquisitions

We believe that our recent acquisitions result in certain benefits, including expanding our portfolio of software and products and enabling us to better serve our customer's requests for data intelligence and simulation technology. However, to realize some of these anticipated benefits, the acquired businesses must be successfully integrated. The success of these acquisitions will depend in part on our ability to realize these anticipated benefits. We may fail to realize the anticipated benefits of these acquisitions for a variety of reasons.

Foreign currency fluctuations

Because of our substantial international operations, we are exposed to foreign currency risks that arise from our normal business operations, as well as our transactions that are denominated in foreign currencies, including the Euro, British Pound Sterling, Indian Rupee, Japanese Yen, and Chinese Yuan. To present the changes in our underlying business without regard to the impact of currency fluctuations, we evaluate certain of our operating results both on an as reported basis, as well as on a constant currency basis.

Constant currency amounts exclude the effect of foreign currency fluctuations on our reported results. Our comparative financial results were impacted by fluctuations in the value of the United States dollar relative to other currencies during the year ended December 31, 2018, as compared to the year ended December 31, 2017. To present this information, the results for 2018 for entities whose functional currency is a currency other than the United States dollar were converted to United States dollars at rates that were in effect for 2017. These adjusted amounts are then compared to our current period reported amounts to provide operationally driven variances in our results.

The net positive effects of currency fluctuations on our Revenue and Adjusted EBITDA are reflected in the table below.

(in thousands)	Year ended December 31, 2018	
Revenue	\$	4,027
Adjusted EBITDA	\$	1,422

Expanded use of our software applications

Our ability to grow our revenue is affected, in part, by the pace at which our customers continue to expand their use of our design, simulation, optimization and analysis applications, and suite of data intelligence products and the degree to which prospective customers realize the benefit of using our software applications. To grow our presence within our customers and attract new customers, we devote substantial sales and marketing resources to drive increased adoption across our existing customers and encourage new customers to commence using our software. As a result of this "land and expand" business model, we expect to

generate additional revenue from our current and future customer base. To the extent our sales and marketing efforts do not translate into customer retention or expansion, or if we do not allocate those expenses efficiently, our financial performance may be adversely affected. Therefore, our financial performance will depend in part on the degree to which our “land and expand” strategies are successful.

Investments for growth

We have made and plan to continue to make investments for long-term growth, including investments in our ongoing research and development activities seeking to create new software and to enhance our existing applications to address emerging technology trends and additional customer needs. Generally, the development of new or improved applications in our software can result in the expansion of our user base within an organization and a potential increase in revenue over time, although the expenditures associated with such developments may adversely affect our performance in the near term. We intend to continue to invest resources in sales and marketing, by further expanding our sales teams and increasing our marketing activities. Our ability to continue to grow revenue from our current and potential customer base is dependent, in part, upon the success of our current and future research and development and sales and marketing activities.

Business segments

We have identified two reportable segments: Software and Client Engineering Services:

- *Software* —Our Software segment includes software and software related services. The software component of this segment includes our portfolio of software products including our solvers and optimization technology products, modeling and visualization tools, data intelligence and analysis products, high performance computing, or HPC, software applications and hardware products, IoT platform and analytics tools as well as support and the complementary software products we offer through our Altair Partner Alliance, or APA. The APA includes technologies ranging from computational fluid dynamics and fatigue to manufacturing process simulation and cost estimation. The software related services component of this segment includes consulting, implementation services, and training focused on product design and development expertise and analysis from the component level up to complete product engineering at any stage of the lifecycle.
- *Client Engineering Services* —Our client engineering services, or CES, segment provides client engineering services to support our customers with long-term, ongoing expertise. We operate our CES business by hiring engineers and data scientists for placement at a customer site for specific customer-directed assignments. We employ and pay them only for the duration of the placement.

Our other businesses which do not meet the criteria to be separate reportable segments are combined and reported as “Other” which represents innovative services and products, including toggled, our LED lighting business. toggled is focused on developing and selling next-generation solid state lighting technology along with communication and control protocols based on our intellectual property for the direct replacement of fluorescent light tubes with LED lamps. Other businesses combined within Other include our WEYV business, a consumer music and content service, and potential services and product concepts that are still in their development stages.

For additional information about our reportable segments and other businesses, see Note 20 in the Notes to consolidated financial statements in Item 15, Part IV of this Annual Report on Form 10-K.

Adoption of ASC 606

Effective January 1, 2018, we adopted ASC 606 as a result of no longer qualifying as an Emerging Growth Company. The adoption of ASC 606 accelerates the recognition of revenues compared to ASC 605. Under ASC 605, we did not have vendor-specific objective evidence, or VSOE, of fair value for post-contract customer support, or PCS, sold along with software products licenses; therefore, revenues for the software products licenses (including perpetual licenses), PCS and professional services, if applicable, were considered to be one accounting unit and, once all services have commenced, were recognized ratably over the remaining period of the arrangement (the longer of the contractual service term or PCS term). Under ASC 606, the concept of assessing VSOE has been eliminated and we determined standalone selling price and allocated transaction price associated with each performance obligation within an arrangement. As a result, the timing of revenue recognition was accelerated because license revenue will be recognized at a point in time, rather than over time.

Results for reporting periods beginning on or after January 1, 2018 are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported in accordance with ASC 605, and other industry specific guidance. The adoption of ASC 606 represents a change in accounting principle that will more closely align revenue recognition with the transfer of promised goods or services to a customer in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. ASC 606 requires an entity to evaluate revenue recognition by identifying a contract with a customer, identifying

the performance obligations in the contract, determining the transaction price, allocating the transaction price to the performance obligations in the contract, and recognizing revenue when (or as) the entity satisfies a performance obligation. Topic 606 also includes Subtopic 340-40 which provides accounting guidance for incremental costs of obtaining a contract with a customer. We refer to Topic 606 and Subtopic 340-40 collectively as “ASC 606.”

(dollars in thousands)	Year Ended December 31, 2018		
	As Reported under ASC 606	Adjustments for ASC 606	ASC 605
Revenue	\$ 396,379	\$ 11,317	\$ 385,062
Gross profit	\$ 280,406	\$ 11,317	\$ 269,089
Net income	\$ 13,715	\$ 10,816	\$ 2,899
Adjusted EBITDA	\$ 50,180	\$ 11,653	\$ 38,527

We had total revenue of \$396.4 million, \$333.3 million and \$313.2 million for the years ended December 31, 2018, 2017 and 2016, respectively, reflecting year-over-year increases of 19% and 6%. The net increase in software revenue due to the adoption of ASC 606 was \$11.3 million for the year ended December 31, 2018. Excluding the impact of ASC 606, revenue increased 16% for the year ended December 31, 2018. We reported net income of \$13.7 million for the year ended December 31, 2018, a net loss of \$99.4 million for the year ended December 31, 2017, and net income of \$10.2 million for the year ended December 31, 2016.

The following table set forth selected quarterly information. The information for each of these quarters has been prepared on the same basis as the audited annual consolidated financial statements and, in the opinion of management, includes all adjustments, which consist only of normal recurring adjustments, necessary for the fair presentation of the results of operations for these periods in accordance with GAAP.

(in thousands)	Three months ended			
	ASC 606			
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018
Software product revenue	\$ 89,670	\$ 70,606	\$ 64,182	\$ 79,903
Total revenue	\$ 113,257	\$ 93,360	\$ 86,751	\$ 103,011
Net income (loss)	\$ 24,684	\$ (1,080)	\$ 934	\$ (10,823)
Adjusted EBITDA	\$ 29,550	\$ 5,303	\$ 2,399	\$ 12,928

Components of results of operations

Revenue

We primarily derive revenue from the licensing of our software, which includes our units-based subscription licensing model and for term and perpetual software licenses, as well as software related services. Our CES business derives revenue from providing engineers and data scientists to support our customers’ long-term, ongoing projects.

Software segment

Software segment revenue consists of revenue from software licenses and software related services including consulting, implementation services, training, and support. To a much lesser extent, the Software segment also includes revenue from the sale of hardware products, primarily as a result of recent business acquisitions.

Software

Software revenue is principally comprised of subscription licenses, and to a lesser extent, perpetual licenses and associated maintenance and support fees. Subscriptions are typically governed by contracts with annual terms which include product updates, maintenance and support. With the adoption of ASC 606, we generally recognize software license revenue up front, while maintenance and support revenue is generally recognized over the term of the contract.

Software related services

Software related services includes consulting, implementation services and training. Our software related services team is comprised of almost 350 highly technical people globally. We focus on establishing a strong working relationship with the user community

allowing us to offer guidance and expertise throughout their product creation process. We generally recognize revenue for software related services as those services are performed.

Client engineering services segment

We operate our CES business by hiring engineers and data scientists for placement at a customer site for specific customer-directed assignments. We employ and pay them only for the duration of the placement.

Our CES business generates revenue from placing simulation specialists, industrial designers, design engineers, materials experts, development and test engineers, manufacturing engineers, information technology specialists and data scientists on-site with our customers in businesses operating in the virtual simulation, product design and development, software development, high-performance computing and data intelligence spaces. We recognize CES revenue based upon hours worked and contractually agreed-upon hourly rates.

Other

Our Other revenue consists primarily of revenue related to our LED lighting business operated out of our wholly-owned subsidiary, toggled. toggled designs, and sources through contract manufacturers, LED lighting and related products for sale to consumers and businesses. We also generate revenue through royalties from licensing toggled technology to third party manufacturers and resellers.

Cost of revenue

Software segment

Cost of software revenue consists of expenses related to software licensing, hardware sales and customer support. Significant expenses include employee compensation and related costs for support team members, travel costs, and royalties for third-party software products available to customers through our products or as part of our APA.

Software

Cost of software revenue consists of personnel and related costs, such as salaries, benefits, bonuses and stock-based compensation, as well as travel expenses, hardware costs and certain data center and facility costs, and substantially all royalty expenses.

Software related services

Cost of software related services revenue consists of personnel and related costs, such as salaries, benefits, bonuses and stock-based compensation, as well as travel expenses and certain data center and facility costs.

Cost of client engineering services

Cost of engineering services revenue consists primarily of employee compensation and related costs. We employ and pay them only for the duration of the placement at a customer site.

Cost of other

Cost of other revenue includes the cost of LED lighting products and freight related to products sold to retail and commercial sales channels.

Operating expenses

Operating expenses, as defined and discussed below, support all the products and services that we provide to our customers and, as a result, they are presented in an aggregate total.

Research and development

Research and development expenses consist primarily of employee compensation and related costs associated with our development team, including salaries, benefits, bonuses, stock-based compensation expense and allocated overhead costs. Our research and development efforts are focused on enhancing the functionality, breadth and scalability of our software, addressing new use cases, and developing additional innovative technologies. Timely development of new products is essential to maintaining our competitive position, and we release new versions of our software on a regular basis. All software development costs are expensed as incurred as our current software development process is essentially completed concurrent with the establishment of technological feasibility.

Sales and marketing

Sales and marketing expenses consist primarily of employee compensation and related costs associated with our sales and marketing staff, including salaries, benefits, bonuses, commissions and stock-based compensation, as well as costs relating to our marketing and business development programs including trade shows and events. We intend to continue to invest resources in our sales and marketing initiatives to drive growth and extend our market position.

General and administrative

General and administrative expenses consist of employee compensation and related costs for executive, finance, legal, human resources, recruiting, and employee-related information technology and administrative personnel, including salaries, benefits, bonuses and stock-based compensation expense, professional fees for external legal and accounting services, depreciation, facilities, recruiting and other consulting services.

Amortization of intangible assets

Amortization of intangible assets consists primarily of amortization of intangibles associated with acquisitions. We expect to incur additional amortization expenses resulting from future strategic acquisitions.

Other operating income

Other operating income consists primarily of government subsidies, primarily in France, in the form of grant income associated with certain of our research and development activities and other items as disclosed.

Interest expense

Interest expense consists of interest expense on our outstanding indebtedness and amortization of debt issuance costs.

Other (income) expense, net

Other (income) expense, net is comprised primarily of foreign currency exchange gains and losses generated from the settlement and remeasurement of transactions denominated in currencies other than the functional currency of our operating units and interest income on invested cash.

Income tax expense

Income tax expense is comprised primarily of income taxes related to United States, foreign, and state jurisdictions in which we conduct business. We record interest and penalties related to income tax matters as income tax expense. We expect the amount of income tax expense (benefit), if any, to vary each reporting period depending upon fluctuations in our quantum and tax jurisdictional mix of income (loss). We have substantial United States net operating loss carryforwards with no expiration period for losses generated 2018 onwards, and tax credit carryforwards which began to expire in 2018. The ability to utilize these tax attributes is highly dependent upon our ability to generate taxable income in the United States in the future.

Our future effective annual tax rate may be materially impacted by the amount of benefits and charges from tax amounts associated with our foreign earnings that are taxed at rates different from the federal statutory rate, the taxation of the foreign earnings in the U.S. under the Global Intangible Low-Taxed Income, or GILTI, regime, changes in valuation allowances, level of profit before tax, accounting for uncertain tax positions, stock-based compensation, business combinations, closure of statute of limitations, settlements of tax audits, and changes in tax laws including United States tax law changes that were enacted in December 2017. A significant amount of our earnings is generated in our EMEA and APAC regions. Our future effective tax rates may be adversely affected to the extent earnings are lower than anticipated in countries where we have lower statutory tax rates.

As of December 31, 2018 and 2017, we had gross deferred tax assets, or DTAs, of \$92.6 million and \$73.6 million, respectively, primarily related to net operating loss carryforwards, tax credits, share-based compensation, deferred revenue, and capitalized research and development expenses. We are entitled to a United States federal tax deduction when non-qualified stock options, or NSOs, are exercised. In connection with our IPO, a significant number of our NSOs were exercised, resulting in a tax deduction for United States income tax purposes. This deduction, in conjunction with other expected deferred tax asset reversals, resulted in our needing to establish a valuation allowance for \$47.0 million in 2017 for the United States DTAs. Our ability to utilize any net operating losses or tax credits may be limited under provisions of the Code if we undergo an ownership change after our IPO (generally defined as a greater than 50-percentage point cumulative change (by value) in the equity ownership of certain stockholders over a rolling three-year period). We also inherited net operating losses, or NOLs, from the acquisition of Datawatch, which are subject to specific limitations on usage. We may also be unable to realize our tax credit carryforwards which began to expire in 2018.

Based on the evidence available, including a lack of taxable earnings in the United States, we recorded a valuation allowance against substantially all of our net deferred tax assets in the United States. If a change in judgment regarding this valuation allowance were to occur in the future, we will record a potentially material deferred tax benefit, which could result in a favorable impact on our effective tax rate in that period. The utilization of tax attributes to offset taxable income reduces the amount of deferred tax assets subject to a valuation allowance.

The Tax Cuts and Jobs Act, or the Tax Act, was enacted on December 22, 2017. The Tax Act reduces the U.S. federal corporate income tax rate from 35% to 21%, requires companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and creates new taxes on certain foreign sourced earnings. Previously, we applied the guidance in Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cut and Jobs Act when accounting for the enactment-date effects of the Tax Act. At December 31, 2018, we have completed our accounting for the tax effects of the Tax Act; we have not recorded any adjustments to the provisional amounts recorded at December 31, 2017 related to the remeasurement of our deferred balances. At December 31, 2017, we originally recorded a provisional amount for its one-time transition tax of \$4.2 million, which was substantially offset by available foreign tax credits. During the year ended December 31, 2018, we revised our estimate of the provisional amount of the one-time transition tax. Upon further analyses of certain aspects of the Tax Act and refinement of its calculations, we increased our provisional amount of transition tax by approximately \$0.6 million. This resulted in no change to income tax expense due to the impact of foreign tax credits.

The Tax Act subjects a U.S. shareholder to current tax on Global Intangible Low-Taxed Income, or GILTI, earned by certain foreign subsidiaries. The impact of GILTI resulted in no incremental tax expense for the year ended December 31, 2018 due to a full valuation allowance on U.S. net deferred tax assets. In addition, we have made an accounting policy election to treat taxes due under the GILTI provision as a current period expense.

Results of operations

The following table sets forth our results of operations and certain financial data for the years ended December 31, 2018, 2017 and 2016:

(in thousands)	Year ended December 31,		
	2018 (1)	2017 (1)	2016 (1)
Revenue:			
License	\$ 207,164		
Maintenance and other services	97,197		
Total software	304,361	\$ 244,817	\$ 223,818
Software related services	36,945	35,397	35,770
Total software and related services	341,306	280,214	259,588
Client engineering services	47,852	46,510	47,702
Other	7,221	6,609	5,950
Total revenue	396,379	333,333	313,240
Cost of revenue:			
License	16,119		
Maintenance and other services	29,655		
Total software	45,774	36,360	31,962
Software related services	26,415	26,888	27,653
Total software	72,189	63,248	59,615
Client engineering services	38,979	38,131	38,106
Other	4,805	5,212	4,879
Total cost of revenue	115,973	106,591	102,600
Gross profit	280,406	226,742	210,640
Operating expenses:			
Research and development	97,592	93,234	71,325
Sales and marketing	80,277	79,958	66,086
General and administrative	79,751	87,979	57,202
Amortization of intangible assets	7,739	5,448	3,322
Other operating income	(9,597)	(6,620)	(2,742)
Total operating expenses	255,762	259,999	195,193
Operating income (loss)	24,644	(33,257)	15,447
Interest expense	200	2,160	2,265
Other (income) expense, net	(2,580)	994	(520)
Income (loss) before income taxes	27,024	(36,411)	13,702
Income tax expense	13,309	62,996	3,539
Net income (loss)	\$ 13,715	\$ (99,407)	\$ 10,163
Other financial information:			
Billings ⁽²⁾	\$ 401,913	\$ 357,212	\$ 320,299
Adjusted EBITDA ⁽³⁾	\$ 50,180	\$ 22,517	\$ 30,830
Net cash provided by operating activities	\$ 36,230	\$ 16,091	\$ 21,385
Free Cash Flow ⁽⁴⁾	\$ 29,571	\$ 8,569	\$ 11,941

(1) The year ended December 31, 2018 has been reported under ASC 606, and the years ended December 31, 2017 and 2016, have been reported under ASC 605 and have not been adjusted under the modified retrospective approach. See Note 3 in the Notes to consolidated financial statements included elsewhere in this Annual Report on Form 10-K.

(2) Billings consists of our total revenue plus the change in our deferred revenue, excluding deferred revenue from acquisitions. For more information about Billings and our other non-GAAP financial measures and reconciliations of our non-GAAP financial measures to the most directly comparable financial measures calculated and presented in accordance with GAAP, see Item 6, Selected Financial Data of this Annual Report on Form 10-K.

(3) We define Adjusted EBITDA as net income (loss) adjusted for income tax expense (benefit), interest expense, interest income and other, depreciation and amortization, stock-based compensation expense, restructuring charges, asset impairment charges and other special items as determined by management. For more information about Adjusted EBITDA and our other non-GAAP

financial measures and reconciliations of our non-GAAP financial measures to the most directly comparable financial measure calculated and presented in accordance with GAAP, see Item 6, Selected Financial Data of this Annual Report on Form 10-K.

- (4) We define Free Cash Flow as net cash provided by operating activities less capital expenditures. For a reconciliation of Free Cash Flow to the most directly comparable financial measure calculated and presented in accordance with GAAP, see Item 6, Selected Financial Data of this Annual Report on Form 10-K.

The following table sets forth our revenue growth on a constant currency basis for the year ended December 31, 2018 compared to the year ended December 31, 2017:

(dollars in thousands)	Year ended December 31,		Change %	Constant currency change (1) %
	2018 (2)	2017 (2)		
Revenue:				
Software	\$ 304,361	\$ 244,817	24%	23%
Software related services	36,945	35,397	4%	2%
Total software and related services	341,306	280,214	22%	20%
Client engineering services	47,852	46,510	3%	3%
Other	7,221	6,609	9%	9%
Total revenue	<u>\$ 396,379</u>	<u>\$ 333,333</u>	19%	18%

- (1) The results for entities whose functional currency is a currency other than the United States dollar were converted to United States dollars at rates that were in effect for the corresponding period of the prior year.
- (2) The year ended December 31, 2018 has been reported under ASC 606, and the year ended December 31, 2017, has been reported under ASC 605 and has not been adjusted under the modified retrospective approach. See Note 3 in the Notes to consolidated financial statements included elsewhere in this Annual Report on Form 10-K.

Years ended December 31, 2018 and 2017

Revenue

Total revenue increased by \$63.0 million, or 19%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This increase was primarily attributable to an increase in subscription and software revenue, along with the impact of the adoption of ASC 606.

Software segment

Software

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Software revenue	\$ 304,361	\$ 244,817	\$ 59,544	24%
As a percent of software segment revenue	89%	87%		
As a percent of consolidated revenue	77%	73%		

Software revenue increased by \$59.5 million, or 24%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. The increase in software revenue due to the adoption of ASC 606 was \$11.3 million, primarily derived from revenue related to software licenses recognized at a point in time under ASC 606 that were historically recognized over time. Excluding the adoption of ASC 606, software revenue increased \$48.2 million, or 20%. This increase was primarily the result of an expansion in the number of units licensed by our existing customers under renewed software license agreements, licensing of units to new customers pursuant to new software license agreements, and, to a lesser extent, revenue attributable to recent acquisitions.

Software related services

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Software related services revenue	\$ 36,945	\$ 35,397	\$ 1,548	4%
As a percent of software segment revenue	11%	13%		
As a percent of consolidated revenue	9%	11%		

Software related services revenue increased \$1.5 million, or 4% for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This increase was primarily the result of increased revenue from consulting services.

Client engineering services segment

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Client engineering services revenue	\$ 47,852	\$ 46,510	\$ 1,342	3%
As a percent of consolidated revenue	12%	14%		

CES revenue increased by \$1.3 million, or 3%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. The increase is primarily related to the growth in the number of placements at our customers.

Other

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Other revenue	\$ 7,221	\$ 6,609	\$ 612	9%
As a percent of consolidated revenue	2%	2%		

Other revenue increased \$0.6 million, or 9% for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This increase was primarily due to increased demand and volume sales of toggled LED lighting tubes.

Cost of revenue

Software segment

Software

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Cost of software revenue	\$ 45,774	\$ 36,360	\$ 9,414	26%
As a percent of software revenue	15%	15%		
As a percent of consolidated revenue	12%	11%		

Cost of software revenue increased by \$9.4 million, or 26%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This increase was due to increased employee compensation and related costs of \$2.8 million, increased third party royalty costs of \$1.2 million for software programs and \$5.7 million in costs associated with the operations of recent acquisitions completed after the end of the previous fiscal year.

Software related services

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Cost of software related services revenue	\$ 26,415	\$ 26,888	\$ (473)	(2%)
As a percent of software related services revenue	71%	76%		
As a percent of consolidated revenue	7%	8%		

Cost of software related services revenue decreased by \$0.5 million, or 2%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. The decrease in the current year period was due to a reduction in headcount driven by improved utilization of existing personnel.

Client engineering services segment

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Cost of client engineering services revenue	\$ 38,979	\$ 38,131	\$ 848	2%
As a percent of client engineering services segment revenue	81%	82%		
As a percent of consolidated revenue	10%	11%		

Cost of CES revenue increased \$0.8 million, or 2%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This increase was due to higher compensation expenses associated with a larger number of placements hired to meet customer demand.

Other

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Cost of other revenue	\$ 4,805	\$ 5,212	\$ (407)	(8%)
As a percent of other revenue	67%	79%		
As a percent of consolidated revenue	1%	2%		

Cost of other revenue decreased by \$0.4 million, or 8%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This decrease is due to a \$0.7 million decrease in third party royalties, partially offset by a \$0.3 million increase in manufacturing costs for toggled, our LED lighting business, driven by the increase in the number of units sold during 2018.

Gross profit

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Gross profit	\$ 280,406	\$ 226,742	\$ 53,664	24%
As a percent of consolidated revenue	71%	68%		

Gross profit increased by \$53.7 million, or 24%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This increase in gross profit was primarily attributable to the growth of our software revenue of \$59.5 million driven by the factors described above, including the increase in software revenue due to the adoption of ASC 606 of \$11.3 million. Excluding the impact of the adoption of ASC 606, gross profit increased by 19% from the prior year.

Operating expenses

Operating expenses, as discussed below, support all products and services that we provide to our customers and, as a result, they are reported and discussed here in an aggregate total.

Research and development

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Research and development	\$ 97,592	\$ 93,234	\$ 4,358	5%
As a percent of consolidated revenue	25%	28%		

Research and development expenses increased by \$4.4 million, or 5%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This increase was primarily attributable to higher employee compensation and related costs of \$15.2 million, resulting from annual compensation adjustments and an increase in our headcount, a significant portion due to acquisitions and a \$0.6 increase in third party software maintenance expense. This increase was largely offset by a decrease in stock-based compensation expense of \$11.8 million.

Sales and marketing

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Sales and marketing	\$ 80,277	\$ 79,958	\$ 319	—%
As a percent of consolidated revenue	20%	24%		

Sales and marketing expenses were essentially unchanged for the year ended December 31, 2018, as compared to the year ended December 31, 2017. While flat on an aggregate basis, an increase in employee compensation and related expenses of \$6.8 million resulting from annual compensation adjustments and increased headcount, was offset by a decrease in stock-based compensation expense of \$6.8 million.

General and administrative

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
General and administrative	\$ 79,751	\$ 87,979	\$ (8,228)	(9%)
As a percent of consolidated revenue	20%	26%		

General and administrative expenses decreased by \$8.2 million, or 9%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This decrease was primarily attributable to a \$25.0 million decrease in stock-based compensation expense, partially offset by an \$11.0 million increase in professional service fees, of which \$8.4 million is directly attributable to the Datawatch transaction, including investment banking fees incurred, a \$3.0 million increase in employee compensation and related costs, a \$1.2 million increase in costs from being a public company, a \$0.8 million increase in rent expense, and a \$0.8 million increase in third party software maintenance expense.

Amortization of intangible assets

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Amortization of intangible assets	\$ 7,739	\$ 5,448	\$ 2,291	42%
As a percent of consolidated revenue	2%	2%		

Amortization of intangible assets increased by \$2.3 million, or 42%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This was attributable to an increase in the amortization of developed technology in the current year period as a result of completed acquisitions in 2017 and 2018.

Other operating income

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Other operating income	\$ (9,597)	\$ (6,620)	\$ 2,977	45%
As a percent of consolidated revenue	(2%)	(2%)		

Other operating income increased by \$3.0 million, or 45%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. The increase is attributable to a gain on the sale of a building for \$4.4 million and an increase in grant income of \$1.6 million in the current year. These increases were partially offset by impairment charges for guaranteed royalty expense of \$2.2 million related to our WEYV business, and impairment of trade names for \$0.6 million as a result of rebranding certain products.

Interest expense

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Interest expense	\$ 200	\$ 2,160	\$ (1,960)	(91%)
As a percent of consolidated revenue	—%	1%		

Interest expense decreased by \$2.0 million for the year ended December 31, 2018, as compared to the year ended December 31, 2017. The decrease in interest costs was due to the repayment of all outstanding balance on our prior term loan and line of credit with IPO proceeds in the fourth quarter of 2017.

Other (income) expense, net

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Other (income) expense, net	\$ (2,580)	\$ 994	\$ (3,574)	(360%)
As a percent of consolidated revenue	(1%)	—%		

Other (income) expense, net increased by \$3.6 million for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This increase was due to fluctuations in the United States dollar relative to other functional currencies during the year ended December 31, 2018, as compared to the prior year, coupled with an increase in interest income of \$1.7 million in 2018.

Income tax expense

(dollars in thousands)	Year ended December 31,		Change	
	2018	2017	\$	%
Income tax expense	\$ 13,309	\$ 62,996	\$ (49,687)	(79%)

Income tax expense decreased by \$49.7 million for the year ended December 31, 2018, as compared to the year ended December 31, 2017. The decrease in the current year tax expense is primarily the result of the following non-recurring items recorded in 2017: (1) \$47.0 million of tax expense related to the recording of a valuation allowance on the U.S. deferred tax assets, (2) \$15.4 million of tax expense due to the remeasurement of net deferred tax assets and liabilities as part of the Tax Act, (3) \$8.8 million of tax expense due to nondeductible stock-based compensation, (4) \$4.2 million of tax expense due to the one-time transition tax, and (5) \$1.0 million in foreign income taxes at rates other than the federal statutory rate. These decreases are partially offset by a \$63.4 million increase in pre-tax income in the current year. See Note 14 in the Notes to consolidated financial statements in Item 15, Part IV of this Annual Report on Form 10-K.

Years ended December 31, 2017 and 2016
Revenue

Total revenue increased by \$20.1 million, or 6%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This increase was primarily attributable to an increase in subscription and software revenue.

Software segment
Software

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Software revenue	\$ 244,817	\$ 223,818	\$ 20,999	9%
As a percent of software segment revenue	87%	86%		
As a percent of consolidated revenue	73%	71%		

The 9% increase in our software revenue for the year ended December 31, 2017, as compared to the year ended December 31, 2016, was primarily the result of an expansion in the number of units licensed by our existing customers under renewed software license agreements and, to a lesser extent, licensing of units to new customers pursuant to new software license agreements. This increase in software revenue occurred across all regions with the largest increase derived from Europe.

Software related services

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Software related services revenue	\$ 35,397	\$ 35,770	\$ (373)	(1%)
As a percent of software segment revenue	13%	14%		
As a percent of consolidated revenue	11%	11%		

Software related services revenue decreased \$0.4 million, or 1%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016.

Client engineering services segment

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Client engineering services revenue	\$ 46,510	\$ 47,702	\$ (1,192)	(3%)
As a percent of consolidated revenue	14%	15%		

CES revenue decreased \$1.2 million, or 3%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. CES business revenue decreased as we filled fewer open positions.

Other

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Other revenue	\$ 6,609	\$ 5,950	\$ 659	11%
As a percent of consolidated revenue	2%	2%		

The 11% increase in other revenue for the year ended December 31, 2017, as compared to the year ended December 31, 2016, was primarily due to increased sales and royalties from toggled, our LED lighting business.

Cost of revenue

Software segment

Software

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Cost of software revenue	\$ 36,360	\$ 31,962	\$ 4,398	14%
As a percent of software revenue	15%	14%		
As a percent of consolidated revenue	11%	10%		

Cost of software revenue increased by \$4.4 million, or 14%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This increase was primarily attributable to higher employee costs of \$2.3 million as a result of annual compensation adjustments and the addition of new personnel in connection with acquisitions, an increase in travel expense of \$0.6 million, increased stock-based compensation expense of \$0.3 million and increased third party royalty costs of \$0.7 million for software programs.

Software related services

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Cost of software related services revenue	\$ 26,888	\$ 27,653	\$ (765)	(3%)
As a percent of software related services revenue	76%	77%		
As a percent of consolidated revenue	8%	9%		

Cost of software related services revenue decreased by \$0.8 million, or 3%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016, primarily related to a decrease in software related services revenue.

Client engineering services segment

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Cost of client engineering services revenue	\$ 38,131	\$ 38,106	\$ 25	—%
As a percent of client engineering services segment revenue	82%	80%		
As a percent of consolidated revenue	11%	12%		

Cost of CES revenue was consistent for the year ended December 31, 2017, as compared to the year ended December 31, 2016. However, margins in our CES business were lower in 2017 due to increased salary costs relative to customer approved bill rates for certain positions.

Other

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Cost of other revenue	\$ 5,212	\$ 4,879	\$ 333	7%
As a percent of other revenue	79%	82%		
As a percent of consolidated revenue	2%	2%		

Cost of other revenue increased by \$0.3 million, or 7%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This was due to an increase in third party royalty expense associated with launch of WEYV, partially offset by a decrease in manufacturing costs from negotiated reductions in pricing from suppliers for the LED lighting business.

Gross profit

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Gross profit	\$ 226,742	\$ 210,640	\$ 16,102	8%
As a percent of consolidated revenue	68%	67%		

Gross profit increased by \$16.1 million, or 8%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This increase in gross profit was primarily attributable to the growth of our software revenue of \$21.0 million driven by the expansion in the number of units purchased by our existing customers and, to a lesser extent, sales to new customers. The increase in revenue was partially offset by the increase in cost of revenue as described above.

Operating expenses

Operating expenses, as discussed below, support all products and services that we provide to our customers and, as a result, they are reported and discussed here in an aggregate total.

Research and development

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Research and development	\$ 93,234	\$ 71,325	\$ 21,909	31%
As a percent of consolidated revenue	28%	23%		

Research and development expenses increased by \$21.9 million, or 31%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This increase was attributable to higher employee costs of \$9.9 million resulting from an increase in our headcount, primarily due to acquisitions and annual compensation adjustments. In addition, stock-based compensation expense increased by \$11.2 million for the year ended December 31, 2017, as compared to the year ended December 31, 2016, due to the increased value of our shares of common stock. Excluding the impact of stock-based compensation, research and development expenses increased by 15%, from \$70.0 million to \$80.7 million for the years ended December 31, 2016 and 2017, respectively.

Sales and marketing

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Sales and marketing	\$ 79,958	\$ 66,086	\$ 13,872	21%
As a percent of consolidated revenue	24%	21%		

Sales and marketing expenses increased by \$13.9 million, or 21%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. Employee compensation costs increased \$4.4 million, sales and marketing campaigns to support our direct sales force increased \$1.0 million, and travel and trade show related expense increased \$1.4 million during the year ended December 31, 2017, as compared to the prior year. In addition, stock-based compensation expense increased by \$6.9 million for the year ended December 31, 2017, as compared to the year ended December 31, 2016, due to the increased value of our shares of common stock. Excluding the impact of stock-based compensation, sales and marketing expenses increased by 11%, from \$65.3 million to \$72.3 million for the years ended December 31, 2016 and 2017, respectively.

General and administrative

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
General and administrative	\$ 87,979	\$ 57,202	\$ 30,777	54%
As a percent of consolidated revenue	26%	18%		

General and administrative expenses increased by \$30.8 million, or 54%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. Employee compensation cost increased \$2.7 million, software maintenance expense increased \$1.3

million, rent expense increased \$1.3 million from new leases and facilities acquired, and professional services increased \$1.2 million primarily due to additional costs of being a public company during the year ended December 31, 2017, as compared to the prior year. In addition, stock-based compensation expense increased by \$23.7 million for the year ended December 31, 2017, as compared to the year ended December 31, 2016, due to the increased value of our shares of common stock. Excluding the impact of stock-based compensation, general and administrative expenses increased by 13%, from \$54.2 million to \$61.3 million for the years ended December 31, 2016 and 2017, respectively.

Amortization of intangible assets

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Amortization of intangible assets	\$ 5,448	\$ 3,322	\$ 2,126	64%
As a percent of consolidated revenue	2%	1%		

Amortization of intangible assets increased by \$2.1 million, or 64%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This increase was attributable to the amortization of intangible assets associated with acquisitions completed during the year ended December 31, 2017, and a full year of amortization related to acquisitions completed during the year ended December 31, 2016.

Other operating income

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Other operating income	\$ (6,620)	\$ (2,742)	\$ 3,878	141%
As a percent of consolidated revenue	2%	1%		

Other operating income increased by \$3.9 million, or 141%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This increase was due to a non-recurring adjustment of \$2.0 million for a change in estimated legal expenses during the year ended December 31, 2017, and an increase in government subsidies, primarily in France, in the form of grant income, including refundable R&D credits.

Interest expense

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Interest expense	\$ 2,160	\$ 2,265	\$ (105)	(5%)
As a percent of consolidated revenue	1%	1%		

Interest expense decreased by \$0.1 million, or 5%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. The decrease in interest costs was due to paying off the term loan and line-of-credit with IPO proceeds in the fourth quarter of 2017.

Other (income) expense, net

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Other (income) expense, net	\$ 994	\$ (520)	\$ 1,514	NM
As a percent of consolidated revenue	—%	—%		

Other (income) expense, net increased by \$1.5 million for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This increase was due to fluctuations in the United States dollar relative to other functional currencies during the year ended December 31, 2017, as compared to the prior year.

Income tax expense

(dollars in thousands)	Year ended December 31,		Change	
	2017	2016	\$	%
Income tax expense	\$ 62,996	\$ 3,539	\$ 59,457	NM

Income tax expense increased by \$59.5 million for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This increase is primarily due to a \$47.0 million increase in tax expense related to the recording of a valuation allowance on the U.S. deferred tax assets, a \$15.4 million increase due to the remeasurement of net deferred tax assets and liabilities as part of the Tax Act, an \$8.8 million increase due to nondeductible stock-based compensation, a \$4.2 million increase due to the one-time transition tax and a \$1.0 million increase in foreign income taxes at rates other than the federal statutory rate, partially offset by a \$17.5 million decrease in pre-tax income mainly in the United States. See Note 14 in the Notes to consolidated financial statements in Item 15, Part IV of this Annual Report on Form 10-K.

Non-GAAP financial measures

In analyzing and planning for our business, we supplement our use of GAAP financial measures with non-GAAP financial measures, including Billings as a liquidity measure, Adjusted EBITDA as a performance measure and Free Cash Flow as a liquidity measure.

Billings. Billings consists of our total revenue plus the change in our deferred revenue, excluding deferred revenue from acquisitions during the period. Given that we generally bill our customers at the time of sale, but typically recognize a portion of the related revenue ratably over time, management believes that Billings is a meaningful way to measure and monitor our ability to provide our business with the working capital generated by upfront payments from our customers. While we believe that Billings provides valuable insight into the cash that will be generated from sales of our software and services, this metric may vary from period-to-period for a number of reasons including the impact of changes in foreign currency exchange rates and the potential impact of acquisitions. See Part II, Item 6, Selected Financial Data for information regarding the limitations of using Billings as a financial measure and for a reconciliation of Billings to revenue, the most directly comparable financial measure calculated in accordance with GAAP.

Our Billings were as follows:

(in thousands, except percentages)	Year ended December 31,			2017 to 2018	2016 to 2017
	2018	2017	2016	Change	Change
				%	%
Billings	\$ 401,913	\$ 357,212	\$ 320,299	13%	12%

Billings increased by \$44.7 million, or 13%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. This increase in Billings was attributable to an 18% increase in Software segment billings.

Billings increased by \$36.9 million, or 12%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This increase in Billings was attributable to a 15% increase in Software segment billings.

Adjusted EBITDA. We define Adjusted EBITDA as net income (loss) adjusted for income tax expense (benefit), interest expense, interest income and other, depreciation and amortization, stock-based compensation expense, restructuring charges, asset impairment charges and other special items as determined by management. We believe that Adjusted EBITDA is a meaningful measure of performance as it is commonly utilized by us and the investment community to analyze operating performance in our industry. See Part II, Item 6, Selected Financial Data for information regarding the limitations of using Adjusted EBITDA as a financial measure and for a reconciliation of Adjusted EBITDA to net income (loss), the most directly comparable financial measure calculated in accordance with GAAP.

Our Adjusted EBITDA was as follows:

(in thousands, except percentages)	Year ended December 31,			2017 to 2018	2016 to 2017
	2018	2017	2016	Change	Change
				%	%
Adjusted EBITDA	\$ 50,180	\$ 22,517	\$ 30,830	123%	(27%)

Adjusted EBITDA increased by \$27.7 million, or 123%, for the year ended December 31, 2018, as compared to the year ended December 31, 2017. Approximately \$11.7 million is from the adoption of ASC 606. Excluding the effect of ASC 606, Adjusted

EBITDA increased \$16.0 million. This increase in Adjusted EBITDA was primarily attributable to the increased revenue from our Software segment.

Adjusted EBITDA decreased by \$8.3 million, or 27%, for the year ended December 31, 2017, as compared to the year ended December 31, 2016. This decrease in Adjusted EBITDA was primarily attributable to the Software segment. The increase in revenue was offset by the increase in operating expenses for the year ended December 31, 2017. The increase in operating expenses was primarily related to annual employee cost adjustments and increased headcount from acquisitions in 2016 and 2017.

Free Cash Flow. Free Cash Flow is a non-GAAP financial measure that we calculate as cash flow provided by operating activities less capital expenditures. We believe that Free Cash Flow is useful in analyzing our ability to service and repay debt and return value directly to stockholders. See Part II, Item 6, Selected Financial Data for information regarding the limitations of using Free Cash Flow as a financial measure and for a reconciliation of Free Cash Flow to net cash provided by operating activities, the most directly comparable financial measure calculated in accordance with GAAP.

Our Free Cash Flow was as follows:

(in thousands, except percentages)	Year ended December 31,			2017 to 2018	2016 to 2017
	2018	2017	2016	Change %	Change %
Net cash provided by operating activities	\$ 36,230	\$ 16,091	\$ 21,385	125%	(25%)
Free Cash Flow	\$ 29,571	\$ 8,569	\$ 11,941	245%	(28%)

Free Cash Flow increased by \$21.0 million, or 245%, for the year ended December 31, 2018, as compared to year ended December 31, 2017. This increase in Free Cash Flow was attributable to an increase in net cash from operating activities of \$20.1 million which primarily reflects an improvement in financial performance in 2018 and net changes to our working capital position.

Free Cash Flow decreased by \$3.4 million, or 28%, for the year ended December 31, 2017, as compared to year ended December 31, 2016. This decrease in Free Cash Flow was attributable to a decrease in net cash from operating activities of \$5.3 million, which primarily reflects a \$6.0 million increase in accounts receivable, along with net changes to our working capital position.

Recurring Software License Rate. A key factor to our success is our recurring software license rate which we measure through billings, primarily derived from annual renewals of our existing subscription customer agreements. We calculate our recurring software license rate for a particular period by dividing (i) the sum of software term-based license billings, software license maintenance billings, and 20% of software perpetual license billings, which we believe approximates maintenance as an element of the arrangement by (ii) the total software license billings including all term-based, maintenance, and perpetual license billings from all customers for that period. For the years ended December 31, 2018, 2017 and 2016, our recurring software license rate was 89%, 89% and 90%, respectively.

Liquidity and capital resources

Our principal sources of liquidity have been the net payments received from global customers using our software and services as well as periodic draws on our credit facilities, when needed. We believe that funds generated from operations, with cash and cash equivalents and the amounts available to us to borrow under our credit facility will be sufficient to meet our anticipated cash needs for at least the next 12 months.

Revolving credit facility

On October 18, 2017, we entered into an amended and restated credit agreement with Altair Engineering Inc., as borrower, JPMorgan Chase Bank, N.A., as the lead arranger, sole book runner, the administrative agent, swingline lender and letter of credit issuer, and a syndicate of lenders ("2017 Credit Agreement"). The 2017 Credit Agreement provided for an initial aggregate commitment amount of \$100.0 million, with a sublimit for the issuance of letters of credit of up to \$5.0 million and a sublimit for swingline loans of up to \$5.0 million. The 2017 Credit Agreement matures on October 18, 2022. The 2017 Credit Agreement provides for an accordion feature that allows us to expand the size of the revolving line of credit by an additional \$50.0 million, subject to certain conditions, by obtaining additional commitments from the existing lenders or by causing a person acceptable to the administrative agent to become a lender (in each case subject to the terms and conditions set forth in the 2017 Credit Agreement).

On October 31, 2018, we increased the revolving commitment available under the 2017 Credit Agreement from \$100.0 million to \$150.0 million. There were no other material changes to the terms of the 2017 Credit Agreement.

As of December 31, 2018, we had \$31.0 million in outstanding borrowings under the 2017 Credit Agreement and there was \$119.0 million available for future borrowing. The 2017 Credit Agreement is available for general corporate purposes, including working capital, capital expenditures, and permitted acquisitions.

The 2017 Credit Agreement is secured by collateral including (i) substantially all of our properties and assets, and the properties and assets of our domestic subsidiaries but excluding any patents, copyrights, patent applications or copyright applications or any trade secrets or software products and (ii) pledges of the equity interests in all present and future domestic subsidiaries (subject to certain exceptions as provided for under the 2017 Credit Agreement). Our direct and indirect domestic subsidiaries are guarantors of all of the obligations under the 2017 Credit Agreement. In addition, the 2017 Credit Agreement contains financial covenants relating to maintaining a minimum interest coverage ratio of 3.0 to 1.0 and maximum leverage ratio of 3.0 to 1.0, as defined in the 2017 Credit Agreement. At December 31, 2018, we were in compliance with all financial covenants. For additional information about the 2017 Credit Agreement, see Note 7 in the Notes to consolidated financial statements in Item 15, Part IV of this Annual Report on Form 10-K.

Cash flows

As of December 31, 2018 and 2017, respectively, we had an aggregate of cash and cash equivalents of \$35.3 million and \$39.2 million, which we held for working capital purposes and capital expenditures. At December 31, 2018 and 2017, respectively, \$3.1 million and \$20.1 million of this aggregate amount was held in the United States and \$28.9 million and \$17.5 million was held in the APAC and EMEA regions with the remainder held in Canada, Mexico, and South America.

There are no significant restrictions on the ability of our subsidiaries to pay dividends or make other distributions to Altair. Based on our current liquidity needs and repatriation strategies, we expect that we can manage our global liquidity needs without material adverse cash tax implications. The 2017 changes in U.S. tax law could materially affect our tax obligations. For further discussion, please see “Item 1A. Risk Factors – New legislations or tax-reform policies that would change U.S. or foreign taxation of international business activities, including uncertainties in the interpretation and application of the 2017 Tax Cuts and Jobs Act, could materially affect our tax obligations and effective tax rate.”

The following table summarizes our cash flows for the periods indicated:

(in thousands)	Year ended December 31,		
	2018	2017	2016
Net cash provided by operating activities	\$ 36,230	\$ 16,091	\$ 21,385
Net cash used in investing activities	(206,210)	(24,851)	(16,033)
Net cash provided by (used in) financing activities	167,530	29,558	(1,864)
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(1,443)	1,641	(362)
Net (decrease) increase in cash, cash equivalents and restricted cash	\$ (3,893)	\$ 22,439	\$ 3,126

Net cash provided by operating activities

Net cash provided by operating activities for year ended December 31, 2018 was \$36.2 million, which reflects an increase of \$20.1 million compared to the year ended December 31, 2017. This increase was primarily a result of our improved financial performance and changes to our working capital position for the year ended December 31, 2018, as compared to the year ended December 31, 2017.

Net cash provided by operating activities for the year ended December 31, 2017 was \$16.1 million which reflects a decrease of \$5.3 million compared to the year ended December 31, 2016. This decrease primarily reflects a \$6.0 million increase in accounts receivable, along with net changes to our working capital position for the year ended December 31, 2017, as compared to the year ended December 31, 2016.

Net cash used in investing activities

Net cash used in investing activities for the year ended December 31, 2018 was \$206.2 million, which reflects an increase in cash used of \$181.4 million compared to the year ended December 31, 2017. This increase was primarily the result of business acquisitions in the year ended December 31, 2018.

Net cash used in investing activities for the year ended December 31, 2017 was \$24.9 million which reflects an increase in cash used of \$8.8 million compared to the year ended December 31, 2016. This increase was the result of an increase in cash payments for business acquisitions in the year ended December 31, 2017, as compared to the year ended December 31, 2016.

Net cash provided by (used in) financing activities

Net cash provided by financing activities for the year ended December 31, 2018 was \$167.5 million, which reflects an increase in cash provided of \$138.0 million compared the year ended December 31, 2017. We received aggregate proceeds of \$135.6 million from our follow-on public offering, net of underwriters' discount and commissions and we had an increase in net borrowings of \$30.8 million for the year ended December 31, 2018.

Net cash provided by financing activities for the year ended December 31, 2017 was \$29.6 million, which reflects an increase in cash provided of \$31.4 million compared to the year ended December 31, 2016. We received aggregate proceeds of \$119.3 million from our IPO, net of underwriters' discounts and commissions. We paid offering costs for our IPO of \$4.6 million and we had an increase in net debt payments of \$87.3 million for the year ended December 31, 2017 compared to the year ended December 31, 2016 resulting from the use of IPO proceeds to pay off our prior term loan and line of credit.

Effect of exchange rate changes on cash, cash equivalents and restricted cash

There was an adverse effect of exchange rate changes on cash, cash equivalents and restricted cash of \$1.4 million for the year ended December 31, 2018, compared to a favorable effect of exchange rate changes on cash, cash equivalents and restricted cash of \$1.6 million for the year ended December 31, 2017, primarily due to currency fluctuations in the Euro.

The positive effect of exchange rate changes on cash, cash equivalents and restricted cash for the year ended December 31, 2017, increased \$2.0 million from the year ended December 31, 2016, primarily due to currency fluctuations in the Euro.

Commitments and contractual obligations

Our principal commitments and contractual obligations at December 31, 2018 consisted of obligations under operating leases for our office facilities and other debt obligations. As of December 31, 2018, the future non-cancelable minimum lease payments under these obligations, and our future non-cancelable minimum payments under our other contractual obligations, were as follows:

(in thousands)	Total	Payments due by period			
		Less than 1 year	1-3 years	3-5 years	More than 5 years
Operating lease obligations	\$ 33,179	\$ 10,661	\$ 13,979	\$ 5,392	\$ 3,147
Long-term debt obligations (excluding interest)	31,025	75	—	30,950	—
Capital lease obligations	813	256	382	175	—
Royalties	1,884	1,470	414	—	—
Other long-term liabilities	4,873	3,647	1,226	-	—
Total	\$ 71,774	\$ 16,109	\$ 16,001	\$ 36,517	\$ 3,147

This table does not include contractual obligations associated with our pension and post-retirement benefit plans. As of December 31, 2018, we had recognized a net benefit liability of \$9.6 million. For additional information on pension and other post-retirement benefits, including expected benefit payments for the next 10 years, see Note 16 in the Notes to consolidated financial statements included elsewhere in this Annual Report on Form 10-K.

The table also does not include liabilities associated with uncertain tax positions due to the high degree of uncertainty regarding the future cash outflows associated with these amounts. For additional discussion of uncertain tax positions, see Note 14 in the Notes to consolidated financial statements included elsewhere in this Annual Report on Form 10-K.

Off-balance sheet arrangements

Through December 31, 2018, we did not have any relationships with unconsolidated organizations or financial partnerships, such as structured finance or special purpose entities that would have been established for the purpose of facilitating off-balance sheet arrangements or other contractually narrow or limited purposes.

Critical accounting policies and estimates

Our management's discussion and analysis of our financial condition and results of operations is based on our financial statements, which have been prepared in accordance with GAAP. The preparation of these financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements, as well as the reported revenues generated and expenses incurred during the reporting periods. Our estimates are based on our historical experience and on various other factors that we believe are reasonable under the circumstances, the results

of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. We believe that the accounting policies discussed below are critical to understanding our historical and future performance, as these policies relate to the more significant areas involving management's judgments and estimates. For further discussion on our significant accounting policies, see Note 2 in the Notes to consolidated financial statements in Item 15, Part IV of this Annual Report on Form 10-K.

Revenue recognition

We generate revenue from our Software and CES segments and our other businesses. Revenue is recognized by identifying a contract with a customer, identifying the performance obligations in the contract, determining the transaction price, allocating the transaction price to the performance obligations in the contract, and recognizing revenue when (or as) we satisfy a performance obligation.

Software

Software revenue includes product revenue from software product licensing arrangements, related services consisting of software maintenance and support in the form of post-contract customer support (PCS or maintenance) and professional services such as consulting and training services. Software products are sold to customers primarily under a term-based software licensing model and to a lesser degree, perpetual software licenses. We enter into contracts that include combinations of products, maintenance and services, which are accounted for as separate performance obligations with differing revenue recognition patterns.

Most term-based software license agreements include our patented units-based subscription model which allows customers to license a pool of units for their organizations, providing individual users flexible access to our entire portfolio of engineering software applications as well as to our growing portfolio of partner products. The amount of software usage is limited by the number of the units licensed by the customer. Revenue from these arrangements is fixed (based on the units licensed) and is not based on actual customer usage of each software product.

Revenue from term-based software licenses is classified as license software revenue. Term-based licenses are sold only as a bundled arrangement that includes the rights to a term software license and PCS, which includes unspecified technical enhancements and customer support. Maximizing the use of observable inputs, we determined that a majority of the estimated standalone selling price of the term-based license is attributable to the term license and a minority is attributable to the PCS. The license component is recognized as revenue upon the later of delivery of the licensed product or the beginning of the license period. The PCS is classified as maintenance revenue and is recognized ratably over the term of the contract, as we provide the PCS benefit over time.

In addition to term-based software licenses, we sell perpetual licenses. Typically, our perpetual licenses are sold with PCS, which includes unspecified technical enhancements and customer support. Revenue from the software component is classified as license software revenue and is recognized upon the later of delivery of the licensed product or the beginning of the license period. We allocate values in bundled perpetual and PCS arrangements based on the standalone selling prices of the perpetual license and PCS. Revenue from PCS is classified as maintenance revenue and is recognized ratably over the term of the contract, as we satisfy the PCS performance obligation over time.

Revenue from training, consulting and other services is recognized as the services are performed. For contracts in which the service consists of a single performance obligation, such as providing a training class to a customer, we recognize revenue upon completion of the performance obligation. For service contracts that are longer in duration and often include multiple performance obligations (for example, both training and consulting), we measure the progress toward completion of the obligations and recognizes revenue accordingly. In measuring progress towards the completion of performance obligations, we typically utilize output-based estimates for services with contractual billing arrangements that are not based on time and materials, and estimate output based on the total tasks completed as compared to the total tasks required for each work contract. Input-based estimates are utilized for services that involve general consultations with contractual billing arrangements based on time and materials, utilizing direct labor as the input measure.

We also execute arrangements through indirect channel partners in which the channel partners are authorized to market and distribute our software products to end users of our products and services in specified territories. In sales facilitated by channel partners, the channel partner generally bears the risk of collection from the end-user customer. We recognize revenue from transactions with channel partners when the channel partner submits a purchase commitment, collectability from the channel partner is probable, and the performance obligation was met, at a point in time or over time as appropriate, provided that all other revenue recognition criteria are satisfied. Revenue from channel partner transactions is the amount remitted to us by the channel partners. This amount includes a fee for PCS that is compensation for providing technical enhancements and the second level of technical support to the end user, which is recognized over the period that PCS is to be provided. We do not offer right of return, product rotation or price protection to any of its channel partners.

Some of our contracts with customers contain multiple performance obligations. Judgment is required in determining whether each performance obligation is distinct. We allocate the transaction price for each contract to each performance obligation based on the

relative standalone selling price, or SSP, for each performance obligation within each contract. The SSP is the price that we would sell a promised service separately to one of our customers. Judgment is required to determine the SSP for each distinct performance obligation. We estimate SSP using information such as past transactions, internally approved pricing guidelines related to the performance obligations and other information reasonably available to us.

Non-income related taxes collected from customers and remitted to governmental authorities are recorded on the consolidated balance sheet as accounts receivable, net and other accrued expenses and current liabilities. These amounts are reported on a net basis in the consolidated statements of operations and do not impact reported revenues or expenses.

Software related services

Consulting services from product design and development projects are considered distinct performance obligations and are provided to customers on a time-and-materials, or T&M, or fixed-price basis. Altair recognizes services revenue from our T&M contracts using input-based estimates, utilizing direct labor and contractually agreed-upon hourly rates as the input measure. For fixed-price contracts, software services revenue is recognized over time using a method that measures the extent of progress towards completion of a performance obligation, generally using a cost-input method where revenue is recognized based on the proportion of total cost incurred to estimated total costs at completion. If output or input measures are not available or cannot be reasonably estimated, revenue is recognized upon completion of the services.

Client engineering services

CES revenue is derived from our hiring of engineers and data scientists for placement at a customer site for specific customer-directed assignments. These professional services are considered distinct performance obligations and are provided to customers on a T&M basis. We recognize client engineering services revenue based upon hours worked and contractually agreed-upon hourly rates.

Other

Other revenue includes product revenue from the sale of LED products for the replacement of fluorescent tubes. Revenue from the sale of LED products for the replacement of fluorescent tubes is recognized when all revenue recognition criteria stated above are met, which is generally when the products are delivered to resellers or to end customers. Sales returns, which reduce revenue and cost of revenue, are estimated using historical experience.

Goodwill and indefinite-lived intangible assets

In accordance with ASC 360, we assess the carrying value of goodwill each year, based on weighting estimates of future cash flows from the reporting units or estimates of the market value of the reporting units, based on comparable companies. We also perform impairment analyses whenever events or circumstances indicate that goodwill or certain intangibles may be impaired. These estimates of future discounted cash flows are based upon historical results, adjusted to reflect our best estimate of future market and operating conditions. Historically, actual results have occasionally differed from our estimated future cash flow estimates. In the future, actual results may differ materially from these estimates. In addition, the comparable companies used to establish market value for our reporting units is based on management's judgment.

The timing and size of any future impairment charges involves the application of our estimates and judgment and could result in the impairment of all, or substantially all, of our goodwill or intangible assets.

Stock-based compensation

Stock-based compensation expense, consisting of stock options expected to be settled by issuing shares of our common stock, are recorded as equity awards. The fair value of these awards on the date of grant is measured using the Black-Scholes option pricing model. The fair value of restricted stock units, or RSUs, is measured using the fair value of our common stock on the date of the grant.

Our use of the Black-Scholes option pricing model requires the input of many assumptions, some highly subjective, including the fair value of our underlying common stock, expected term of the option, expected volatility of the price of our common stock, risk-free interest rates, and expected dividend yield. The assumptions used in our option pricing model represent management's best estimates. These estimates involve inherent uncertainties and the application of management's judgment. If factors change and different assumptions are used, our stock-based compensation expense could be materially different in the future.

These assumptions and estimates are as follows:

- *Fair value of common stock.* Due to the absence of an active market for our common stock prior to our IPO, our board of directors, with the assistance of a third-party valuation specialist, determined the fair value of our common stock. The

valuation methodology included estimates and assumptions including forecasts of future cash flows that require significant judgments. These valuations considered a number of objective and subjective factors, including our actual operating and financial performance, external market conditions, performance of comparable publicly traded companies, comparable transactions, business developments, likelihood of achieving a liquidity event, such as an initial public offering or sale, and common stock transactions, among other factors. Prior to the IPO, we utilized methodologies in accordance with the framework of the American Institute of Certified Public Accountants' Technical Practice Aid, *Valuation of Privately-Held Company Equity Securities issued as Compensation*, to estimate the fair value of our common stock. Significant changes to the key assumptions used in the valuations could result in different fair values of our common stock at each valuation date.

- *Expected term.* The expected term of employee stock options represents the weighted-average period that the stock options are expected to remain outstanding. To determine the expected term, we generally apply the simplified approach in which the expected term of an award is presumed to be the mid-point between the vesting date and the expiration date of the award as we do not have sufficient historical exercise data to provide a reasonable basis for an estimate of expected term.
- *Risk-free interest rate.* We base the risk-free interest rate on the yields of United States Treasury securities with maturities approximately equal to the term of employee stock option awards.
- *Expected volatility.* As we do not have a long trading history for our common stock as a new public company, the expected volatility for our common stock was estimated by taking the average historic price volatility for industry peers based on daily price observations over a period equivalent to the expected term of the stock option awards. Industry peers consist of several public companies in our industry which are either similar in size, stage of life cycle or financial leverage.

Our forfeiture rate is based on actual forfeitures.

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

Employee stock-based awards, consisting of stock options with repurchase features that allow them to be settled in cash at a purchase price that is less than the current fair value, are considered liability-based awards. These awards are initially recorded at fair value and remeasured to fair value at the end of each reporting period until settled.

Our 2001 ISO and NQSO Plan was terminated in 2011. Options granted under the 2001 ISO and NQSO Plan were accounted for as liability awards as the terms of the awards could require or allow repurchase of the shares at amounts different than fair value. We made the accounting policy election to use the intrinsic value method of accounting to determine stock-based compensation liabilities for these awards. During the quarter ended June 30, 2017, in accordance with ASC 718 as we no longer met the definition of a nonpublic entity, we changed our accounting policy to measure the fair value of our liability awards using the Black-Scholes option pricing model. The impact of the change in accounting policy was not material to the financial statements.

The 2001 ISO and NQSO Plan also included stock-based compensation liability for our Class A redeemable common shares outstanding resulting from our call feature with a purchase price that may be set at less than the fair market value at the redemption date. We utilized the fair value of the outstanding Class A redeemable common shares to determine the stock-based compensation liabilities for these redeemable common shares.

As a result of our IPO in the fourth quarter 2017, the call feature terminated which resulted in the liability associated with our Class A redeemable common shares and the liability associated with stock options outstanding under the 2001 ISO and NQSO Plan to be reclassified to equity as of December 31, 2017, in accordance with ASC 718.

Accounting for income taxes

We utilize the asset and liability method of accounting for income taxes in accordance with ASC 740, *Accounting for Income Taxes*. Under this method, deferred tax assets and liabilities are determined based on differences between the financial reporting and tax basis of assets and liabilities. Deferred tax assets and liabilities are measured using the enacted tax rates and statutes that will be in effect when those differences are expected to reverse. Deferred tax assets can result from unused operating losses, research and development credits, foreign tax credit carryforwards, and deductions recorded for financial statement purposes prior to them being deductible on a tax return. Valuation allowances are provided against net deferred tax assets if, based upon the available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized.

The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income and the reversal of taxable temporary differences. We consider, among other available information, scheduled reversals of deferred tax liabilities, projected future taxable income, limitations on the availability of tax credit carryforwards, and other evidence assessing the potential realization of deferred tax assets. Adjustments to the valuation allowance are included in the tax provision in our consolidated statements of operations in the period they become known or can be estimated.

Significant management judgment is required in determining any valuation allowance recorded against deferred tax assets and liabilities. The valuation allowance is based on our estimates of taxable income for jurisdictions in which we operate and the period over which our deferred tax assets may be recoverable. Historically, we have had substantial United States tax credit carryforwards which began to expire in 2018. The ability to utilize these DTAs is highly dependent upon our ability to generate taxable income in the United States in the future.

We apply a more-likely-than-not recognition threshold to our accounting for tax uncertainties. We review all of our tax positions and make determinations as to whether our tax positions are more likely than not to be sustained upon examination by the relevant taxing authorities. Only those benefits, or exposures, that have a greater than fifty percent likelihood of being sustained upon examination by taxing authorities are recognized. Interest and penalties related to uncertain tax positions are recorded in income tax expense (benefit) in the consolidated statements of operations.

Recently issued accounting pronouncements

For information regarding recent accounting guidance and the impact of this guidance on our consolidated financial statements, see Note 2 of the Notes to consolidated financial statements in Item 15, Part IV of this Annual Report on Form 10-K, which is incorporated by reference.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to certain global market risks, including foreign currency exchange risk and interest rate risk associated with our debt.

Foreign Currency Risk

As a result of our substantial international operations, we are exposed to foreign currency risks that arise from our normal business operations, including in connection with our transactions that are denominated in foreign currencies. In addition, we translate sales and financial results denominated in foreign currencies into United States dollars for purposes of our consolidated financial statements. As a result, appreciation of the United States dollar against these foreign currencies generally will have a negative impact on our reported revenue and operating income while depreciation of the United States dollar against these foreign currencies will generally have a positive effect on reported revenue and operating income.

To date, we have not entered into any foreign currency hedging contracts, since exchange rate fluctuations have not had a material impact on our operating results and cash flows. Based on our current international operations, we do not plan on engaging in hedging activities in the near future.

Interest Rate Risk

As of December 31, 2018, and 2017, we had cash, cash equivalents and restricted cash of \$35.7 million and \$39.6 million, respectively, consisting primarily of bank deposits and money market funds. As of December 31, 2018, we had \$31.0 million outstanding under our 2017 Credit Agreement. Such interest-bearing instruments carry a degree of interest rate risk; however, historical fluctuations of interest expense have not been significant. As of December 31, 2017, we had no amounts outstanding under our 2017 Credit Agreement.

Interest rate risk relates to the gain/increase or loss/decrease we could incur on our debt balances and interest expense associated with changes in interest rates. It is our policy not to enter into derivative instruments for speculative purposes, and therefore, we hold no derivative instruments for trading purposes.

Item 8. Financial Statements and Supplementary Data.

The financial statements required by this Item 8 are included in our consolidated financial statements and set forth in the pages indicated in Part IV, Item 15(a) of this Annual Report on Form 10-K and are incorporated herein by reference. The supplementary financial information required by this Item 8 is included in Note 20 of the Notes to consolidated financial statements and set forth in the pages indicated in Part IV, Item 15(a) of this Annual Report on Form 10-K and is incorporated herein by reference.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure.

None.

Item 9A. Controls and Procedures

(a) Evaluation of Disclosure Controls and Procedures

The Company maintains disclosure controls and procedures (as defined in Rule 13a-15(e) or 15d-15(e) of the Exchange Act) that are designed to ensure that information required to be disclosed in periodic reports filed with the SEC under the Securities Exchange Act of 1934 is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to the Company's management, including its Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, has evaluated the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2018. Based upon that evaluation, the Company concluded that its disclosure controls and procedures were ineffective as of December 31, 2018 due to the material weakness described below.

(b) Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rule 13a-15(f) and 15d(f). Internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with United States generally accepted accounting principles. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's annual or interim financial statements will not be prevented or detected on a timely basis.

Our management, including our Chief Executive Officer and Chief Financial Officer, conducted an assessment of the effectiveness of our internal control over financial reporting as of December 31, 2018 based on the criteria established by Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). In accordance with guidance issued by the Securities and Exchange Commission, companies are permitted to exclude acquisitions from their assessment of internal control over financial reporting for the first fiscal year in which the acquisition occurred. Accordingly, we have excluded from our assessment the internal control over financial reporting of: Datawatch Corporation, Simsolid Corporation and FluiDyna GmbH, which are included in our December 31, 2018 consolidated financial statements and constituted 5% and 1% of total and net assets (excluding acquired goodwill and intangible assets), respectively, as of December 31, 2018 and 2% of revenues for the year then ended. We have excluded these three entities from our annual assessment of and conclusion on the effectiveness of our internal control over financial reporting.

Management has identified a material weakness over the income tax process as of December 31, 2018. We determined that management's review controls over income taxes are not operating effectively to detect a material misstatement in the financial statements related to income tax accounting around acquisitions, as well as routine and non-routine transactions. Based on the material weakness described above, we have concluded that internal control over financial reporting was ineffective as of December 31, 2018.

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

Remediation Efforts with Respect to Material Weakness

We have developed a remediation plan to address the material weakness described above. The plan includes enhancing our preparation and review procedures around income tax accounting, which includes supplementing our resources using an independent consultant with technical expertise in the tax accounting over acquisitions and routine and non-routine transactions.

(c) Changes in Internal Control Over Financial Reporting

There was no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f)) under the Exchange Act) that occurred during the fourth quarter ended December 31, 2018, that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information called for by this item will be set forth in our Proxy Statement for the 2019 Annual Meeting of Stockholders to be filed with the SEC within 120 days of the fiscal year ended December 31, 2018, or Proxy Statement, and is incorporated herein by reference.

Item 11. Executive Compensation.

The information called for by this item will be set forth in our Proxy Statement and is incorporated herein by reference.

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

The information required by this item will be set forth in our Proxy Statement and is incorporated herein by reference.

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

The information required by this item will be set forth in our Proxy Statement and is incorporated herein by reference.

Item 14. Principal Accountant Fees and Services.

The information required by this item will be set forth in our Proxy Statement and is incorporated herein by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

(a) *Documents Filed as Part of This Annual Report on Form 10-K:*

(1) *Financial Statements:* The following consolidated financial statements and reports of the independent registered account firm are filed as part of this report:

	Page
Report of Independent Registered Public Accounting Firm	73
<u>Consolidated financial statements</u>	
Consolidated balance sheets	76
Consolidated statements of operations	77
Consolidated statements of comprehensive (loss) income	78
Consolidated statement of changes in stockholders' equity	79
Consolidated statements of cash flows	80
Notes to consolidated financial statements	82

(2) *Financial Statement Schedule:* The following financial statement schedule is filed as part of this report and should be read in conjunction with the consolidated financial statements.

**Schedule II – Valuation and Qualifying Accounts
(in thousands)**

	Balance at beginning of year	Additions	Deductions	Balance at end of year
Allowance for Doubtful Accounts				
Year ended December 31, 2018	\$ 798	\$ 394	\$ (42)	\$ 1,150
Year ended December 31, 2017	\$ 565	\$ 610	\$ (377)	\$ 798
Year ended December 31, 2016	\$ 937	\$ 291	\$ (663)	\$ 565

Schedules not listed above have been omitted because they are not applicable, are not required or the information required to be set forth therein is included in the consolidated financial statements or notes thereto.

(3) *Exhibits:* The exhibits listing in the accompanying Exhibit Index immediately following the financial statements are filed as part of, or incorporated by reference into, this Annual Report on Form 10-K.

(b) *Exhibits:* See Item 15(a)(3) as set forth above.

(c) *Financial Statement Schedules:* See Item 15(a)(2) as set forth above.

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Altair Engineering Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Altair Engineering Inc. and subsidiaries (the Company) as of December 31, 2018 and 2017, the related consolidated statements of operations, comprehensive (loss) income, changes in stockholders' equity (deficit) and cash flows for each of the three years in the period ended December 31, 2018, and the related notes and financial statement schedule listed in the Index at Item 15(a) (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated March 1, 2019 expressed an adverse opinion thereon.

Adoption of Accounting Standards Update (ASU) No. 2014-09

As discussed in Note 2 and 3 to the consolidated financial statements, the Company changed its method of accounting for revenue from contracts with customers, and incremental costs to acquire contracts with customers in each period presented, due to the Company's adoption of ASU No. 2014-09, *Revenue from contracts with customers*, effective January 1, 2018.

Basis for Opinion

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

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

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2015.

Detroit, Michigan
March 1, 2019

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Altair Engineering Inc.

Opinion on Internal Control over Financial Reporting

We have audited Altair Engineering Inc. and subsidiaries internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, because of the effect of the material weakness described below on the achievement of the objectives of the control criteria, Altair Engineering Inc. and subsidiaries (the Company) has not maintained effective internal control over financial reporting as of December 31, 2018, based on the COSO criteria.

A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's annual or interim financial statements will not be prevented or detected on a timely basis. The following material weakness has been identified and included in management's assessment. Management has identified a material weakness in its internal controls over accounting for income taxes.

As indicated in the accompanying Management's Report on Internal Control over Financial Reporting, management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of Datawatch Corporation, Simsolid Corporation and Fluidyna GmbH, which are included in the December 31, 2018 consolidated financial statements of the Company and constituted 5% and 1% of total and net assets (excluding acquired goodwill and intangible assets), respectively, as of December 31, 2018 and 2% of revenues for the year then ended. Our audit of internal control over financial reporting of the Company also did not include an evaluation of the internal control over financial reporting of all current year acquisitions.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the 2018 consolidated financial statements of the Company. This material weakness was considered in determining the nature, timing and extent of audit tests applied in our audit of the 2018 consolidated financial statements, and this report does not affect our report dated March 1, 2019, which expressed an unqualified opinion thereon.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

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

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

/s/ Ernst & Young LLP

Detroit, Michigan

March 1, 2019

ALTAIR ENGINEERING INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS

(in thousands, except per share data)	December 31,	
	2018	2017
ASSETS		
CURRENT ASSETS		
Cash and cash equivalents	\$ 35,345	\$ 39,213
Accounts receivable, net	96,803	86,635
Inventory, net	1,964	1,980
Income tax receivable	4,431	6,054
Prepaid expenses and other current assets	15,491	10,006
Total current assets	154,034	143,888
Property and equipment, net	30,153	31,446
Goodwill	210,532	62,706
Other intangible assets, net	69,836	24,461
Deferred tax assets	1,373	8,351
Other long-term assets	17,288	17,019
TOTAL ASSETS	\$ 483,216	\$ 287,871
LIABILITIES, MEZZANINE EQUITY AND STOCKHOLDERS' EQUITY		
CURRENT LIABILITIES		
Current portion of long-term debt	\$ 331	\$ 232
Accounts payable	8,357	4,880
Accrued compensation and benefits	31,740	26,560
Obligations for acquisition of businesses	1,218	13,925
Other accrued expenses and current liabilities	26,347	21,744
Deferred revenue	59,765	130,122
Total current liabilities	127,758	197,463
Long-term debt, net of current portion	31,417	178
Deferred revenue, non-current	6,754	9,640
Other long-term liabilities	28,153	17,647
TOTAL LIABILITIES	194,082	224,928
Commitments and contingencies		
MEZZANINE EQUITY	2,352	2,352
STOCKHOLDERS' EQUITY		
Preferred stock (\$0.0001 par value), authorized 45,000 shares, none issued and outstanding	—	—
Common stock (\$0.0001 par value)		
Class A common stock, authorized 513,797 shares, issued and outstanding 38,349 and 26,725 shares as of December 31, 2018 and 2017, respectively	4	2
Class B common stock, authorized 41,203 shares, issued and outstanding 32,171 and 36,508 shares as of December 31, 2018 and 2017, respectively	3	4
Additional paid-in capital	379,832	232,156
Accumulated deficit	(82,005)	(166,499)
Accumulated other comprehensive loss	(11,052)	(5,072)
TOTAL STOCKHOLDERS' EQUITY	286,782	60,591
TOTAL LIABILITIES, MEZZANINE EQUITY AND STOCKHOLDERS' EQUITY	\$ 483,216	\$ 287,871

See accompanying notes to consolidated financial statements.

ALTAIR ENGINEERING INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS

(in thousands, except per share data)	Year ended December 31,		
	2018 (1)	2017 (1)	2016 (1)
Revenue			
License	\$ 207,164		
Maintenance and other services	97,197		
Total software	304,361	\$ 244,817	\$ 223,818
Software related services	36,945	35,397	35,770
Total software and related services	341,306	280,214	259,588
Client engineering services	47,852	46,510	47,702
Other	7,221	6,609	5,950
Total revenue	396,379	333,333	313,240
Cost of revenue			
License	16,119		
Maintenance and other services	29,655		
Total software	45,774	36,360	31,962
Software related services	26,415	26,888	27,653
Total software	72,189	63,248	59,615
Client engineering services	38,979	38,131	38,106
Other	4,805	5,212	4,879
Total cost of revenue	115,973	106,591	102,600
Gross profit	280,406	226,742	210,640
Operating expenses			
Research and development	97,592	93,234	71,325
Sales and marketing	80,277	79,958	66,086
General and administrative	79,751	87,979	57,202
Amortization of intangible assets	7,739	5,448	3,322
Other operating income	(9,597)	(6,620)	(2,742)
Total operating expenses	255,762	259,999	195,193
Operating income (loss)	24,644	(33,257)	15,447
Interest expense	200	2,160	2,265
Other (income) expense, net	(2,580)	994	(520)
Income (loss) before income taxes	27,024	(36,411)	13,702
Income tax expense	13,309	62,996	3,539
Net income (loss)	\$ 13,715	\$ (99,407)	\$ 10,163
Income (loss) per share:			
Net income (loss) per share attributable to common stockholders, basic	\$ 0.20	\$ (1.89)	\$ 0.21
Net income (loss) per share attributable to common stockholders, diluted	\$ 0.18	\$ (1.89)	\$ 0.18
Weighted average shares outstanding:			
Weighted average number of shares used in computing net income (loss) per share, basic	67,468	52,466	48,852
Weighted average number of shares used in computing net income (loss) per share, diluted	74,878	52,466	57,856

(1) The year ended December 31, 2018 has been reported under ASC 606, and the years ended December 31, 2017 and 2016 have been reported under ASC 605 and have not been adjusted under the modified retrospective approach. See Note 3 – Revenue from contracts with customers for the effect of the adoption of ASC 606 on the Company’s consolidated financial statements.

See accompanying notes to consolidated financial statements.

ALTAIR ENGINEERING INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE (LOSS) INCOME

(in thousands)	Year ended December 31,		
	2018	2017	2016
Net income (loss)	\$ 13,715	\$ (99,407)	\$ 10,163
Other comprehensive (loss) income, net of tax:			
Foreign currency translation (net of tax effect of \$0, \$0 and (\$60) respectively)	(5,211)	2,351	20
Retirement related benefit plans (net of tax effect of \$318, \$0 and \$195, respectively)	(769)	(159)	(576)
Total other comprehensive (loss) income	(5,980)	2,192	(556)
Comprehensive income (loss)	\$ 7,735	\$ (97,215)	\$ 9,607

See accompanying notes to consolidated financial statements.

ALTAIR ENGINEERING INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CHANGES IN STOCKHOLDERS' EQUITY (DEFICIT)

(in thousands)	Common stock				Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive loss	Total Altair Engineering Inc. stockholders' equity (deficit)	Non- controlling interest	Total stockholders' equity (deficit)
	Class A		Class B							
	Shares	Amount	Shares	Amount						
Balance at January 1, 2016	5,748	\$ 1	41,680	\$ 4	\$ 41,909	\$ (77,255)	\$ (6,708)	\$ (42,049)	\$ 10	\$ (42,039)
Net income	—	—	—	—	—	10,163	—	10,163	—	10,163
Issuance of common stock	3,484	—	—	—	456	—	—	456	—	456
Stock redemptions	(332)	—	(476)	—	(3,291)	—	—	(3,291)	—	(3,291)
Stock-based compensation	—	—	—	—	614	—	—	614	—	614
Foreign currency translation, net of tax	—	—	—	—	—	—	20	20	—	20
Retirement related benefit plans, net of tax	—	—	—	—	—	—	(576)	(576)	—	(576)
Balance at December 31, 2016	8,900	1	41,204	4	39,688	(67,092)	(7,264)	(34,663)	10	(34,653)
Net loss	—	—	—	—	—	(99,407)	—	(99,407)	—	(99,407)
Initial public offering, net of issuance costs of \$4,830	13,800	1	(2,200)	—	114,437	—	—	114,438	—	114,438
Shares converted upon Delaware incorporation	2,496	—	(2,496)	—	—	—	—	—	—	—
2001 ISO Plan modification	—	—	—	—	66,510	—	—	66,510	—	66,510
Issuance of common stock for acquisitions	988	—	—	—	8,712	—	—	8,712	—	8,712
Exercise of stock options	541	—	—	—	1,792	—	—	1,792	—	1,792
Purchase of noncontrolling interests	—	—	—	—	(19)	—	—	(19)	(10)	(29)
Amortization of mezzanine equity	—	—	—	—	(8)	—	—	(8)	—	(8)
Stock-based compensation	—	—	—	—	1,044	—	—	1,044	—	1,044
Foreign currency translation, net of tax	—	—	—	—	—	—	2,351	2,351	—	2,351
Retirement related benefit plans, net of tax	—	—	—	—	—	—	(159)	(159)	—	(159)
Balance at December 31, 2017	26,725	2	36,508	4	232,156	(166,499)	(5,072)	60,591	—	60,591
Cumulative effect of an accounting change	—	—	—	—	—	70,779	—	70,779	—	70,779
Net income	—	—	—	—	—	13,715	—	13,715	—	13,715
Follow-on public offering, net of offering costs of \$370	5,731	1	(1,675)	(1)	135,201	—	—	135,201	—	135,201
Adjustment for acquisitions	—	—	—	—	(96)	—	—	(96)	—	(96)
Conversion from Class B to Class A	2,662	—	(2,662)	—	—	—	—	—	—	—
Issuance of common stock for acquisitions	145	—	—	—	8,681	—	—	8,681	—	8,681
Exercise of stock options	3,086	1	—	—	2,076	—	—	2,077	—	2,077
Stock-based compensation	—	—	—	—	1,814	—	—	1,814	—	1,814
Foreign currency translation, net of tax	—	—	—	—	—	—	(5,211)	(5,211)	—	(5,211)
Retirement related benefit plans, net of tax	—	—	—	—	—	—	(769)	(769)	—	(769)
Balance at December 31, 2018	<u>38,349</u>	<u>\$ 4</u>	<u>32,171</u>	<u>\$ 3</u>	<u>\$ 379,832</u>	<u>\$ (82,005)</u>	<u>\$ (11,052)</u>	<u>\$ 286,782</u>	<u>\$ —</u>	<u>\$ 286,782</u>

See accompanying notes to consolidated financial statements.

**ALTAIR ENGINEERING INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS**

(in thousands)	Year Ended December 31,		
	2018	2017	2016
OPERATING ACTIVITIES:			
Net income (loss)	\$ 13,715	\$ (99,407)	\$ 10,163
Adjustments to reconcile net income (loss) to net cash provided by operating activities:			
Depreciation and amortization	14,734	11,747	9,980
Provision for bad debt	394	610	291
Stock-based compensation expense	3,339	47,281	5,132
Gain on sale of assets held for sale and other	(4,503)	(244)	35
Impairment of intangible assets	608	—	—
Deferred income taxes	763	52,571	(6,076)
Other, net	(183)	542	230
Changes in assets and liabilities:			
Accounts receivable	(1,394)	(10,397)	(4,397)
Prepaid expenses and other current assets	204	1,559	(2,337)
Other long-term assets	(1,660)	(11,288)	(930)
Accounts payable	1,647	(1,087)	(1,321)
Accrued compensation and benefits	5,678	2,060	2,366
Other accrued expenses and current liabilities	(6,667)	6,207	(1,173)
Deferred revenue	9,555	15,937	9,422
Net cash provided by operating activities	<u>36,230</u>	<u>16,091</u>	<u>21,385</u>
INVESTING ACTIVITIES:			
Payments for acquisition of businesses, net of cash acquired	(203,438)	(15,582)	(6,499)
Capital expenditures	(6,659)	(7,522)	(9,444)
Proceeds from sale of assets held for sale and other	6,614	446	34
Payments for acquisition of developed technology	(2,727)	(2,120)	(154)
Other investing activities, net	—	(73)	30
Net cash used in investing activities	<u>(206,210)</u>	<u>(24,851)</u>	<u>(16,033)</u>
FINANCING ACTIVITIES:			
Proceeds from issuance of Class A common stock in follow-on public offering, net of underwriters' discounts and commissions	135,572	—	—
Borrowings under revolving commitment	37,041	126,832	151,928
Payments on revolving commitment	(6,091)	(154,187)	(136,087)
Proceeds from issuance of common stock	2,077	1,792	456
Payments for follow-on public offering and IPO offering costs	(556)	(4,644)	—
Principal payments on long-term debt	(126)	(59,869)	(16,232)
Payments for redemption of common stock	(119)	(1,045)	(3,049)
Proceeds from issuance of Class A common stock in initial public offering, net of underwriters' commissions	—	119,268	—
Proceeds from issuance of debt	—	1,541	2,030
Payment for return of capital	—	—	(725)
Other financing activities	(268)	(130)	(185)
Net cash provided by (used in) financing activities	<u>167,530</u>	<u>29,558</u>	<u>(1,864)</u>
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(1,443)	1,641	(362)
Net (decrease) increase in cash, cash equivalents and restricted cash	(3,893)	22,439	3,126
Cash, cash equivalents and restricted cash at beginning of year	39,578	17,139	14,013
Cash, cash equivalents and restricted cash at end of period	<u>\$ 35,685</u>	<u>\$ 39,578</u>	<u>\$ 17,139</u>
Supplemental disclosures of cash flow:			
Interest paid	\$ 223	\$ 2,092	\$ 2,190
Income taxes paid	\$ 6,735	\$ 5,893	\$ 5,909
Supplemental disclosure of non-cash investing and financing activities:			
Issuance of common stock in connection with acquisitions	\$ 8,681	\$ 8,712	\$ —
Promissory notes issued and deferred payment obligations for acquisitions	\$ 1,729	\$ 12,352	\$ 4,182
Capital leases	\$ 895	\$ 124	\$ 129
Property and equipment in accounts payable, other accrued expenses and current liabilities, and other liabilities	\$ 330	\$ 582	\$ 1,777
Issuance of common stock with put rights	\$ —	\$ 2,352	\$ —
Initial public offering costs in accounts payable	\$ —	\$ 186	\$ —
Notes issued for stock redemptions	\$ —	\$ —	\$ 807

See accompanying notes to consolidated financial statements.

ALTAIR ENGINEERING INC. AND SUBSIDIARIES

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Description of business

Altair Engineering Inc. (“Altair” or the “Company”) incorporated in the state of Michigan in 1985 and became a Delaware corporation in October 2017. The Company is a global technology company providing software and cloud solutions in the areas of product design and development, high performance computing and data intelligence. Altair enables organizations across broad industry segments to compete more effectively in a connected world while creating a more sustainable future. The Company is based in Troy, Michigan.

The Company’s simulation-driven approach to innovation is powered by the Company’s broad portfolio of high-fidelity and high-performance physics solvers. The Company’s integrated suite of software optimizes design performance across multiple disciplines encompassing structures, motion, fluids, thermal management, electromagnetics, system modeling, and embedded systems, while also providing data intelligence and true-to-life visualization and rendering.

Altair’s software products represent a comprehensive, open architecture solution for simulation, data intelligence and cloud computing to empower decision making for improved product development, manufacturing, energy management and exploration, financial services, health care, and retail operations. Altair believes its products offer a comprehensive set of technologies to design and optimize high performance, efficient, innovative and sustainable products and processes in an increasingly connected world.

Altair also provides Client Engineering Services to support its customers with long-term ongoing product design and development expertise. This has the benefit of embedding the Company within customers, deepening its understanding of their processes, and allowing the Company to more quickly perceive trends in the overall market, helping the Company to better tailor its research and development and sales initiatives. The Company hires engineers and data scientists for placement at a customer site for specific customer-directed assignments.

Initial public offering

In November 2017, the Company closed its initial public offering (“IPO”), in which the Company issued and sold 9,865,004 shares of Class A common stock inclusive of the underwriters’ option to purchase additional shares that was exercised in full. The price per share to the public was \$13.00. The Company received aggregate proceeds of \$119.3 million from the IPO, net of underwriters’ discounts and commissions, before deducting offering costs of approximately \$4.8 million.

The IPO also included the sale of 3,934,996 shares of Class A common stock by certain stockholders, giving effect to the conversion of 2,200,000 shares of the Company’s Class B common stock into an equivalent number of shares of Class A common stock, and 1,734,996 stock options for Class A common stock exercised by the Company’s chief executive officer. The Company did not receive any proceeds from the sale of shares of Class A common stock by the selling stockholders.

Follow-on public offering

In June 2018, the Company closed its follow-on public offering (the “Offering”), in which the Company issued and sold 4,056,004 shares of Class A common stock (inclusive of 763,424 shares sold upon the exercise by the underwriters of their option to purchase additional shares of our Class A common stock). The price per share to the public was \$35.00. The Company received aggregate proceeds of \$135.6 million from the Offering, net of underwriters’ discounts and commissions, before deducting offering costs of approximately \$0.4 million.

The Offering also included the sale of 2,307,420 shares of Class A common stock by selling stockholders, giving effect to the conversion of 1,675,420 shares of the Company’s Class B common stock into an equivalent number of shares of Class A common stock and the exercise of 257,000 options to purchase Class A common stock. The Company did not receive any proceeds from the sale of shares of Class A common stock by the selling stockholders other than the \$0.5 million in proceeds from exercises of stock options by certain selling stockholders.

2. Summary of significant accounting policies

Principles of consolidation

The accompanying consolidated financial statements have been prepared using accounting principles generally accepted in the United States of America (“GAAP”). The consolidated financial statements include the results of the Company and its controlled subsidiaries. Third-party holdings of equity interests in the Company’s subsidiaries that are less than controlled represent noncontrolling interests. Intercompany accounts and transactions have been eliminated in the consolidated financial statements.

Reclassifications

Certain prior period amounts included in the 2017 and 2016 consolidated statements of cash flows have been reclassified to conform to the current year presentation. Specifically, in the accompanying consolidated statement of cash flows for the years ended December 31, 2017 and 2016, Gain on sale of assets held for sale and other has been reclassified out of Other operating activities. This reclassification had no effect on Net cash provided by operating activities. Additionally, Proceeds from the sale of assets held for sale and other has been reclassified out of Other investing activities. This reclassification had no effect on Net cash used in investing activities.

Use of estimates

The preparation of the consolidated financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosures of contingent assets and liabilities at the date of the financial statements, and reported amounts of revenue and expenses during the reporting periods. On an ongoing basis, management evaluates its significant estimates including the stand alone selling price, or SSP, for each distinct performance obligation included in customer contracts with multiple performance obligations, the determination of the period of benefit for capitalized costs to obtain a contract, provision for doubtful accounts, tax valuation allowances, liabilities for uncertain tax provisions, impairment of goodwill and intangible assets, retirement obligations, useful lives of intangible assets, revenue for fixed price contracts, valuation of common stock, and stock-based compensation. Actual results could differ from those estimates.

Delaware Conversion

On October 5, 2017, the Company became a Delaware corporation and effected a four-for-one stock split of its common stock. On the effective date of the Company becoming a Delaware corporation, (i) each share of outstanding common stock was increased to four shares of common stock, par value \$0.0001 per share, (ii) the number of shares of common stock issuable under each outstanding option to purchase common stock was increased on a four-for-one basis, (iii) the exercise price of each outstanding option to purchase common stock was reduced on a four-for-one basis, and (iv) the redemption price of each outstanding put option was reduced on a four-for-one basis. All share and per share information referenced throughout the consolidated financial statements and notes thereto have been retroactively adjusted to reflect this stock split.

In connection with the Company becoming a Delaware corporation, 2,495,752 shares of Class B common stock, held by holders of less than 3% of Class B common stock immediately prior to the conversion, converted into Class A common stock.

Pursuant to the Company's Delaware certificate of incorporation, the Company's authorized capital consists of 513,796,572 shares of Class A common stock, 41,203,428 shares of Class B common stock and 45,000,000 shares of preferred stock.

Foreign currency translation

The functional currency of the Company's foreign subsidiaries is their respective local currency. The assets and liabilities of the subsidiaries are translated to U.S. dollars at the exchange rate on the balance sheet date. Equity balances and transactions are translated using historical exchange rates. Revenues and expenses are translated at the average exchange rate during the period. Translation adjustments arising from the use of differing exchange rates from period to period are recorded as a component of accumulated other comprehensive loss within stockholders' equity.

All assets and liabilities denominated in a currency other than the functional currency are remeasured into the functional currency with gains and losses recognized in foreign currency losses, net, in the consolidated statements of operations. The Company has no transactions which hedge purchase commitments and no intercompany balances which are designated as being of a long-term investment in nature.

Revenue recognition

The Company generates revenue from our Software and CES segments and our other businesses. Revenue is recognized by identifying a contract with a customer, identifying the performance obligations in the contract, determining the transaction price, allocating the transaction price to the performance obligations in the contract, and recognizing revenue when (or as) the Company satisfies a performance obligation.

Software

Software revenue includes product revenue from software product licensing arrangements, related services consisting of software maintenance and support in the form of post-contract customer support (PCS or maintenance) and professional services such as

consulting and training services. To a much lesser extent, software revenue also includes revenue from the sale of hardware products, primarily as a result of recent business acquisitions.

Software products are sold to customers primarily under a term-based software licensing model and to a lesser degree, perpetual software licenses. The Company enters into contracts that include combinations of products, maintenance and services, which are accounted for as separate performance obligations with differing revenue recognition patterns.

Most term-based software license agreements include the Company's patented units-based subscription model which allows customers to license a pool of units for their organizations, providing individual users flexible access to the Company's entire portfolio of engineering software applications as well as to its growing portfolio of partner products. The amount of software usage is limited by the number of the units licensed by the customer. Revenue from these arrangements is fixed (based on the units licensed) and is not based on actual customer usage of each software product.

Revenue from term-based software licenses is classified as license software revenue. Term-based licenses are sold only as a bundled arrangement that includes the rights to a term software license and PCS, which includes unspecified technical enhancements and customer support. Maximizing the use of observable inputs, the Company determined that a majority of the estimated standalone selling price of the term-based license is attributable to the term license and a minority is attributable to the PCS. The license component is recognized as revenue upon the later of delivery of the licensed product or the beginning of the license period. The PCS is classified as maintenance revenue and is recognized ratably over the term of the contract, as the Company provides the PCS benefit over time.

In addition to term-based software licenses, the Company sells perpetual licenses. Typically, the Company's perpetual licenses are sold with PCS, which includes unspecified technical enhancements and customer support. Revenue from the software component is classified as license software revenue and is recognized upon the later of delivery of the licensed product or the beginning of the license period. The Company allocates value in bundled perpetual and PCS arrangements based on the standalone selling prices of the perpetual license and PCS. Revenue from PCS is classified as maintenance revenue and is recognized ratably over the term of the contract, as the Company satisfies the PCS performance obligation over time.

Revenue from training, consulting and other services is recognized as the services are performed. For contracts in which the service consists of a single performance obligation, such as providing a training class to a customer, the Company recognizes revenue upon completion of the performance obligation. For service contracts that are longer in duration and often include multiple performance obligations (for example, both training and consulting), the Company measures the progress toward completion of the obligations and recognizes revenue accordingly. In measuring progress towards the completion of performance obligations, the Company typically utilizes output-based estimates for services with contractual billing arrangements that are not based on time and materials, and estimates output based on the total tasks completed as compared to the total tasks required for each work contract. Input-based estimates are utilized for services that involve general consultations with contractual billing arrangements based on time and materials, utilizing direct labor as the input measure.

The Company also executes arrangements through indirect channel partners in which the channel partners are authorized to market and distribute the Company's software products to end users of the Company's products and services in specified territories. In sales facilitated by channel partners, the channel partner generally bears the risk of collection from the end-user customer. The Company recognizes revenue from transactions with channel partners when the channel partner submits a purchase commitment, collectability from the channel partner is probable, and the performance obligation was met, at a point in time or over time as appropriate, provided that all other revenue recognition criteria are satisfied. Revenue from channel partner transactions is the amount remitted to the Company by the channel partners. This amount includes a fee for PCS that is compensation for providing technical enhancements and the second level of technical support to the end user, which is recognized over the period that PCS is to be provided. The Company does not offer right of return, product rotation or price protection to any of its channel partners.

Non-income related taxes collected from customers and remitted to governmental authorities are recorded on the consolidated balance sheet as accounts receivable, net and other accrued expenses and current liabilities. These amounts are reported on a net basis in the consolidated statements of operations and do not impact reported revenues or expenses.

Software related services

Consulting services from product design and development projects are considered distinct performance obligations and are provided to customers on a time-and-materials, or T&M, or fixed-price basis. Altair recognizes services revenue from our T&M contracts using input-based estimates, utilizing direct labor and contractually agreed-upon hourly rates as the input measure. For fixed-price contracts, software services revenue is recognized over time using a method that measures the extent of progress towards completion of a performance obligation, generally using a cost-input method where revenue is recognized based on the proportion of total cost incurred to estimated total costs at completion. If output or input measures are not available or cannot be reasonably estimated, revenue is recognized upon completion of the services.

Client engineering services

CES revenue is derived from our hiring of engineers and data scientists for placement at a customer site for specific customer-directed assignments. These professional services are considered distinct performance obligations and are provided to customers on a T&M basis. We recognize client engineering services revenue based upon hours worked and contractually agreed-upon hourly rates.

Other

Other revenue includes product revenue from the sale of LED products for the replacement of fluorescent tubes. Revenue from the sale of LED products for the replacement of fluorescent tubes is recognized when all revenue recognition criteria stated above are met, which is generally when the products are delivered to resellers or to end customers. Sales returns, which reduce revenue, are estimated using historical experience.

Cost of revenue*Cost of software*

Cost of software revenue consist of expenses related to software licensing, hardware sales and customer support. Significant expenses include employee related costs for support team members, travel costs, and royalties for third-party software products available to customers through the Company's products or as part of the Company's Partner Alliance Program, or APA.

Cost of client engineering services

Cost of engineering services revenue consists primarily of employee compensation and related costs. We employ and pay them only for the duration of the placement.

Cost of other

Cost of other revenue includes the cost of LED lighting products and freight related to products sold to retail and commercial sales channels.

Deferred revenue

Deferred revenue consists of customer billings or payments received in advance of the recognition of revenue and is recognized as revenue when revenue recognition criteria are met.

Cash, cash equivalents and restricted cash

The Company considers all highly liquid investments with original or remaining maturities of 90 days or less at the date of purchase to be cash equivalents. Cash and cash equivalents are recorded at cost, which approximates fair value.

Restricted cash is included in other long-term assets on the consolidated balance sheets. The following table provides a reconciliation of cash, cash equivalents and restricted cash reported in the consolidated balance sheets that sum to the total of the amounts reported in the consolidated statements of cash flows (in thousands):

	December 31,	
	2018	2017
Cash and cash equivalents	\$ 35,345	\$ 39,213
Restricted cash included in other long-term assets	340	365
Total cash, cash equivalents, and restricted cash shown in the statement of cash flows	\$ 35,685	\$ 39,578

Restricted cash represents amounts required for a contractual agreement with an insurer for the payment of potential health insurance claims, and term deposits for bank guarantees.

Accounts receivable, net

Accounts receivable, net consisted of the following (in thousands):

	December 31,	
	2018	2017
Accounts receivable, trade	\$ 93,073	\$ 82,185
Contract assets	3,730	4,450
Accounts receivable, net	<u>\$ 96,803</u>	<u>\$ 86,635</u>

An allowance for doubtful accounts is recorded when amounts are determined to be uncollectible based on specific identification of customer circumstances, age of the receivable and other available information. Accounts are written off when it becomes apparent that such amounts will not be collected. Generally, the Company does not require collateral or charge interest on accounts receivable. Accounts receivable were reported net of an allowance for doubtful accounts of \$1.2 million and \$0.8 million at December 31, 2018 and 2017, respectively. Activity in the allowance for doubtful accounts was as follows (in thousands):

	For the year ended December 31,		
	2018	2017	2016
Balance, beginning of year	\$ (798)	\$ (565)	\$ (937)
Provision charged to expense	(394)	(610)	(291)
Write-offs, net of recoveries	3	414	638
Effects of foreign currency translation	39	(37)	25
Balance, end of year	<u>\$ (1,150)</u>	<u>\$ (798)</u>	<u>\$ (565)</u>

Concentrations of credit risk

The Company's financial instruments that are potentially subject to concentrations of credit risk consist primarily of cash and trade receivables. The risk with respect to trade receivables is partially mitigated by the diversity, both by geography and by industry, of the Company's customer base. The Company's accounts receivable is derived from sales to a large number of direct customers and resellers around the world. Sales to customers within the automotive industry accounted for approximately 45%, 50%, and 50% of the Company's 2018, 2017 and 2016 revenue, respectively, with no other industry representing more than 10% of revenue. No individual customer accounted for 10% or more of revenue in the years ended December 31, 2018, 2017 or 2016.

Inventory

Inventory consist of finished goods and is stated at the lower of cost and net realizable value. Cost is determined using the first-in, first-out method. Net realizable value is the estimated selling prices in the ordinary course of business, less reasonable predictable costs of completion, disposal and transportation. The valuation of inventory requires management to estimate excess inventory as well as inventory that is not of saleable quality. The determination of obsolete or excess inventory requires management to estimate market conditions and future demand for the Company's products.

Property and equipment, net

Property and equipment are stated at cost, less accumulated depreciation and amortization. Equipment held under capital leases are stated at the present value of minimum lease payments less accumulated amortization. Depreciation is calculated using the straight-line method over the estimated useful lives of the assets. Leasehold improvements and assets acquired under capital leases are amortized over the lease term or the estimated useful life of the related asset or improvement, whichever is shorter.

Expenditures for maintenance and repairs are charged to expense in the period incurred. Major expenditures for betterments are capitalized when they meet the criteria for capitalization. When assets are retired or otherwise disposed of, the cost and accumulated depreciation are removed from the accounts and any resulting gain or loss is reflected in the consolidated statements of operations in the period realized.

Software development costs

Software development costs incurred prior to the establishment of technological feasibility are expensed as incurred. Technological feasibility is established upon the completion of a detailed program design. Capitalization of software development costs begins upon the establishment of technological feasibility and ends when the product is available for general release. Generally, the time between the establishment of technological feasibility and commercial release of software is short. As such, all internal software development

costs have been expensed as incurred and included in research and development expense in the accompanying consolidated statements of operations.

Impairment of long-lived assets

Long-lived assets, such as property and equipment, and definite-lived intangible assets, including developed technology and customer relationships, are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. If circumstances require a long-lived asset or asset group to be tested for possible impairment, the Company compares the undiscounted future cash flows expected to be generated by that asset or asset group to its carrying amount. If the carrying amount of the long-lived asset or asset group is not recoverable on an undiscounted cash flow basis, an impairment charge is recognized to the extent that the carrying amount exceeds its fair value. Fair value is determined through various valuation techniques, including discounted cash flow models and third-party independent appraisals. No impairment losses were recognized in 2018, 2017, or 2016.

Goodwill and other indefinite-lived intangible assets

Goodwill represents the excess of the consideration transferred for an acquired entity over the estimated fair values of the net tangible assets and the identifiable assets acquired. As described in Note 4—Acquisitions, the Company has recorded goodwill in connection with certain acquisitions. Goodwill and other indefinite-lived intangible assets are not amortized, but rather are reviewed for impairment annually or more frequently if facts or circumstances indicate that the carrying value may not be recoverable.

The Company has determined that there is one reporting unit with goodwill subject to goodwill impairment testing. An entity has the option to perform a qualitative assessment to determine whether it is more likely than not that the fair value of the reporting unit is less than its carrying amount prior to performing the quantitative two-step impairment test. The qualitative assessment evaluates various events and circumstances, such as macro-economic conditions, industry and market conditions, cost factors, relevant events and financial trends that may impact a reporting unit's fair value. If it is determined that the estimated fair value of the reporting unit is more likely than not less than its carrying amount, including goodwill, the two-step goodwill impairment test is required. Otherwise, no further analysis would be required. For 2017 and 2016, the Company performed a qualitative assessment of goodwill and determined that it was not more likely than not that the fair value of its reporting unit with goodwill was less than the carrying amounts. Accordingly, the Company determined that its goodwill was not impaired.

The Company may skip the qualitative assessment, or if the two-step impairment test for goodwill is deemed necessary, this quantitative impairment analysis compares the fair value of the Company's reporting unit to its related carrying value. If the fair value of the reporting unit exceeds its carrying amount, step two does not need to be performed. If the fair value of the reporting unit is less than its carrying amount, an indication of goodwill impairment exists and the Company must perform step two of the impairment test. Under step two, an impairment loss is recognized for any excess of the carrying amount of the reporting unit's goodwill over the implied fair value of that goodwill. The implied fair value of goodwill is determined by allocating the fair value of the reporting unit in a manner similar to a purchase price allocation and the residual fair value after this allocation is the implied fair value of the reporting unit goodwill. Fair value of the reporting units is determined using an income approach. The income approach is based on projected debt-free cash flows which are discounted to the present value using discount factors that consider the timing and risk of cash flows. The Company also takes into consideration a multiple of earnings valuation technique. The Company believes that this approach is appropriate because it provides a reasonable estimate of the price that would be received to sell the reporting unit in an orderly transaction between market participants at the measurement date. While there are inherent uncertainties related to the assumptions used in this analysis, the Company believes that this approach provides a reasonable estimate of fair value.

The Company performs its annual impairment review of goodwill in the fourth quarter of each year and when a triggering event occurs between annual impairment dates. For 2018, the Company performed a quantitative assessment of goodwill and determined that the fair value of the reporting unit exceeded its carrying amount, as such, step two does not need to be performed. Accordingly, the Company determined that its goodwill was not impaired.

During the quarter ended September 30, 2018, the Company performed an interim test of indefinite-lived trade names. This test was triggered by the Company's decision during the quarter to rename and rebrand certain products in the Software segment. Upon completion of the impairment test, the Company recorded an impairment charge of \$0.6 million which is included in other operating income for the year ended December 31, 2018. There was no indication of impairment of other indefinite-lived intangible assets for the Company's annual test which is completed in the fourth quarter. No impairment charges were recognized in 2017 and 2016.

Receivable for R&D credit

The French government provides a research and development ("R&D") tax credit known as Credit Impôt Recherche, or CIR, in order to encourage Companies to invest in R&D. The tax credit is deductible from the French income tax and any excess is carried forward for three years. After three years, any unused credit may be reimbursed to the Company by the French government. As of

December 31, 2018, the Company had approximately \$11.7 million receivable from the French government related to CIR, of which \$2.6 million is recorded in income tax receivable and the remaining \$9.1 million is recorded in other long-term assets. As of December 31, 2017, the Company had approximately \$10.2 million receivable from the French government related to CIR, of which \$3.3 million was recorded in income tax receivable and the remaining \$6.9 million was recorded in other long-term assets. CIR is subject to customary audit by the French tax authorities.

Valuation of common stock prior to IPO

Due to the absence of an active market for the Company's common stock prior to the Company's IPO in the fourth quarter of 2017, the Board of Directors, with the assistance of a third-party valuation specialist, determined the fair value of the Company's common stock. The valuation methodology included estimates and assumptions including forecasts of future cash flows that required significant judgments. These valuations considered a number of objective and subjective factors, including the Company's actual operating and financial performance, external market conditions, performance of comparable publicly traded companies, comparable transactions, business developments, likelihood of achieving a liquidity event, such as an initial public offering or sale, and common stock transactions, among other factors. The Company utilized methodologies in accordance with the framework of the American Institute of Certified Public Accountants' Technical Practice Aid, *Valuation of Privately-Held Company Equity Securities issued as Compensation*, to estimate the fair value of its common stock. Significant changes to the key assumptions used in the valuations could have resulted in different fair values of the Company's common stock at each valuation date.

Derivative financial instruments

The Company may use derivative financial instruments, primarily interest rate swap contracts or foreign currency contracts, to hedge its exposure to interest rate or foreign exchange risk. Such derivative financial instruments are initially recorded at fair value on the date on which a derivative contract is entered into and are subsequently remeasured to fair value at period end. Any gains or losses arising from changes in fair value on derivative contracts during the year are recorded in other (income) expense, net in the consolidated statement of operations. Hedge accounting has not been applied.

Income taxes

The Company accounts for income taxes under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax basis and for operating loss and tax credit carryforwards. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income in the period that includes the enactment date. The Company records net deferred tax assets to the extent it believes that these assets will more likely than not be realized. These deferred tax assets are subject to periodic assessments as to recoverability and if it is determined that it is more likely than not that the benefits will not be realized, valuation allowances are recorded which increase the provision for income taxes. In making such determination, the Company considers all available positive and negative evidence, including historical taxable income, projected future taxable income, the expected timing and reversal of existing temporary differences, ability to carryback losses, and tax planning strategies. If based upon the evidence, it is more likely than not that the deferred tax asset will not be realized, a valuation allowance is recorded. A valuation allowance is recognized to reduce deferred tax assets to the amount that management believes is more likely than not to be realized.

The Company applies a more-likely-than-not recognition threshold to its accounting for tax uncertainties. The Company reviews all of its tax positions and makes determinations as to whether its tax positions are more likely than not to be sustained upon examination by the relevant taxing authorities. Only those benefits that have a greater than fifty percent likelihood of being sustained upon examination by taxing authorities are recognized. Interest and penalties related to uncertain tax positions are recorded in the provision for income taxes in the consolidated statements of operations.

Research and development costs

Research and development costs are expensed as incurred. Research and development expenses consist primarily of salaries and benefits of research and development employees and costs incurred related to the development of new software products and significant enhancements and engineering changes to existing software products. Research and development expenses were \$97.6 million, \$93.2 million, and \$71.3 million for the years ended December 31, 2018, 2017 and 2016, respectively.

Advertising costs

Advertising costs are expensed as incurred. Advertising expenses were \$4.4 million, \$3.5 million and \$2.5 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Mezzanine equity

In 2017, the Company issued 200,000 shares of Class A common stock to a third party as partial consideration for the purchase of developed technology. These shares have a put right that can be exercised by the holder five years from date of purchase at \$12.50 per share that requires the shares to be recorded at fair value and classified as mezzanine equity in the consolidated balance sheet. As of December 31, 2017, the Company concluded that it is no longer probable that the put option will be exercised as the put value is substantially below market value and subsequent adjustment is not required.

Classification of the instrument shall remain as mezzanine equity until one of the following three events take place; 1) shares are sold on open market; 2) a redemption feature lapses; or 3) there is a modification of the terms of the instrument. As none of these events have taken place as of December 31, 2018, the classification remains as mezzanine equity.

Stock-based compensation

Employee stock-based awards, consisting of stock options or restricted stock units (RSUs) expected to be settled by issuing shares of Class A common stock, are recorded as equity awards. The fair value of these awards on the date of grant is measured using the Black-Scholes option pricing model. The Company expenses the grant date fair value of its time-vested stock options subject to graded vesting using the straight-line method over the applicable service period. The fair value of RSUs, is measured using the fair value of the Company's Class A common stock on the date of the grant. The fair value of RSUs is recognized as expense on a straight-line basis over the requisite service period, which is generally four years.

Employee stock-based awards, which consisted of stock options with repurchase features that allowed them to be settled in cash at a purchase price that was less than the current fair value, were considered liability-based awards. These awards were initially recorded at fair value and remeasured to fair value at the end of each reporting period until settled. During the quarter ended June 30, 2017, the Company changed its accounting policy to measure the fair value of its liability awards using the Black-Scholes option pricing model as a result of the Company no longer meeting the definition of a non-public entity. The impact of the change in accounting policy was immaterial to the financial statements. Upon IPO effectiveness in the fourth quarter of 2017, the repurchase feature was terminated and resulted in a modification of the option awards and these options were accounted for as equity awards post the Company's IPO.

Recent accounting guidance

Accounting standards adopted

The Company ceased to qualify as an emerging growth company (as defined in the Jumpstart Our Business Startups Act of 2012) as of December 31, 2018, therefore all of the 2018 public company adoptions are reflected in this Annual Report on Form 10-K.

Revenue Recognition — In May 2014, the Financial Accounting Standards Board, or "FASB", issued ASU No. 2014-09, *Revenue from Contracts with Customers (Topic 606)* (ASU 2014-09). The Company adopted ASU 2014-09 and its related amendments, or ASC 606, effective January 1, 2018 using the modified retrospective approach for all contracts not completed as of the date of adoption. Results as of and for the year ended December 31, 2018 are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported in accordance with ASC 605, *Revenue Recognition* (ASC 605) and other industry specific guidance. Under ASC 605, the Company did not report "License" and "Maintenance and other services" revenue or cost of revenue. Therefore, the Company could not report these amounts for comparable prior periods. See Note 3 – Revenue from contracts with customers for the effect of the adoption of ASC 606 on the Company's consolidated financial statements.

Financial Instruments —In January 2016, the FASB issued Accounting Standards Update (“ASU”) No. 2016-01, *Financial Instruments—Overall: Recognition and Measurement of Financial Assets and Financial Liabilities*. The Company adopted this standard effective January 1, 2018. This standard affects the accounting for equity instruments, financial liabilities under the fair value option and the presentation and disclosure requirements of financial instruments. The adoption did not have a material effect on the Company’s consolidated financial statements.

Cash Classification —In August 2016, the FASB issued ASU No. 2016-15, *Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments*, The Company adopted ASU 2016-15 effective January 1, 2018, on a retrospective basis. This standard provides guidance for targeted changes with respect to how cash receipts and cash payments are classified in the statements of cash flows. The adoption did not have a material effect on the Company’s consolidated financial statements.

Retirement Benefits – In March 2017, the FASB issued ASU 2017-07, *Compensation – Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost*. The Company adopted ASU 2017-07 effective January 1, 2018. This ASU provides guidance on the presentation of the service cost component and the other components of net period pension cost in the consolidated statements of operations. The adoption did not have a material effect on the Company’s consolidated financial statements.

Stock Compensation – In May 2017, the FASB issued ASU 2017-09, *Compensation – Stock Compensation (Topic 718): Scope of Modification Accounting*, which amends the guidance about which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting in Topic 718. This change is required to be applied prospectively to an award modified on or after the adoption date. The Company adopted this standard on January 1, 2018, and will apply this guidance to modifications of stock-based compensation arrangements after this date. The adoption did not have a material effect on the Company’s consolidated financial statements.

Accounting standards not yet adopted

Leases —In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)*. This standard amends various aspects of existing accounting guidance for leases, including the recognition of a right-of-use asset and a lease liability on the balance sheet for all leases with terms longer than 12 months. Leases will be classified as either finance or operating, with classification affecting the pattern of expense recognition in the income statement. This standard also introduces new disclosure requirements for leasing arrangements. The Company is adopting ASU 2016-02 on January 1, 2019 and plans to elect the optional transition method as well as the package of practical expedients upon adoption. The Company is currently in the process of completing its review of lease contracts, evaluating other contracts for potential embedded leases, and establishing new processes and revised internal controls.

Upon adoption, the Company expects to record a right of use asset and a corresponding lease liability for its operating leases where the Company is the lessee. The potential impact on the Company’s consolidated financial statements is largely based on the present value of future minimum lease payments, the amount of which will depend upon the population of leases in effect at the date of adoption. Future minimum lease payments totaled \$33.2 million as of December 31, 2018, as disclosed in Note 19 - Commitments and contingencies.

Goodwill Impairment —In January 2017, the FASB issued ASU No. 2017-04, *Intangibles – Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment*, which simplifies accounting for goodwill impairments by eliminating step two from the goodwill impairment test. This guidance is effective for annual or interim goodwill impairment tests in fiscal years beginning after December 15, 2019. Early adoption is permitted for interim and annual goodwill impairment tests performed on testing dates after January 1, 2017. The new standard must be applied on a prospective basis. The adoption of this guidance is not expected to have a material impact on the Company’s consolidated financial statements.

Derivatives and Hedging – In August 2017, the FASB issued ASU 2017-12, *Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities*. This ASU amends the guidance with the objective of improving the financial reporting of hedging relationships to better portray the economic results of an entity’s risk management activities in its financial statements. In addition, this ASU amends the current guidance to simplify the application of the hedge accounting guidance. The amendments are effective for annual and interim reporting periods beginning after December 15, 2018, with early adoption permitted. The adoption of this guidance is not expected to have a material impact on the Company’s consolidated financial statements.

Comprehensive Income – In February 2018, the FASB issued ASU 2018-02, *Income Statement — Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income (AOCI)*, which gives entities the option to reclassify to retained earnings the tax effects resulting from the Tax Cuts and Jobs Act, or the Tax Act, related to items in AOCI that the FASB refers to as having been stranded in AOCI. The new guidance may be applied retrospectively to each period in which the effect of the Tax Act is recognized in the period of adoption. The Company must adopt this guidance for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years. Early adoption is permitted for periods for which

financial statements have not yet been issued or made available for issuance, including the period the Tax Act was enacted. The guidance, when adopted, will require new disclosures regarding a company's accounting policy for releasing the tax effects in AOCI and permit the company the option to reclassify to retained earnings the tax effects resulting from the Tax Act that are stranded in AOCI. The Company is currently evaluating how to apply the new guidance and has not determined whether it will elect to reclassify stranded amounts. The adoption of ASU 2018-02 is not expected to have a material effect on the Company's consolidated financial statements and related disclosures.

Stock Compensation – In June 2018, the FASB issued ASU 2018-07, *Compensation – Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting*. This ASU simplifies the accounting for share-based payments to nonemployees by aligning it with the accounting for share-based payments to employees, with certain exceptions. Under the guidance, the measurement of equity-classified nonemployee awards will be fixed at the grant date, which may lower an entity's cost and reduce volatility in the income statement. The amendments are effective for fiscal years beginning after December 15, 2018, including interim periods within that fiscal year. Early adoption is permitted, including in an interim period, but not before an entity adopts ASC 606, *Revenue from contracts with customers*. The adoption of this guidance is not expected to have a material effect on the Company's consolidated financial statements.

Fair Value – In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework – Changes to the Disclosure Requirements for Fair Value Measurement*. This ASU modifies the disclosure requirements for fair value measurements, by removing, modifying, or adding certain disclosures. The amendments are effective for fiscal years, and interim reporting periods within those fiscal years, beginning after December 15, 2019. Early adoption is permitted for any removed or modified disclosures. The Company is currently evaluating the impact of the new guidance on its consolidated financial statements and related disclosures.

Retirement Benefits – In August 2018, the FASB issued ASU 2018-14, *Compensation – Retirement Benefits- Defined Benefit Plans – General (Subtopic 715-20): Disclosure Framework – Changes to the Disclosure Requirements for Defined Benefit Plans*. This ASU modifies the disclosure requirements for defined benefit pension or other postretirement plans. The amendments are effective for fiscal years ending after December 15, 2020, early adoption is permitted. The adoption of this guidance is not expected to have a material impact on the Company's consolidated financial statements.

Intangibles – In August 2018, the FASB issued ASU 2018-15, *Intangibles – Goodwill and Other – Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That is a Service Contract*. This ASU clarifies and aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. The amendments are effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years, early adoption is permitted. The Company is currently evaluating the impact of the new guidance on its consolidated financial statements and related disclosures.

3. Revenue from contracts with customers

Adoption of ASC 606, Revenue from Contracts with Customers

The Company adopted ASC 606 on January 1, 2018, using the modified retrospective approach for all contracts not completed as of the date of adoption. Results for reporting periods beginning on or after January 1, 2018, are presented under ASC 606, while prior period amounts are not adjusted and continue to be reported in accordance with ASC 605, and other industry specific guidance. The adoption of ASC 606 represents a change in accounting principle that will more closely align revenue recognition with the transfer of promised goods or services to a customer in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. ASC 606 requires an entity to evaluate revenue recognition by identifying a contract with a customer, identifying the performance obligations in the contract, determining the transaction price, allocating the transaction price to the performance obligations in the contract, and recognizing revenue when (or as) the entity satisfies a performance obligation. Topic 606 also includes Subtopic 340-40 which provides accounting guidance for incremental costs of obtaining a contract with a customer. The Company refers to Topic 606 and Subtopic 340-40 collectively as "ASC 606." The Company elected not to apply any of the practical expedients which are allowed in the application of this new guidance.

The Company recorded a decrease to accumulated deficit of \$84.6 million, or \$70.8 million net of tax, on January 1, 2018, due to the cumulative effect of the ASC 606 adoption, with the impact primarily derived from revenue related to software licenses recognized at a point in time under ASC 606 that were historically recognized over time. There was no impact on Client Engineering Services or Other revenue upon the adoption of ASC 606.

Revenue recognition

Software revenue

Revenue is derived principally from the licensing of software products and from related maintenance contracts. The Company enters into contracts that include combinations of products, maintenance and services, which are accounted for as separate performance obligations with differing revenue recognition patterns.

Revenue from term-based software licenses is classified as software revenue. Term-based licenses are sold only as a bundled arrangement that includes the rights to a term software license and post-contract customer support (PCS), which includes unspecified technical enhancements and customer support. Maximizing the use of observable inputs, the Company determined that a majority of the estimated standalone selling prices of the term-based license is attributable to the term license and a minority is attributable to the PCS. The license component is classified as software revenue and recognized as revenue upon the later of delivery of the licensed product or the beginning of the license period. PCS is classified as software revenue and is recognized ratably over the term of the contract, as the Company provides the PCS benefit over time as a stand ready to perform obligation.

In addition to term-based software licenses, the Company sells perpetual licenses. Software revenue is recognized upon the later of delivery of the licensed product or the beginning of the license period. Typically, the Company's perpetual licenses are sold with PCS. The Company allocates value in bundled perpetual and PCS arrangements based on the value relationship between the software license and maintenance. Revenue from PCS is classified as software revenue and is recognized ratably over the term of the contract, as the Company satisfies the PCS performance obligation over time as a stand ready to perform obligation.

Revenue from training, consulting and other services is recognized as the services are performed. For contracts in which the service consists of a single performance obligation, such as providing a training class to a customer, the Company recognizes revenue upon completion of the performance obligation. For service contracts that are longer in duration and often include multiple performance obligations (for example, point-in-time training and consulting), the Company measures the progress toward completion of the obligations and recognizes revenue accordingly. In measuring progress towards the completion of performance obligations, the Company typically utilizes output-based estimates for services with fixed fee arrangements, and estimates output based on the total tasks completed as compared to the total tasks required for each contract. Input-based estimates are utilized for services that involve general consultations with contractual billing arrangements based on time and materials, utilizing direct labor as the input measure.

The Company also executes arrangements through indirect channel partners in which the channel partners are authorized to market and distribute the Company's software products to end users of the Company's products and services in specified territories. In sales facilitated by channel partners, the channel partner bears the risk of collection from the end-user customer. The Company recognizes revenue from transactions with channel partners when the channel partner submits a purchase commitment, collectability from the channel partner is probable, and the performance obligation is met, at a point in time or over time as appropriate, provided that all other revenue recognition criteria are satisfied. Revenue from channel partner transactions is the amount remitted to the Company by the channel partners. This amount includes a fee for PCS that is compensation for providing technical enhancements and the second level of technical support to the end user, which is recognized over the period that PCS is to be provided. The Company does not offer right of return, product rotation, or price protection to any of its channel partners.

Non-income related taxes collected from customers and remitted to governmental authorities are recorded on the consolidated balance sheet as Accounts receivable, net and Other accrued expenses and current liabilities. These amounts are reported on a net basis in the Consolidated statements of operations and do not impact reported revenues or expenses.

Significant judgments

Software revenue

The Company's contracts with customers typically include promises to transfer licenses and services to a customer. Judgment is required to determine if the promises are separate performance obligations within the context of the arrangement, and if so, the allocation of the transaction price to each performance obligation. The Company's determination of standalone selling price for performance obligations is based on the midpoint of the range of historical observable prices for goods and services sold separately. In addition, the Company estimates the standalone selling price for certain performance obligations where observable prices are not directly available or a significant portion of historical prices are not within the range. The Company estimates standalone selling price at contract inception considering all information that is reasonably available and is based on the amount of consideration for which the Company expects to be entitled in exchange for transferring the promised good or service to the customer. The corresponding revenues are recognized as the related performance obligations are satisfied.

The Company's contracts do not include a significant financing component requiring adjustment to the transaction price. Payment terms vary by contract type, however, arrangements typically stipulate a requirement for the customer to pay within 30 days.

The Company rarely enters into agreements to modify previously executed contracts, which constitute contract modifications. The Company assesses each of these contract modifications to determine (i) if the additional products and services are distinct from the products and services in the original arrangement; and (ii) if the amount of consideration expected for the added products and services reflects the stand-alone selling price of those products and services, as adjusted for contract-specific circumstances. A contract modification meeting both criteria is accounted for as a separate contract. A contract modification not meeting both criteria is considered a change to the original contract and is accounted for on either (i) a prospective basis as a termination of the existing contract and the creation of a new contract; or (ii) a cumulative catch-up basis. Generally, the Company's contract modifications meet both criteria and are accounted for as a separate contract, as adjusted for contract-specific circumstances.

Software related services revenue

Consulting services from product design and development projects are considered distinct performance obligations and are provided to customers on a time-and-materials ("T&M") or fixed-price basis. Altair recognizes software services revenue for T&M contracts based upon hours worked and contractually agreed-upon hourly rates using the input method. Revenue from fixed-price engagements is recognized using the output method based on the ratio of costs incurred, to the total estimated project costs.

Client engineering services and Other revenue

Client engineering services revenue are derived from professional services for staffing primarily representing engineers and data scientists located at a customer site. These professional services are considered distinct performance obligations and are provided to customers on a T&M basis. The Company recognizes this revenue for T&M contracts based upon hours worked and contractually agreed-upon hourly rates using the input method. No significant judgments were made for revenue recognition related to businesses included within Other revenue.

Impact of ASC 606 on consolidated financial statement line items

The following table summarizes the cumulative impact of adoption of the new revenue standard for revenue recognition on line items within the consolidated balance sheets (in thousands):

	As of December 31, 2017		
	Prior to adoption of ASC 606	Adjustments for ASC 606	As Adjusted
Prepaid expenses and other current assets	\$ 10,006	\$ 1,589	\$ 11,595
Deferred tax assets	\$ 8,351	\$ (12,352)	\$ (4,001)
Other long-term assets	\$ 17,019	\$ 128	\$ 17,147
Other accrued expenses and current liabilities	\$ 21,744	\$ 1,049	\$ 22,793
Deferred revenue, current	\$ 130,122	\$ (77,645)	\$ 52,477
Deferred revenue, non-current	\$ 9,640	\$ (5,263)	\$ 4,377
Other long-term liabilities	\$ 17,647	\$ 445	\$ 18,092
Accumulated deficit	\$ (166,499)	\$ 70,779	\$ (95,720)

	As of December 31, 2018		
	Prior to adoption of ASC 606	Adjustments for ASC 606	As Reported
Prepaid expenses and other current assets	\$ 13,693	\$ 1,798	\$ 15,491
Deferred tax assets	\$ 14,092	\$ (12,719)	\$ 1,373
Other long-term assets	\$ 17,077	\$ 211	\$ 17,288
Other accrued expenses and current liabilities	\$ 25,435	\$ 912	\$ 26,347
Deferred revenue, current	\$ 144,710	\$ (84,945)	\$ 59,765
Deferred revenue, non-current	\$ 13,791	\$ (7,037)	\$ 6,754
Other long-term liabilities	\$ 27,636	\$ 517	\$ 28,153
Accumulated deficit	\$ (163,600)	\$ 81,595	\$ (82,005)
Accumulated other comprehensive loss	\$ (9,300)	\$ (1,752)	\$ (11,052)

The Company recorded \$82.9 million of deferred revenue to accumulated deficit upon the adoption of ASC 606 on January 1, 2018. The adoption of ASC 606 accelerates the recognition of revenues compared to ASC 605. Under ASC 605, the Company did not have vendor-specific objective evidence (“VSOE”) of fair value for post-contract customer support (“PCS”) sold along with software products licenses; therefore, revenues for the software products licenses (including perpetual licenses), PCS and professional services, if applicable, were considered to be one accounting unit and, once all services have commenced, were recognized ratably over the remaining period of the arrangement (the longer of the contractual service term or PCS term). Under ASC 606, the concept of assessing VSOE has been eliminated and the Company determined standalone selling price and allocated transaction price associated with each performance obligation within an arrangement. As a result, the pattern of software license revenue recognition has changed under ASC 606. Software license revenue was typically recognized ratably over the term of the contract under the previous guidance; however, a majority of the contract is recognized upon the later of delivery of the licensed product or the beginning of the license period under ASC 606. This change in the pattern of revenue recognition, coupled with the recording of deferred revenue to

accumulated deficit as of January 1, 2018, resulted in the changes to the consolidated balance sheet line items as noted in the table above.

The following table presents the effect of the adoption of ASC 606 on the consolidated statement of operations (in thousands):

	Year Ended December 31, 2018		
	Prior to adoption of ASC 606	Adjustments for ASC 606	As Reported
Revenue			
Licenses	\$ 195,847	\$ 11,317	\$ 207,164
Gross profit	\$ 269,089	\$ 11,317	\$ 280,406
Operating expenses			
Sales and marketing	\$ 80,613	\$ (336)	\$ 80,277
Total operating expenses	\$ 256,098	\$ (336)	\$ 255,762
Operating income	\$ 12,991	\$ 11,653	\$ 24,644
Income before income taxes	\$ 15,371	\$ 11,653	\$ 27,024
Income tax expense	\$ 12,472	\$ 837	\$ 13,309
Net income	\$ 2,899	\$ 10,816	\$ 13,715
Income per share:			
Basic	\$ 0.04	\$ 0.16	\$ 0.20
Diluted	\$ 0.04	\$ 0.14	\$ 0.18

The increase to software revenue was primarily due to the upfront recognition of license revenue, which would have been recognized ratably over the contract under prior guidance. The decrease in sales and marketing expense was due to the capitalization of costs to obtain a contract that were expensed as incurred under prior guidance. The increase to tax expense was due to the tax impact of the increase in operating income.

The adoption of ASC 606 had no impact on the Company's cash flows from operations. However, with the adoption of ASC 606, there will be an acceleration of income tax payments associated with deferred revenue credited to accumulated deficit and never recognized as revenue in the financial statements. The 2019 tax payments related to the adoption of ASC 606 is expected to be approximately \$1.0 million.

Disaggregation of revenue

The Company disaggregates its software revenue by type of performance obligation and timing of revenue recognition as follows (in thousands):

	Year Ended December 31,		
	2018 (ASC 606)	2017 (ASC 605) (1)	2016 (ASC 605) (1)
Software revenue:			
Term licenses	\$ 168,909		
Perpetual licenses	38,255		
Maintenance	86,150		
Professional services and other	11,047		
Total software revenue	\$ 304,361	\$ 244,817	\$ 223,818

(1) As noted above, prior period amounts have not been adjusted under the modified retrospective approach.

Under ASC 606, the Company derived approximately 10% of its total revenue through indirect sales channels for the year ended December 31, 2018.

For the year ended December 31, 2018, software related services revenue of \$36.9 million, client engineering services of \$47.9 million and other revenue of \$7.2 million, were categorized based on the nature, timing and uncertainty of revenue and cash flows effected by economic factors.

Costs to obtain a contract

The Company pays commissions for new software product and PCS sales as well as for renewals of existing software and PCS contracts. Commissions paid to obtain renewal contracts are not commensurate with the commissions paid for new product sales and therefore, a portion of the commissions paid for new contracts relate to future renewals.

The Company accounts for new product sales commissions using a portfolio approach and allocates the cost of commissions in proportion to the allocation of transaction price of license and PCS performance obligations. Commissions allocated to the license and license renewal components are expensed at the time the license revenue is recognized. Commissions allocated to PCS are capitalized and amortized on a straight-line basis over a period of four years, reflecting the Company's estimate of the expected period that it will benefit from those commissions. As of December 31, 2018, capitalized costs to obtain a contract were \$2.0 million recorded in Prepaid and other current assets and \$0.2 million recorded in Other long-term assets. Amortization expense was \$0.3 million for the year ended December 31, 2018 and is included in sales and marketing expense in the Company's consolidated statement of operations.

Deferred revenue

Deferred revenue consists of billings made or payments received in advance of revenue recognition from software license, PCS and professional services agreements. The timing of revenue recognition may differ from the timing of billings to customers. Payment terms vary by the type and location of customer and the products or services offered. The term between invoicing and when payment is due is not significant. The Company generally invoices its customers annually for the forthcoming year of software licenses, and more frequently for other products and services. Accordingly, the Company's deferred revenue balance does not include revenue for future years of multiple year non-cancellable contracts that have not yet been billed. Approximately \$53.0 million of revenue was recognized during 2018 was included in the deferred revenue balances at the beginning of the year.

4. Acquisitions

Datawatch Corporation

On November 5, 2018, the Company entered into an Agreement and Plan of Merger ("Merger Agreement") with Datawatch Corporation, a Delaware corporation ("Datawatch"), and Dallas Merger Sub, Inc., a Delaware corporation ("Purchaser") and a wholly owned subsidiary of the Company.

Datawatch provides data intelligence technologies with market leading enterprise data preparation, predictive analytics and visualization solutions that fuel business analytics. Datawatch's products include software applications known as Monarch, Knowledge Studio and Panopticon. The data intelligence markets are evolving rapidly to leverage many of the same technologies, such as high-performance computing and visualization. Datawatch's solutions, which include data preparation, data prediction, and real-time high-volume data visualization technologies, are highly relevant and applicable to almost any company and vertical market, including many of the industry segments currently using Altair's technology. The Company intends to cross-sell Datawatch products into Altair's diversified global customer base.

Pursuant to the Merger Agreement, the Purchaser commenced a tender offer to purchase all of the issued and outstanding shares of Datawatch common stock, (the "Shares") at a purchase price of \$13.10 per share, net to seller in cash, without interest and less any applicable withholding taxes (the "Offer").

On December 13, 2018, the Company accepted and paid for all Shares that were validly tendered and completed the acquisition of Datawatch through the merger of Purchaser with and into Datawatch, with Datawatch surviving as a wholly owned subsidiary of the Company.

As a result of the merger, subject to certain potential exceptions provided for in the merger agreement, all remaining shares of Datawatch common stock not previously tendered into Altair's tender offer were converted into the right to receive \$13.10 per share in cash, without interest and less any applicable withholding taxes.

Altair completed the acquisition of Datawatch for consideration of approximately \$183.4 million which consisted of consideration paid to former holders of common stock of Datawatch at \$13.10 a share, or \$168.2 million and approximately \$6.7 million to former holders of outstanding Datawatch equity awards. In addition, Altair paid \$8.0 million on the day of closing to settle all of Datawatch's outstanding debt and incurred a liability of approximately \$0.5 million payable to former holders of certain unvested Datawatch equity awards for which service had been rendered at the acquisition date. Altair financed the acquisition with cash on hand and a drawdown from its existing credit facility.

In connection with the acquisition of Datawatch, the Company incurred \$10.4 million of transaction related costs, which consisted primarily of fees paid to investment bankers' and employee severance, which were recorded to general and administrative, sales and marketing, and research and development expenses in the consolidated statement of operations for the year ended December 31, 2018.

The financial results of Datawatch have been included in the consolidated financial statements since the acquisition date.

The acquisition of Datawatch has been accounted for as a business combination, under the acquisition method of accounting, which results in acquired assets and assumed liabilities being measured at their estimated fair values as of December 13, 2018, the acquisition date. As of the acquisition date, goodwill is measured as the excess of consideration transferred, which is also generally measured at fair value of the net acquisition date fair values of the assets acquired and liabilities assumed.

The following table summarizes the preliminary purchase consideration transferred to acquire Datawatch and the amounts of identified assets acquired and liabilities assumed at the acquisition date (in thousands):

Fair value of consideration transferred	\$	183,427
Recognized amounts of identifiable assets acquired and liabilities assumed:		
Cash	\$	8,278
Accounts receivable		10,784
Other assets		3,055
Property and equipment		980
Trade names		7,400
Developed technology (6-year life)		22,600
Customer relationships (10-year life)		16,400
Accounts payable and other liabilities		(5,393)
Deferred revenue		(4,100)
Other long-term liabilities		(7,928)
Total net identifiable assets acquired and liabilities assumed		52,076
Goodwill (1)	\$	131,351

(1) Goodwill is primarily attributable to market synergies expected to arise after the acquisition and approximately \$0.8 million is deductible for tax purposes. All goodwill is recorded in the Software segment.

The consummation of the merger resulted in a change in control which accelerated vesting for certain restricted stock units ("RSUs") of Datawatch. These RSUs were converted into the right to receive merger consideration in the amount of \$6.7 million, which is included in total consideration transferred.

The consummation of the merger also modified certain Datawatch RSUs without change in control provisions. These RSUs were modified such that the holder has the right to receive cash payments upon vesting at \$13.10 per share in the amount of \$3.9 million, of which \$0.5 million was allocated to pre-combination expense and consideration transferred as it relates to service prior to the acquisition date. The remaining \$3.4 million was preliminarily allocated to future services and will be expensed over the remaining service periods on a straight-line basis.

The excess of preliminary purchase consideration over the preliminary fair value of net tangible and identifiable intangible assets acquired was recorded as goodwill. The preliminary fair values assigned to tangible and identifiable intangible assets acquired and liabilities assumed are based on management's estimates and assumptions. The deferred tax liability established was primarily a result of the difference in the book basis and tax basis related to the identifiable intangible assets. The preliminary estimated fair values of assets acquired and liabilities assumed, including current and noncurrent income taxes payable and deferred taxes, customer contract assets and liabilities and identifiable intangible assets may be subject to change as additional information is received and certain tax returns are finalized. Thus, the provisional measurements of fair value set forth above are subject to change. The primary areas that remain preliminary relate to the fair value of intangible assets acquired, certain tangible assets and liabilities acquired, income taxes and residual goodwill.

The Company expects to finalize the valuation as soon as practicable, but not later than one year from the acquisition date.

Unaudited Pro Forma Financial Information

The unaudited pro forma results presented below include the effects of the Datawatch acquisition as if it had been consummated as of January 1, 2017. The pro forma results below include adjustments related to conforming revenue accounting policies, amortization to reflect the fair value of acquired identifiable intangible assets, share-based compensation associated with accelerated vesting, acquisition-related costs, and the associated income tax impacts. The pro forma information does not necessarily reflect the actual results of operations had the acquisition been consummated at the beginning of the fiscal reporting period indicated nor is it indicative of future operating results. The pro forma information does not include any adjustment for (i) potential revenue enhancements, cost synergies or other operating efficiencies that could result from the acquisition or (ii) transaction or integration costs relating to the acquisition.

The unaudited pro forma financial information was as follows (in thousands, except per share data):

	Year ended December 31,	
	2018	2017
Total revenue	\$ 435,414	\$ 363,906
Net income (loss)	\$ 7,613	\$ (115,010)
Net income (loss) per share attributable to common stockholders, basic	\$ 0.11	\$ (2.19)
Net income (loss) per share attributable to common stockholders, diluted	\$ 0.10	\$ (2.19)

SIMSOLID Corporation

In October 2018, the Company acquired all of the outstanding capital stock of SIMSOLID Corporation, a Canadian corporation ("SIMSOLID"), for aggregate consideration of \$22.1 million. The consideration consisted of cash in the amount of \$12.0 million, 145,000 shares of the Company's Class A common stock and commitments (through convertible notes and deferred shares) to issue an additional 145,000 shares of the Company's Class A common stock, one half of which will be issued on the first business day following the one year anniversary of the closing date and one half of which will be issued on the first business day following the two year anniversary of the closing date, subject to acceleration in the event of a change of control of the Company and subject to reduction as a set-off to any indemnification obligations. The convertible promissory notes will convert into 41,537 additional shares of the Company's Class A common stock, which can be converted by either party on the first business day following the one year anniversary of the closing date and on the first business day following the two year anniversary of the closing date, subject to acceleration in the event of a change of control of the Company and subject to reduction as a set-off to any indemnification obligations. The convertible notes are accounted for as other current and non-current liabilities as of December 31, 2018. The shares associated with the convertible notes are excluded from the calculation of basic shares outstanding as of December 31, 2018.

The financial results of SIMSOLID have been included in the consolidated financial statements since the acquisition date.

SIMSOLID works on full-fidelity computer-aided design, or CAD, assemblies to provide fast, accurate, and robust structural simulation without requiring geometry simplification, cleanup, or meshing. The SIMSOLID computational engine is a commercial implementation of novel and unpublished mathematics based on extensions to the theory of external approximations. SIMSOLID controls solution accuracy using multi-pass adaptive analysis, which the Company believes makes the SIMSOLID solution extremely fast, accurate and memory efficient.

The following table summarizes the consideration transferred to acquire SIMSOLID and the amounts of identified assets acquired and liabilities assumed at the acquisition date (in thousands):

Fair value of consideration transferred	\$	22,139
Recognized amounts of identifiable assets acquired and liabilities assumed:		
Current assets	\$	135
Trade names		344
Developed technology		3,291
Current liabilities		(141)
Long term liabilities		(960)
Total net identifiable assets acquired and liabilities assumed		2,669
Goodwill	\$	19,470

The allocation of fair value of purchase consideration is incomplete pending the final determination of the fair value of assets acquired and liabilities assumed, and is subject to change within the measurement period (up to one year from the acquisition date). The primary areas that remain preliminary relate to the fair value of intangible assets acquired, certain tangible assets and liabilities acquired, income taxes and residual goodwill.

Goodwill is primarily attributable to market synergies expected to arise after the acquisition and is not deductible for tax purposes.

FluiDyna GmbH

In May 2018, the Company purchased the remaining equity interests in FluiDyna GmbH (“FluiDyna”) for aggregate consideration of EUR 2.2 million (\$2.7 million). Prior to the purchase of the remaining equity interests, the Company owned 24% of the outstanding equity interests in FluiDyna. The purchase price was allocated to assets and liabilities of FluiDyna based on the fair values of the assets acquired and liabilities assumed. The allocation included \$2.1 million to intangibles, consisting of developed technology and customer relationships and \$1.8 million to goodwill, which is not tax deductible. The financial results of FluiDyna have been included in the consolidated financial statements since the acquisition date.

The allocation of fair value of purchase consideration is subject to change within the measurement period (up to one year from the acquisition date). The primary areas that remain preliminary relate to the fair value of intangible assets acquired, certain tangible assets and liabilities acquired, income taxes and residual goodwill.

FluiDyna developed NVIDIA CUDA and GPU-based Computational Fluid Dynamics (“CFD”) and numerical simulation technologies. The Company made an initial investment in FluiDyna in 2015. FluiDyna’s simulation software products ultraFluidx and nanoFluidx have been available to the Company’s customers through the Altair Partner Alliance and also offered as standalone licenses. ultraFluidX solves large scale internal and external aerodynamics problems for a broad class of problems including ultra-fast prediction and evaluation of vehicle, building, and environmental aerodynamics. nanoFluidX is a fluid dynamics simulation tool based on the smoothed particle hydrodynamics method to predict the flow in complex geometries with complex motion.

CANDI Controls, Inc.

In April 2018, the Company entered into an asset purchase agreement with California-based CANDI Controls, Inc. (“CANDI”) and acquired all the intellectual property assets of CANDI for \$2.4 million. The sale was approved by the bankruptcy court on April 25, 2018, and the asset purchase was completed on April 26, 2018.

CANDI developed a modern platform which supports multiple data protocols for edge gateway computers to communicate with a constellation of Internet of Things (“IoT”) devices. CANDI’s software is designed to easily connect systems and equipment with cloud-based monitoring and control services to help organizations improve performance, conserve resources, and cut operational costs. Sensor data can be analyzed, visualized, and processed with machine learning and predictive analytics tools to forecast performance and prescribe actions consistent with business objectives.

Runtime Design Automation

On September 28, 2017, the Company acquired 100% of the shares of Runtime Design Automation (“Runtime”) for a total of \$19.4 million in cash, of which \$9.4 million is payable one year from the acquisition date, which includes a \$0.7 million working capital adjustment, and 708,000 shares of the Company’s Class A common stock. Runtime complements Altair’s PBS Works™ suite of products for comprehensive, secure workload management for HPS and cloud environments and has solutions to manage highly complex workflows. PBS Works targets product design, weather prediction, oil exploration and bio-informatics, and Runtime primarily serves customers in electronic design automation.

The following table summarizes the consideration transferred to acquire Runtime and the amounts of identified assets acquired and liabilities assumed at the acquisition date (in thousands):

Fair value of consideration transferred	\$	25,508
Recognized amounts of identifiable assets acquired and liabilities assumed:		
Cash		564
Accounts receivable		2,257
Deferred tax assets		1,713
Other assets		257
Trade names		440
Developed technology (4-year life)		7,870
Customer relationships (7-year life)		2,490
Accounts payable and other liabilities		(1,000)
Deferred revenue		(1,925)
Deferred tax liabilities		(4,645)
Total net identifiable assets acquired and liabilities assumed		8,021
Goodwill	\$	17,487

Goodwill is primarily attributable to market synergies expected to arise after the acquisition and is not deductible for tax purposes.

Carriots S.L.

In May 2017, the Company acquired 100% of the shares of Carriots S.L. (“Carriots”) for \$3.6 million cash, \$2.7 million notes payable, and 80,000 shares of the Company’s Class A common stock. Carriots is an Internet of Things (“IoT”) Cloud platform that allows easy development of new IoT enabled products. Carriots complements Altair’s other product suites to provide a comprehensive solution for customers to design and implement IoT enabled products.

The following table summarizes the consideration transferred to acquire Carriots and the amounts of identified assets acquired and liabilities assumed at the acquisition date (in thousands):

Fair value of consideration transferred	\$	6,657
Recognized amounts of identifiable assets acquired and liabilities assumed:		
Deferred tax assets		394
Other assets		472
Trade names		252
Developed technology (4-year life)		1,317
Customer relationships (7-year life)		296
Accounts payable and other liabilities		(1,015)
Total net identifiable assets acquired and liabilities assumed		1,716
Goodwill	\$	4,941

Goodwill is primarily attributable to market synergies expected to arise after the acquisition and is not deductible for tax purposes.

Other business acquisitions

During the year ended December 31, 2017, the Company completed other business acquisitions that were individually and in the aggregate insignificant. The Company has accounted for all of its acquisitions using the acquisition method. The operating results of each acquisition have been included in the consolidated financial statements since the respective dates of acquisition. The combined purchase price related to the 2017 acquisitions, excluding Runtime and Carriots, was not material.

For each of its acquisitions the Company engaged a third-party valuation firm to assist the Company in valuing certain assets and liabilities acquired.

5. Property and equipment, net

Property and equipment consisted of the following (in thousands):

	Estimated useful lives	December 31,	
		2018	2017
Land	Indefinite	\$ 7,994	\$ 7,994
Building and improvements	5-39 years	13,120	15,185
Computer equipment and software	3-5 years	34,582	32,103
Office furniture and equipment	5-15 years	7,958	6,751
Leasehold improvements	(1)	6,926	6,467
Total property and equipment		70,580 (2)	68,500 (2)
Less: accumulated depreciation and amortization		40,427	37,054
Property and equipment, net		\$ 30,153	\$ 31,446

(1) Shorter of lease term or estimated useful life, generally ranging from five to ten years.

(2) Equipment under capital lease obligations had an original carrying value of approximately \$2.0 million and \$1.1 million at December 31, 2018 and 2017, respectively.

On August 7, 2018, the Company consummated the sale of the building that was used as the headquarters for its toggled subsidiary. The building was previously recorded as a held for sale asset and had a book value of \$2.1 million as of June 30, 2018. In connection with the sale of the building, the Company entered into a three-year lease back of part of the building, primarily for continued use as a distribution center for toggled's operational needs. The Company recognized a gain of \$4.4 million which is included in other operating income for the year ended December 31, 2018.

In November 2016, the Company purchased land adjacent to Altair's corporate headquarters for \$4.0 million for future expansion of the Company's facilities.

Depreciation expense, including amortization of assets under capital lease, was \$7.0 million, \$6.3 million and \$6.7 million for the years ended December 31, 2018, 2017 and 2016, respectively.

6. Goodwill and other intangible assets

Goodwill

The changes in the carrying amount of goodwill, which is attributable to the Software reportable segment, are as follows (in thousands):

Balance at December 31, 2016	\$	36,625
Acquisitions		22,420
Effects of foreign currency translation		3,661
Balance at December 31, 2017		62,706
Acquisitions		152,630
Effects of foreign currency translation and other		(4,804)
Balance at December 31, 2018	\$	210,532

Other intangible assets

A summary of other intangible assets is shown below (in thousands):

	December 31, 2018			
	Weighted average amortization period	Gross carrying amount	Accumulated amortization	Net carrying amount
<i>Definite-lived intangible assets:</i>				
Developed technology	4-6 years	\$ 54,530	\$ 15,517	\$ 39,013
Customer relationships	7-10 years	28,422	7,309	21,113
Other intangibles	10 years	109	56	53
Total definite-lived intangible assets		<u>83,061</u>	<u>22,882</u>	<u>60,179</u>
<i>Indefinite-lived intangible assets:</i>				
Trade names		9,657		9,657
Total other intangible assets		<u>\$ 92,718</u>	<u>\$ 22,882</u>	<u>\$ 69,836</u>
	December 31, 2017			
	Weighted average amortization period	Gross carrying amount	Accumulated amortization	Net carrying amount
<i>Definite-lived intangible assets:</i>				
Developed technology	4 years	\$ 25,947	\$ 9,909	\$ 16,038
Customer relationships	7 years	11,794	6,195	5,599
Other intangibles	10 years	143	57	86
Total definite-lived intangible assets		<u>37,884</u>	<u>16,161</u>	<u>21,723</u>
<i>Indefinite-lived intangible assets:</i>				
Trade names		2,738		2,738
Total other intangible assets		<u>\$ 40,622</u>	<u>\$ 16,161</u>	<u>\$ 24,461</u>

Amortization expense related to amortizing intangible assets was \$7.7 million, \$5.4 million and \$3.3 million for the years ended December 31, 2018, 2017 and 2016, respectively.

Estimated amortization expense for the next five years as of December 31, 2018 is as follows (in thousands):

Year ending	
December 31, 2019	\$ 13,880
December 31, 2020	\$ 12,959
December 31, 2021	\$ 10,590
December 31, 2022	\$ 7,378
December 31, 2023	\$ 6,627

7. Debt

The carrying value of debt is as follows (in thousands):

	December 31,	
	2018	2017
Revolving credit facility	\$ 30,950	\$ —
Obligations held under capital leases (Note 19)	813	207
Other borrowings	75	203
Total debt	31,838	410
Less: unamortized debt issuance costs	90	—
Less: current portion of long-term debt	331	232
Long-term debt, net of current portion	\$ 31,417	\$ 178

Credit agreement

Revolving credit facility

On October 18, 2017, the Company entered into an amended and restated credit agreement with Altair Engineering Inc., as borrower, JPMorgan Chase Bank, N.A., as the lead arranger, sole book runner, the administrative agent, swingline lender and letter of credit issuer, and a syndicate of lenders (“2017 Credit Agreement”). The 2017 Credit Agreement provided for an initial aggregate commitment amount of \$100.0 million, with a sublimit for the issuance of letters of credit of up to \$5.0 million and a sublimit for swingline loans of up to \$5.0 million. The 2017 Credit Agreement matures on October 18, 2022. The 2017 Credit Agreement provides for an accordion feature that allows the Company to expand the size of the revolving line of credit by an additional \$50.0 million, subject to certain conditions, by obtaining additional commitments from the existing lenders or by causing a person acceptable to the administrative agent to become a lender (in each case subject to the terms and conditions set forth in the 2017 Credit Agreement).

On October 31, 2018, the Company increased the revolving commitment available under the 2017 Credit Agreement from \$100.0 million to \$150.0 million. There were no other material changes to the terms of the 2017 Credit Agreement.

As of December 31, 2018, the Company had \$31.0 million of outstanding borrowings under the 2017 Credit Agreement and there was \$119.0 million available for future borrowing. The 2017 Credit Agreement is available for general corporate purposes, including working capital, capital expenditures, and permitted acquisitions. The weighted average interest rate on borrowings under the 2017 Credit Agreement was 4.6% for the year ended December 31, 2018.

Borrowings under the 2017 Credit Agreement bear interest at a rate per annum equal to an agreed upon applicable margin plus, at the Company’s option, either the Alternate Base Rate (defined as the greatest of (1) the Prime Rate (as defined in the 2017 Credit Agreement) in effect on such day, (2) the Federal Funds Effective Rate (as defined in the 2017 Credit Agreement) in effect on such day plus 1/2 of 1.00% or (3) the Adjusted LIBO Rate (as defined in the 2017 Credit Agreement) for a one month interest period on such day (or if such day is not a business day, the immediately preceding business day) plus 1.00%) or the Adjusted LIBO Rate. The applicable margin for borrowings under the 2017 Credit Agreement is based on the Company’s most recently tested consolidated total net leverage ratio and will vary from (a) in the case of Eurodollar loans, 1.25% to 2.00%, and (b) in the case of ABR loans or swingline loans, 0.25% to 1.00%. The Company pays a commitment fee ranging from 0.15% to 0.30% on the unused portion of the 2017 Credit Agreement.

Collateral and guarantees

The 2017 Credit Agreement is secured by collateral including (i) substantially all of the Company’s properties and assets, and the properties and assets of the Company’s domestic subsidiaries but excluding any patents, copyrights, patent applications or copyright applications or any trade secrets or software products and (ii) pledges of the equity interests in all present and future domestic subsidiaries (subject to certain exceptions as provided for under the 2017 Credit Agreement). The Company’s direct and indirect domestic subsidiaries are guarantors of all the obligations under the 2017 Credit Agreement.

Debt covenants

The 2017 Credit Agreement requires the Company to maintain the following financial covenants:

- *Maximum Net Leverage Ratio* : Commencing with the fiscal quarter ending December 31, 2017 and on the last day of each fiscal quarter thereafter, the Company on a consolidated basis will not permit the ratio of total indebtedness (net of unrestricted domestic cash in excess of \$20.0 million) to EBITDA, as such terms are defined in the 2017 Credit Agreement, for the rolling four quarter period ending on such date to be greater than 3.00 to 1.00 as of the last day of each fiscal quarter.
- *Consolidated Interest Coverage Ratio* : Commencing with the fiscal quarter ending December 31, 2017 and on the last day of each fiscal quarter thereafter, the Company on a consolidated basis will not permit the ratio of (x) EBITDA to (y) cash Consolidated Interest Expense, as such terms are defined in the 2017 Credit Agreement, in each case for the rolling four quarter period ending on such date, to be less than 3.00 to 1.00 as of the last day of each fiscal quarter.

At December 31, 2018, the Company was in compliance with all such financial covenants.

Prior credit agreement

Prior to entering into the 2017 Credit Agreement, the Company's credit agreement consisted of a \$65.0 million term loan and a \$60.0 million revolving commitment, including a \$5.0 million swingline subfacility, and a letter of credit subfacility (collectively, the "Secured Credit Agreement".) At December 31, 2016, the Company had \$84.9 million outstanding under the Secured Credit Agreement and there was \$32.6 million available for future borrowing. All borrowings under the Secured Credit Agreement were due on the termination date in April 2019.

On November 3, 2017, in connection with the completion of the Company's IPO, the Company repaid in full all outstanding debt under the Secured Credit Agreement. The Company paid a total of approximately \$93.1 million, which included outstanding principal, interest, and other nominal costs. Upon the repayment of the Secured Credit Agreement, all unamortized debt issuance costs were recorded as interest expense.

Other

The Company has available overdraft and line of credit facilities in several countries in which it operates. These credit facilities are with various domestic and international banks and are at quoted market rates. At both December 31, 2018 and 2017, the Company had \$3.5 million of availability under these facilities and there were no outstanding commitments.

Scheduled maturities of long-term debt

At December 31, 2018, future maturities of long-term debt, excluding capital leases, were as follows (in thousands):

Year ending December 31,		
2019	\$	75
2020		—
2021		—
2022		30,950
2023		—
Total	<u>\$</u>	<u>31,025</u>

8. Other liabilities

The following table provides the details of other accrued expenses and current liabilities (in thousands):

	December 31,	
	2018	2017
Accrued VAT	\$ 4,536	\$ 3,916
Income taxes payable	4,458	3,724
Accrued professional fees	3,165	2,500
Accrued royalties	2,613	2,037
Billings in excess of cost	1,504	832
Defined contribution plan liabilities	1,376	1,274
Government grants	915	712
Non-income tax liabilities	853	1,343
Related party liabilities	—	119
Other current liabilities	6,927	5,287
Total	<u>\$ 26,347</u>	<u>\$ 21,744</u>

The following table provides the details of other long-term liabilities (in thousands):

	December 31,	
	2018	2017
Pension and other post retirement liabilities	\$ 9,111	\$ 7,670
Deferred tax liabilities	7,736	1,620
Other liabilities	11,306	8,357
Total	<u>\$ 28,153</u>	<u>\$ 17,647</u>

9. Fair value measurements

The accounting guidance for fair value, among other things, defines fair value, establishes a consistent framework for measuring fair value and expands disclosure for each major asset and liability category measured at fair value on either a recurring or nonrecurring basis. Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability (an exit price) in an orderly transaction between market participants at the reporting date. The framework for measuring fair value consists of a three-level valuation hierarchy that prioritizes the inputs to valuation techniques used to measure fair value based upon whether such inputs are observable or unobservable. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect market assumptions made by the reporting entity. The three-level hierarchy for the inputs to valuation techniques is briefly summarized as follows:

- Level 1— Quoted prices in active markets for identical assets and liabilities at the measurement date;
- Level 2— Observable inputs, other than the quoted prices in active markets, that are observable either directly or indirectly; and
- Level 3— Unobservable inputs in which there is little or no market data, which require the reporting entity to develop its own assumptions.

An asset's or liability's fair value measurement level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement. Valuation techniques used need to maximize the use of observable inputs and minimize the use of unobservable inputs.

Items measured at fair value on a recurring basis

The following table sets forth a summary of the changes in the fair value of the Company's Level 3 financial liabilities (in thousands):

	Liability for Class A redeemable common shares	Liability for stock-based compensation awards
Balance at December 31, 2016	\$ 10,632	\$ 11,604
Exercise of stock options	432	(411)
Forfeitures of stock options	—	(157)
Change in fair value	19,223	25,191
Modification to stock options as a result of the Company's IPO ⁽¹⁾	(30,287)	(36,227)
Balance at December 31, 2017	<u>\$ —</u>	<u>\$ —</u>

(1) As a result of the Company's IPO in the fourth quarter of 2017, the call feature terminated which resulted in the \$66.5 million liability valued immediately prior to the IPO associated with the Company's Class A redeemable common shares and with the stock options outstanding under the 2001 ISO and NQSO Plan to be reclassified to equity in the fourth quarter of 2017 in accordance with ASC 718.

The carrying value of cash and cash equivalents, accounts receivable and accounts payable approximate fair value due to their short maturities. Interest on the Company's long-term debt is at a variable rate, and as such the debt obligation outstanding approximates fair value.

The carrying value of the Company's derivative financial instruments are measured at fair value on a recurring basis. The fair value of derivatives is determined based on inputs derived from or corroborated by observable market data pertaining to relevant interest rates and is considered a level 2 fair value measurement. See Note 10—Financial instruments for additional information regarding the use and fair value of derivatives.

10. Financial instruments

The Company is exposed to certain financial market risks related to its ongoing business operations. The primary risks the Company can manage through derivative financial instruments and hedging activities are foreign currency exchange rate risk and interest rate risk. Derivative financial instruments and hedging activities can be utilized to protect the Company's cash flow from adverse movements in foreign currency exchange rates and to manage interest costs. Although the Company is exposed to credit loss in the event of nonperformance by the counterparty to the derivative financial instruments, the Company attempts to limit this exposure by entering into agreements directly with major financial institutions that meet the Company's credit standards and that are expected to fully satisfy their obligations under the contracts.

Interest rate swaps

Interest rate exposures are reviewed periodically and the Company may enter into interest rate swap agreements to manage its exposure. The Company's exposure to interest rate risk arises primarily from changes in the LIBOR rate. The Company will hold these derivatives for economic purposes but does not designate these derivatives to obtain hedge accounting treatment. As such, gains or losses on these contracts (including contracts that do not qualify for hedge accounting under ASC 815), are reported in earnings immediately as Other (income) expense, net. These contracts limit exposure to changes in interest payments associated with variable rate debt. However, as the change in the fair value of the interest rate swaps is impacted by both realized and unrealized gains and losses on the contracts, the amount recognized in earnings may not offset the changes in the variability of interest expense during a given period.

As of December 31, 2018, and 2017, the Company had an interest rate swap outstanding with a \$4.5 million notional value. This interest rate swap matures on December 23, 2019.

Foreign currency derivatives

The Company sells its products (and incurs costs) in countries throughout the world. As a result, it is exposed to fluctuations in foreign currency exchange rates. Foreign currency exposures are reviewed on a periodic basis and any natural offsets are considered prior to entering into a derivative financial instrument. The Company could enter into foreign exchange contracts to hedge portions of its foreign currency denominated forecasted revenues, purchases and the subsequent cash flows after considering natural offsets within the consolidated group. The Company will hold these derivatives for economic purposes but does not designate these derivatives to obtain hedge accounting treatment. As such, gains or losses on these contracts (including contracts that do not qualify for hedge accounting under ASC 815), are reported in earnings immediately and are substantially offset by the effect of the revaluation of the underlying foreign currency denominated transactions. There were no foreign exchange contracts outstanding at December 31, 2018 or 2017.

Derivative instruments

As of December 31, 2018 and 2017, the fair value of the Company's derivative instruments included in other long-term liabilities was a liability of \$0.1 million and \$0.2 million, respectively.

Credit-risk-related contingent features

The Company has entered into International Swaps and Derivatives Association ("ISDA") agreements with its significant derivative counterparty. These agreements provide bilateral netting and offsetting of accounts that are in a liability position with those that are in an asset position. These agreements do not require the Company to maintain a minimum credit rating in order to be in compliance and do not contain any margin call provisions or collateral requirements that could be triggered by derivative instruments in a net liability position. As of December 31, 2018, the Company had not and was not required to post any collateral to support its derivatives in a liability position.

11. Stockholders' equity

Preferred stock

As of December 31, 2018, the Company had authorized 45,000,000 shares of preferred stock, par value \$0.0001, of which no shares were issued or outstanding. The Board of Directors has the authority to issue the preferred stock in one or more series and to fix rights, preferences, privileges, and restrictions, including dividends and the number of shares constituting any series or the designation of such series, without any further vote or action by the stockholders.

Common stock

As of December 31, 2018, the Company had authorized 513,796,572 shares of Class A common stock, par value \$0.0001, and 41,203,428 shares of Class B common stock, par value \$0.0001. The rights of the holders of Class A common stock and Class B common stock are identical, except with respect to voting and conversion rights. Each share of Class A common stock is entitled to one vote per share. Each share of Class B common stock is entitled to ten votes per share and is convertible into one share of Class A common stock.

The holders of Class A and Class B common stock are entitled to dividends at the sole discretion of the Board of Directors. No common stock dividends were declared or paid in 2018, 2017 or 2016.

12. Stock-based compensation

2001 stock-based compensation plans

Nonqualified stock option plan

In 2001, the Company established the Nonqualified Stock Option Plan ("NSO Plan") under which 4,337,856 stock options with an exercise price of \$.000025 remain outstanding at December 31, 2018. The NSO Plan was terminated in 2003. Stock options under the NSO plan were immediately vested and have a contractual term of 35 years from the date of grant. The outstanding awards will continue to be governed by their existing terms under the NSO Plan. The NSO Plan is accounted for as an equity plan.

The following table summarizes the stock option activity under the NSO Plan:

	Number of options	Weighted average exercise price per share	Weighted average remaining contractual term (years)	Aggregate intrinsic value (in millions)
Outstanding at January 1, 2018	6,441,972	\$ 0.000025	19.0	\$ 154.1
Exercised	(2,104,116)	\$ 0.000025		
Forfeited	—	\$ —		
Outstanding and exercisable at December 31, 2018	4,337,856	\$ 0.000025	18.0	\$ 119.6

Incentive and nonqualified stock-based plan

Also in 2001, the Company established the Incentive and Nonqualified Stock-based Plan (“ISO Plan”) which was terminated in 2011 and was authorized to issue nonqualified stock options (“NQSO”) and incentive stock options (“ISO”) totaling 11,153,872 shares of Class A common stock. The NQSO grants could be issued at less than the fair market value at date of grant under the terms of the ISO Plan, while ISO grants were issued at a price equal to or greater than the fair market value at date of grant. Options generally vest over a two to three-year period. All options have a contractual term of ten years from the date of grant. At December 31, 2018 and 2017, there were 532,220 and 888,864 options outstanding, respectively, under the ISO Plan.

Until the effective date of the Company’s IPO, options granted under the ISO Plan were accounted for as liability awards as the terms of the awards could require or allow repurchase of the shares at amounts different than fair value. The Company made the accounting policy election to use the intrinsic value method of accounting to determine stock-based compensation liabilities for these awards. During the quarter ended June 30, 2017, the Company changed its accounting policy to measure the fair value of its liability awards using the Black-Scholes option pricing model as a result of the Company no longer meeting the definition of a non-public entity. The impact of the change in accounting policy was immaterial to the financial statements.

As a result of the Company’s IPO in the fourth quarter 2017, the call feature terminated which resulted in the \$66.5 million liability valued immediately prior to the IPO associated with the Company’s Class A redeemable common shares and with the stock options outstanding under the 2001 ISO and NQSO Plan to be reclassified to equity as of December 31, 2017 in accordance with ASC 718.

The following table summarizes the stock option activity under the 2001 Stock-based compensation plans for the periods indicated as follows:

	Number of options	Weighted average exercise price per share	Weighted average remaining contractual term (years)	Aggregate intrinsic value (in millions)
Outstanding at January 1, 2018	888,864	\$ 0.67	2.5	\$ 20.7
Exercised	(356,644)	\$ 0.69		
Forfeited	—	\$ —		
Outstanding and exercisable at December 31, 2018	532,220	\$ 0.65	1.4	\$ 14.3

The total intrinsic value of the ISO Plan stock options exercised during the years ended December 31, 2018, 2017 and 2016 was \$5.2 million, \$25.6 million, and \$2.7 million respectively.

2012 stock-based compensation plans

During 2012, the Company established the 2012 Incentive and Nonqualified Stock Option Plan (“2012 Plan”) which permits the issuance of 5,200,000 shares of Class A common stock for the grant of nonqualified stock options (“NQSO”) and incentive stock options (“ISO”) for management, other employees, and board members of the Company. The options are issued at a price equal to or greater than fair market value at date of grant. All options have a contractual term of 10 years from date of grant.

The 2012 Plan is accounted for as an equity plan. For those options expected to vest, compensation expense is recognized on a straight-line basis over a four-year period, the total requisite service period of the awards. Compensation expense related to the 2012 Plan was \$0.6 million, \$0.7 million and \$0.6 million for the years ended December 31, 2018, 2017 and 2016, respectively.

The following table summarizes the stock option activity under the 2012 Plan for the periods indicated as follows:

	Number of options	Weighted average exercise price per share	Weighted average remaining contractual term (years)	Aggregate intrinsic value (in millions)
Outstanding at January 1, 2018	2,183,127	\$ 3.74	7.3	\$ 44.1
Granted	—	\$ —		
Exercised	(623,119)	\$ 2.76		
Forfeited	(18,843)	\$ 4.68		
Outstanding at December 31, 2018	1,541,165	\$ 4.12	6.9	\$ 36.2
Exercisable at December 31, 2018	975,291	\$ 3.70	6.1	\$ 23.3

Total compensation cost related to nonvested awards not yet recognized as of December 31, 2018 totaled \$0.9 million and is expected to be recognized over a weighted average period of 2.7 years.

2017 stock-based compensation plan

In 2017, the Company's board of directors adopted the 2017 Equity Incentive Plan ("2017 Plan"), which was approved by the Company's stockholders. The 2017 Plan provides for the grant of incentive stock options to the Company's employees and any parent and subsidiary corporations' employees, and for the grant of nonstatutory stock options, stock appreciation rights, restricted stock, restricted stock units, performance units, performance shares, other cash-based awards and other stock-based awards to the Company's employees, directors and consultants and the Company's parent, subsidiary, and affiliate corporations' employees and consultants. The 2017 Plan has 8,104,971 authorized shares of the Company's Class A common stock reserved for issuance.

The following table summarizes the restricted stock units, or RSUs, awarded under the 2017 Plan for the period:

	Number of RSUs
Outstanding at January 1, 2018	—
Granted	228,201
Vested	(1,000)
Forfeited	(21,140)
Outstanding at December 31, 2018	206,061

The weighted average grant date fair value of the RSUs was \$30.96 and the RSUs generally vest in four equal annual installments. Total compensation cost related to nonvested awards not yet recognized as of December 31, 2018, totaled \$5.3 million, and is expected to be recognized over a weighted average period of four years.

Fair value of equity awards

The Company measures the fair value of its stock options on the date of grant using the Black-Scholes option pricing model. This valuation model requires the Company to make certain estimates and assumptions, including assumptions related to the expected price volatility of the Company's stock, the period under which the options will be outstanding, the rate of return on risk-free investments, and the expected dividend yield for the Company's stock.

The weighted average assumptions used in the Black-Scholes option pricing model used to calculate the fair value of options granted during the years ended December 31, 2017 and 2016 are as follows:

	2017 grants	2016 grants
Weighted average grant date fair value per share	\$1.86 - \$1.94	\$1.42 - \$1.65
Expected volatility	34%	37%
Expected term (in years)	5.75-6.25	5.75-6.25
Risk-free interest rate	2.02%	1.37%-1.79%
Expected dividend yield	0%	0%

Prior to the IPO, the Company's equity value was estimated utilizing a combination of the Discounted Cash Flow Method under the Income Approach, the Guideline Public Company Method, and the Transaction Method under the Market Approach. The equity value is used to derive the fair value per share which is used as an input in the Black Scholes option pricing model. The estimated volatility was derived using the historical volatility of the returns of comparable publicly traded companies. The risk-free rate was based on U.S. Treasury zero-coupon yield curves with a remaining term equal to the expected term of the option. The Company has not historically paid dividends and does not anticipate paying cash dividends in the foreseeable future. The Company used the simplified method to determine expected term.

Other

In connection with the acquisition of Datawatch, all outstanding unvested Datawatch RSUs were converted into a right to receive cash (the "Replacement Awards"). The payment to the holders of unvested Datawatch RSUs will be payable on or after the date that such RSUs would have otherwise vested in accordance with its original terms.

The accounting treatment for the outstanding unvested Datawatch RSUs in the context of the business combination is to allocate the fair value of the RSU's at the date of consummation attributable to pre-combination service to the aggregate merger consideration. The difference between the fair value of the Replacement Awards and the amount allocable to pre-combination service was considered a post-combination expense to the Company after the consummation date.

The estimated post combination expense to the Company as a result of the business combination was approximately \$3.4 million which will be recognized on a straight-line basis over the remaining service period that was stipulated in each holder's original RSU agreement. The weighted average remaining service period is 2.0 years. Once the vesting conditions of the service period are met, Altair will cash-settle the Replacement Awards. The liability related to the Datawatch RSUs as of December 31, 2018, was \$0.6 million and is recorded in Other accrued expenses and current liabilities.

In connection with the acquisition of Runtime Design Automation ("RTDA"), all outstanding stock options of RTDA became fully vested and exercisable prior to the date of consummation which represents an acceleration to full vesting of all unvested stock options as of the date of the business combination.

The accounting treatment for the outstanding stock options in the context of the business combination is to allocate the fair market value of RTDA's options at the date of consummation attributable to pre-combination service to the aggregate merger consideration. The difference between the fair market value of the replacement awards and the amount allocable to pre-combination service was considered a post-combination expense to the Company after the consummation date.

The estimated post combination expense to the Company as a result of the business combination was approximately \$2.0 million which was immediately expensed in the post combination financial statements in the third quarter of 2017, as there were no further service conditions. The Company determined that the Black-Scholes model was an appropriate valuation model for the employee share options as all of RTDA's stock options had only service conditions.

Stock-based compensation expense

The stock-based compensation expense was recorded as follows (in thousands):

	Year ended December 31,		
	2018	2017	2016
Cost of revenue-software	\$ 31	\$ 350	\$ 22
Research and development	740	12,540	1,370
Sales and marketing	910	7,693	775
General and administrative	1,658	26,698	2,965
Total stock-based compensation expense	<u>\$ 3,339</u>	<u>\$ 47,281</u>	<u>\$ 5,132</u>

13. Other (income) expense, net

Other (income) expense, net consists of the following (in thousands):

	Year ended December 31,		
	2018	2017	2016
Foreign exchange (gain) loss	\$ (626)	\$ 1,254	\$ (271)
Other	(1,954)	(260)	(249)
Other (income) expense, net	<u>\$ (2,580)</u>	<u>\$ 994</u>	<u>\$ (520)</u>

14. Income taxes

The components of income (loss) before income taxes are as follows (in thousands):

	Year ended December 31,		
	2018	2017	2016
U.S.	\$ 4,228	\$ (49,761)	\$ (2,225)
Non-U.S.	22,796	13,350	15,927
	<u>\$ 27,024</u>	<u>\$ (36,411)</u>	<u>\$ 13,702</u>

The significant components of the income tax expense are as follows (in thousands):

	Year ended December 31,		
	2018	2017	2016
Current			
U.S. Federal	\$ 2	\$ —	\$ —
Non-U.S.	12,552	10,290	9,413
U.S. State and Local	(8)	135	202
Total current	<u>12,546</u>	<u>10,425</u>	<u>9,615</u>
Deferred			
U.S. Federal	1,714	54,130	(5,358)
Non-U.S.	(934)	(1,306)	(610)
U.S. State and Local	(17)	(253)	(108)
Total deferred	<u>763</u>	<u>52,571</u>	<u>(6,076)</u>
Income tax expense	<u>\$ 13,309</u>	<u>\$ 62,996</u>	<u>\$ 3,539</u>

The reconciliation of income taxes calculated at the U.S. Federal statutory income tax rate to income tax expense is as follows (in thousands):

	Year ended December 31,		
	2018	2017	2016
U.S. federal statutory rate	21%	35%	35%
Income taxes at U.S. federal statutory rate	\$ 5,675	\$ (12,744)	\$ 4,796
Foreign income taxes at rates other than the federal statutory rate	2,096	373	(584)
U.S. state and local income taxes, net of U.S. federal tax benefit	(3,446)	(155)	94
U.S. Tax Cut and Jobs Act: transition tax, net of foreign tax credits	—	4,187	—
Global intangible low-taxed income	6,587	—	—
Change in valuation allowance	16,725	47,429	—
Foreign withholding taxes	5,103	4,181	4,235
Foreign dividends	—	—	5,077
U.S. foreign tax credit	(4,564)	(4,154)	(8,786)
Research and development tax credit	(2,819)	(2,999)	(2,696)
Domestic production activities deduction	—	—	(840)
Non-deductible stock-based compensation	(14,964)	10,871	2,064
Meals & entertainment	181	358	235
Other	672	(163)	(91)
Deferred tax on investment in subsidiary	—	—	(264)
Uncertain tax positions	903	446	299
Acquisition costs	503	—	—
Tax law changes	657	15,366	—
Income tax expense	<u>\$ 13,309</u>	<u>\$ 62,996</u>	<u>\$ 3,539</u>

The Tax Cuts and Jobs Act, or the Tax Act, was enacted on December 22, 2017. The Tax Act reduces the U.S. federal corporate income tax rate from 35% to 21%, requires companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and creates new taxes on certain foreign sourced earnings. The Company is applying the guidance in Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cut and Jobs Act when accounting for the enactment-date effects of the Tax Act. At December 31, 2018, the Company has completed its accounting for the tax effects of the Tax Act; the Company has not recorded any adjustments to the provisional amounts recorded at December 31, 2017 related to the remeasurement of its deferred balances. At December 31, 2017, the Company originally recorded a provisional amount for its one-time transition tax of \$4.2 million, which was substantially offset by available foreign tax credits. During the year ended December 31, 2018, the Company revised its estimate of the provisional amount of the one-time transition tax. Upon further analyses of certain aspects of the Tax Act and refinement of its calculations, the Company increased its provisional amount of transition tax by approximately \$0.6 million. This resulted in no change to income tax expense due to the impact of foreign tax credits.

The Tax Act subjects a U.S. shareholder to current tax on global intangible low-taxed income (“GILTI”) earned by certain foreign subsidiaries. The impact of GILTI resulted in no incremental tax expense for the year ended December 31, 2018 due to a full valuation allowance on U.S. net deferred tax assets. In addition, the Company has made an accounting policy election to treat taxes due under the GILTI provision as a current period expense.

Deferred income tax assets and liabilities result from differences in the basis of assets and liabilities for tax and financial statements purposes. The approximate tax effect of each type of temporary difference, and operating losses and tax credit carryforwards that give rise to a significant portion of the deferred tax assets and liabilities are as follows (in thousands):

	December 31,	
	2018	2017
Deferred tax assets:		
Deferred revenue	\$ 3,063	\$ 19,569
Net operating loss carryforwards	37,549	7,601
Tax credit carryforwards	30,516	22,191
Stock-based compensation	6,858	8,922
Capitalized research and development	8,266	8,798
Accrued expenses	—	648
Employee benefits	4,825	3,931
Other	1,777	1,905
Total gross deferred tax assets	92,854	73,565
Less: valuation allowances	(76,101)	(54,331)
Net deferred tax assets (1)	16,753	19,234
Deferred tax liabilities:		
Prepaid royalties	7,687	6,925
Property and equipment and intangibles	13,945	4,567
Deferred tax on investment in subsidiary	329	272
Other	1,155	739
Total deferred tax liabilities	23,116	12,503
Total net deferred tax assets	\$ (6,363)	\$ 6,731

(1) Reflects gross amount before jurisdictional netting of deferred tax assets and liabilities.

Deferred tax assets and liabilities are determined separately for each tax jurisdiction on a separate or on a consolidated tax filing basis, as applicable, in which the Company conducts its operations or otherwise incurs taxable income or losses. A valuation allowance is recorded when it is more likely than not that some portion or all of the gross deferred tax assets will not be realized. The realization of deferred tax assets depends on the ability to generate sufficient taxable income of the appropriate character within the carryback or carryforward periods provided for in the tax law for each applicable tax jurisdiction. The Company considers the following possible sources of taxable income when assessing the realization of deferred tax assets:

- taxable income in prior carryback years;
- future reversals of existing taxable temporary differences;
- future taxable income exclusive of reversing temporary differences and carryforwards; and
- prudent and feasible tax planning strategies that the Company would be willing to undertake to prevent a deferred tax asset from otherwise expiring.

The assessment regarding whether a valuation allowance is required or whether a change in judgment regarding the valuation allowance has occurred also considers all available positive and negative evidence, including but not limited to:

- nature, frequency, and severity of cumulative losses in recent years;
- duration of statutory carryforward and carryback periods;
- statutory limitations against utilization of tax attribute carryforwards against taxable income;
- historical experience with tax attributes expiring unused; and
- near- and medium-term financial outlook.

The weight given to the positive and negative evidence is commensurate with the extent to which the evidence may be objectively verified. Accordingly, it is generally difficult to conclude a valuation allowance is not required when there is significant objective and verifiable negative evidence, such as cumulative losses in recent years. The Company uses the actual results for the last two years and current year results as the primary measure of cumulative losses in recent years.

The evaluation of deferred tax assets requires judgment in assessing the likely future tax consequences of events recognized in the financial statements or tax returns and future profitability. The recognition of deferred tax assets represents the Company's best estimate of those future events. Changes in the current estimates, due to unanticipated events or otherwise, could have a material effect on the Company's results of operations and financial condition.

In certain tax jurisdictions, the Company's analysis indicates that it has cumulative losses in recent years. This is considered significant negative evidence which is objective and verifiable and, therefore, difficult to overcome. However, the cumulative loss position is not solely determinative and, accordingly, the Company considers all other available positive and negative evidence in its analysis. Based on its analysis, the Company has recorded a valuation allowance for the portion of deferred tax assets where based on the weight of available evidence it is unlikely to realize those deferred tax assets.

Based on the evidence available including a lack of sustainable earnings, the Company in its judgment previously recorded a valuation allowance against substantially all of its net deferred tax assets in the United States. If a change in judgment regarding this valuation allowance were to occur in the future, the Company will record a potentially material deferred tax benefit, which could result in a favorable impact on the effective tax rate in that period.

As a result of the Tax Act, the Company has not had a change in judgement regarding the gross book-tax basis differences in its non-U.S. consolidated subsidiaries. The Tax Act required a one-time transition tax for deemed repatriation of accumulated undistributed earnings of certain foreign investments. If we determine that all or a portion of our foreign earnings are no longer indefinitely reinvested, we may be subject to additional foreign withholding taxes, U.S. taxes on foreign currency fluctuations on these accumulated undistributed earnings, and incremental U.S. state income taxes, beyond the Tax Act's one-time transition tax. The Company continues to record deferred foreign taxes on gross book-tax basis differences to the extent of foreign distributable reserves and excess cash balances for its subsidiary in India. Determining the amount of unrecognized deferred tax liability related to any remaining undistributed foreign earnings is not practicable.

The following table summarizes the changes to the valuation allowance balance at December 31, 2018, 2017 and 2016 (in thousands):

	December 31,		
	2018	2017	2016
Beginning balance	\$ 54,331	\$ 4,153	\$ 2,452
Additions charged to expense	16,725	47,429	177
Deductions	—	—	(207)
Other	5,045	2,749	1,731
Ending balance	<u>\$ 76,101</u>	<u>\$ 54,331</u>	<u>\$ 4,153</u>

The amount in Other for 2018 of \$5.0 million is primarily related to the recording of a valuation allowance against deferred taxes recorded for business combinations of \$12.6 million, and to accumulated deficit related to the adoption of ASC 606 for \$(7.4) million.

The following table summarizes the amount and expiration dates of operating loss and tax credit carryforwards at December 31, 2018 (in thousands):

	Expiration dates	Amounts
U.S. general business credits and loss carryforwards	2019-Indefinite	\$ 53,853
Foreign loss carryforwards	Indefinite	8,030
U.S. foreign tax credits	2028	6,182
Total operating loss and tax credit carryforwards		<u>\$ 68,065</u>

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

	Year ended December 31,		
	2018	2017	2016
Unrecognized tax benefits—January 1	\$ 6,157	\$ 5,604	\$ 5,305
Increase in unrecognized tax benefits as a result of:			
Additions for tax positions of current period	234	634	299
Additions for tax positions of prior periods	10,866	—	—
Reductions for tax positions of prior periods	(100)	(81)	—
Reductions due to statute of limitations	(60)	—	—
Unrecognized tax benefits—December 31	<u>\$ 17,097</u>	<u>\$ 6,157</u>	<u>\$ 5,604</u>

At December 31, 2018, the Company had \$17.1 million of gross unrecognized tax benefits that if recognized would affect the effective tax rate and adjustments to other tax accounts, primarily deferred taxes. The Company expects a change in the gross unrecognized tax benefits to be approximately \$0.4 million that will impact the effective tax rate during 2019.

The Company operates globally but considers its more significant tax jurisdictions to include the United States, India, Germany, Japan, and China. India has tax years open for examination from 2008 through 2017. All other significant jurisdictions have open tax years from 2014 through 2017.

The Company records interest and penalties with respect to unrecognized tax benefits as a component of the provision for income taxes. For the years ended December 31, 2018 and 2017, accrued interest and penalties related to unrecognized tax benefits were insignificant.

15. Income (loss) per share

Basic income (loss) per share attributable to common stockholders is computed using the weighted average number of shares of common stock outstanding for the period, excluding stock options. Diluted income (loss) per share attributable to common stockholders is based upon the weighted average number of shares of common stock outstanding for the period and potentially dilutive common shares, including the effect of stock options under the treasury stock method. The following table sets forth the computation of the numerators and denominators used in the basic and diluted income (loss) per share amounts (in thousands, except per share data):

	Year ended December 31,		
	2018	2017	2016
Numerator:			
Net income (loss)	<u>\$ 13,715</u>	<u>\$ (99,407)</u>	<u>\$ 10,163</u>
Denominator:			
Denominator for basic income (loss) per share— weighted average shares	67,468	52,466	48,852
Effect of dilutive securities, stock options and RSUs	7,410	—	9,004
Denominator for diluted income (loss) per share	<u>74,878</u>	<u>52,466</u>	<u>57,856</u>
Net income (loss) per share attributable to common stockholders, basic	<u>\$ 0.20</u>	<u>\$ (1.89)</u>	<u>\$ 0.21</u>
Net income (loss) per share attributable to common stockholders, diluted	<u>\$ 0.18</u>	<u>\$ (1.89)</u>	<u>\$ 0.18</u>

The computation of diluted income (loss) per share does not include shares that are anti-dilutive under the treasury stock method because their exercise prices are higher than the average fair value of the Company's stock during the year. For the year ended December 31, 2018, there were no anti-dilutive shares, which were excluded from the computation of income (loss) per share. For the year ended December 31, 2017, there were 10.2 million potentially anti-dilutive shares, which were excluded from the computation of income (loss) per share. For the year ended December 31, 2016, there were no anti-dilutive shares excluded from the computation of income (loss) per share.

16. Retirement benefits

The Company sponsors a 401(k)-profit sharing plan (the "Plan") for all eligible U.S. employees. This Plan allows eligible employees to contribute up to 80% of their compensation to the Plan. The Company makes discretionary matching contributions to the Plan provided the employee is employed on the last day of the year. Such discretionary contributions vest ratably over five years of service.

The Company's contributions to the Plan were \$1.3 million, \$1.1 million and \$1.1 million for the years ended December 31, 2018, 2017 and 2016, respectively.

The Company also participates in government-mandated retirement and/or termination indemnity plans, benefiting certain non-U.S. employees. Termination benefits are generally lump sum payments based upon an individual's years of credited service and annual salary at retirement. These plans are generally unfunded and employees receive payments at the time of retirement or termination under applicable labor laws or agreements. The amount of net benefit cost recorded in the consolidated statements of operations for these plans was \$1.2 million, \$1.2 million and \$0.9 million in 2018, 2017 and 2016, respectively. The amount of benefits paid under these plans was \$0.4 million, \$0.2 million and \$0.2 million in 2018, 2017 and 2016, respectively. The accumulated benefit obligation, unlike the projected benefit obligation, does not reflect expected benefit increases from future salary levels, and was \$6.0 million and \$5.5 million at December 31, 2018 and 2017, respectively, under these plans. The projected benefit obligation, net of plan assets of \$0.9 million, was \$9.6 million and \$8.0 million at December 31, 2018 and 2017, respectively.

A summary of the components of the pension benefits obligation recorded in the consolidated balance sheets are as follows (in thousands):

	December 31,	
	2018	2017
Accrued compensation and benefits	\$ 513	\$ 368
Other long-term liabilities	9,111	7,670
	<u>\$ 9,624</u>	<u>\$ 8,038</u>

The estimated future benefit payments, which reflect expected future service, that are expected to be paid for each of the next five years are as follows (in thousands):

Year ending	
December 31, 2019	\$ 537
December 31, 2020	\$ 356
December 31, 2021	\$ 283
December 31, 2022	\$ 337
December 31, 2023	\$ 519
Next five years	\$ 2,484

17. Accumulated other comprehensive loss

The components of accumulated other comprehensive loss are as follows (in thousands):

	Foreign currency translation	Retirement related benefit plans	Total
Balance at December 31, 2015	\$ (5,745)	\$ (963)	\$ (6,708)
Other comprehensive income (loss) before reclassification	80	(771)	(691)
Tax effects	(60)	195	135
Other comprehensive income (loss)	20	(576)	(556)
Balance at December 31, 2016	(5,725)	(1,539)	(7,264)
Other comprehensive income (loss) before reclassification	2,351	(213)	2,138
Amounts reclassified from accumulated other comprehensive loss	—	54	54
Tax effects	—	—	—
Other comprehensive income (loss)	2,351	(159)	2,192
Balance at December 31, 2017	(3,374)	(1,698)	(5,072)
Other comprehensive income (loss) before reclassification	(5,211)	90	(5,121)
Amounts reclassified from accumulated other comprehensive loss	—	(1,177)	(1,177)
Tax effects	—	318	318
Other comprehensive income (loss)	(5,211)	(769)	(5,980)
Balance at December 31, 2018	\$ (8,585)	\$ (2,467)	\$ (11,052)

18. Related party transactions

In February 2017, the Company purchased the noncontrolling interest in a consolidated subsidiary from a founder stockholder for an aggregate purchase price of \$29 thousand.

In 2016, the Company redeemed 546,776 shares of Class A common stock from related parties for an aggregate purchase price of \$2.1 million payable in installments.

In 2016, the Company redeemed 113,388 shares of Class B common stock from a founder stockholder for an aggregate purchase price of \$0.6 million payable in nine equal monthly installments.

In October 2015, the Company acquired Altair Bellingham, LLC from significant stockholders of the Company for cash of \$0.7 million, which was paid in February 2016.

At December 31, 2018, the Company had no obligations to related parties. At December 31, 2017, the Company had obligations to related parties for \$0.1 million recorded in other accrued expenses and current liabilities.

At December 31, 2017, the Company had receivables from an entity for which the Company had an equity investment, FluiDyna, for \$0.5 million recorded in other long-term assets. The Company acquired FluiDyna in May 2018; as a result, the receivable has been eliminated from the December 31, 2018 consolidated balance sheet. For additional information on the acquisition of FluiDyna, see Note 4 - Acquisitions.

19. Commitments and contingencies

Swedish Tax Litigation

The Swedish Tax Authorities, or STA, have assessed tax, penalties and interest in the amount of \$6.7 million related to the acquisition of Panopticon AB by Datawatch, in 2013 for the years 2013, 2014 and 2015. The STA, upon auditing the acquisition transaction, reached a conclusion that post acquisition, certain assets were removed from Sweden, triggering the tax obligation. The STA is also of the opinion that some services related to product development provided to the new parent company in the U.S. were performed by Panopticon AB at a price below market price triggering tax obligations. Datawatch contested the findings by the STA throughout the audit process and is now contesting the STA position in the first level of administrative courts. An Administrative Court hearing had been set for January 2019; however, upon Altair acquiring Datawatch and engaging new Swedish tax counsel, the Administrative Court agreed to a short postponement. A new hearing date is expected to be established no earlier than May or June of 2019. This tax controversy is a long-standing tax matter related to a unique combination of complex tax laws and regulations coupled with unusual facts and circumstances for which there appears to be little or no precedence in prior case law in this jurisdiction. Ultimate resolution of this matter, which could be several years from this point, inclusive of applicable appellate procedures, will be based upon significant judgment and interpretation by the parties involved, especially as this matter progresses through the court process.

MSC Litigation

In July 2007, MSC Software Corporation filed a lawsuit against the Company alleging misappropriation of trade secrets, breach of confidentiality and other claims. On April 10, 2014, a jury returned a verdict against the Company. The Company challenged the verdict and on November 13, 2014, a judge vacated all but \$0.4 million of the judgment and ordered a new trial on damages. On December 13, 2017, the court granted Altair's motion for summary judgment and dismissed MSC's claim of trade secret misappropriation. On January 5, 2018, MSC filed a notice of appeal of the final judgment entered on December 13, 2017 and prior orders in this action to the Sixth Circuit Court of Appeals. On January 19, 2018, Altair filed a cross-appeal. The Sixth Circuit referred the case to mediation. On August 28, 2018, the parties filed stipulations of dismissal with both the District Court and the Court of Appeals. The matter is settled.

Legal proceedings

From time to time, the Company may be subject to legal proceedings and claims in the ordinary course of business. The Company has received, and may in the future continue to receive, claims from third parties asserting, among other things, infringement of their intellectual property rights. Future litigation may be necessary to defend the Company, its partners and its customers by determining the scope, enforceability and validity of third party proprietary rights, or to establish and enforce the Company's proprietary rights. The results of any current or future litigation cannot be predicted with certainty and regardless of the outcome, litigation can have an adverse impact on the Company because of defense and settlement costs, diversion of management resources and other factors.

Royalty agreements

The Company has entered into various renewable, nonexclusive license agreements under which the Company has been granted access to the licensor's technology and the right to sell or use the technology in the Company's products. Royalties are payable to developers of the software at various rates and amounts, which generally are based upon unit sales or revenue. Royalty fees were \$9.7 million, \$9.3 million, and \$7.9 million for the years ended December 31, 2018, 2017 and 2016, respectively, and are reported in Cost of revenue—software and Cost of revenue—other.

Leases

The Company leases office space, vehicles, and computer equipment. Such leases, some of which are noncancelable, are set to expire at various dates. Certain of these lease arrangements contain escalation clauses whereby monthly rent increases over time.

The future minimum annual lease payments under noncancelable operating leases with an initial term in excess of one year and future minimum capital lease payments at December 31, 2018, are as follows (in thousands):

Year Ending December 31,	Capital leases	Operating leases
2019	\$ 256	\$ 10,661
2020	209	8,306
2021	173	5,673
2022	137	3,573
2023	38	1,819
Thereafter	—	3,147
Total minimum lease payments	813	\$ 33,179
Less: current installments under capital lease obligations	256	
Total long-term portion	\$ 557	

Rent expense for operating leases was \$11.0 million, \$9.9 million and \$8.5 million for the years ended December 31, 2018, 2017 and 2016, respectively.

20. Segment information

The Company defines its operating segments as components of its business where separate financial information is available and used by the chief operating decision maker (“CODM”) in deciding how to allocate resources to its segments and in assessing performance. The Company’s CODM is its Chief Executive Officer.

The Company has identified two reportable segments for financial reporting purposes: Software and Client Engineering Services. The primary measure of segment operating performance is Adjusted EBITDA, which is defined as net income (loss) adjusted for income tax expense (benefit), interest expense, interest income and other, depreciation and amortization, stock-based compensation expense, restructuring charges, asset impairment charges and other special items as determined by management. Adjusted EBITDA includes an allocation of corporate headquarters costs.

The Software reportable segment derives revenue from the sale and lease of licenses for software products focused on the development and application of simulation technology to synthesize and optimize designs, processes and decisions for improved business performance. The Software segment also derives revenue from software support, upgrades, training and consulting services focused on product design and development expertise and analysis support from the component level up to complete product engineering at any stage of the lifecycle. To a much lesser extent, the Software segment also includes revenue from the sale of hardware products, primarily as a result of recent business acquisitions.

The Client Engineering Services reportable segment provides support to its customers with long-term ongoing product design and development expertise in its market segments of Solvers & Optimization, Modeling & Visualization, Industrial and Concept Design, and high-performance computing. The Company hires simulation specialists, industrial designers, design engineers, materials experts, development and test specialists, manufacturing engineers and information technology specialists for placement at customer sites for specific customer-directed assignments.

The “All other” represents innovative services and products, including toggled®, the Company’s LED lighting business. toggled® is focused on developing and selling next-generation solid state lighting technology along with communication and control protocols based on intellectual property for the direct replacement of fluorescent light tubes with LED lamps. Other businesses combined within Other include our WEYV business, a consumer music and content service, and potential services and product concepts that are still in their development stages.

Inter-segment sales are not significant for any period presented. The CODM does not review asset information by segment when assessing performance, therefore no asset information is provided for reportable segments. The accounting policies of the segments are the same as those described in Note 2— Summary of significant accounting policies.

The following tables are in thousands:

Year ended December 31, 2018	Software	CES	All other	Total
Revenue	\$ 341,306	\$ 47,852	\$ 7,221	\$ 396,379
Adjusted EBITDA	\$ 48,643	\$ 5,155	\$ (3,618)	\$ 50,180
Year ended December 31, 2017	Software	CES	All other	Total
Revenue	\$ 280,214	\$ 46,510	\$ 6,609	\$ 333,333
Adjusted EBITDA	\$ 22,864	\$ 4,966	\$ (5,313)	\$ 22,517
Year ended December 31, 2016	Software	CES	All other	Total
Revenue	\$ 259,588	\$ 47,702	\$ 5,950	\$ 313,240
Adjusted EBITDA	\$ 29,411	\$ 5,425	\$ (4,006)	\$ 30,830

	Year ended December 31,		
	2018	2017	2016
Reconciliation of Adjusted EBITDA to GAAP income (loss) before income taxes:			
Adjusted EBITDA	\$ 50,180	\$ 22,517	\$ 30,830
Stock-based compensation expense	(3,339)	(47,281)	(5,132)
Interest expense	(200)	(2,160)	(2,265)
Interest income and other (1)	(4,883)	2,260	249
Depreciation and amortization	(14,734)	(11,747)	(9,980)
Income (loss) before income taxes	\$ 27,024	\$ (36,411)	\$ 13,702

(1) Includes for the year ended December 31, 2018 a) nonrecurring costs from the acquisition of Datawatch of \$10.4 million, b) gain on the sale of a building of \$4.4 million, c) impairment charges for royalty contracts and trade names resulting in \$2.8 million of expense. Includes for each of the years ended December 31, 2018 and 2017, a non-recurring adjustment for a change in estimated legal expenses resulting in \$2.0 million of income in each year.

Revenue is attributed to geographic areas based on the country of origin. The following table provides sales to external customers and long-lived assets for each of the geographic areas in which the Company operates (in thousands):

	Revenue			Long-lived assets (1)	
	Year ended December 31,			December 31,	
	2018	2017	2016	2018	2017
United States	\$ 186,026	\$ 142,679	\$ 139,079	\$ 63,266	\$ 38,729
Other countries	8,604	6,404	6,032	11,447	116
Total Americas	194,630	149,083	145,111	74,713	38,845
Germany	45,664	43,751	39,470	4,305	2,802
France	16,154	18,128	15,729	1,583	2,176
Other countries	42,846	40,050	34,909	4,729	4,534
Total Europe, Middle East and Africa	104,664	101,929	90,108	10,617	9,512
Japan	35,478	33,686	33,198	2,045	2,237
Other countries	61,607	48,635	44,823	2,957	2,574
Total Asia Pacific	97,085	82,321	78,021	5,002	4,811
Total	\$ 396,379	\$ 333,333	\$ 313,240	\$ 90,332	\$ 53,168

(1) Includes property and equipment, net and definite-lived intangible assets, net.

21. Supplemental quarterly financial information (unaudited)

The following tables set forth selected unaudited quarterly information. The information for each of these quarters has been prepared on the same basis as the audited annual consolidated financial statements and, in the opinion of management, includes all adjustments, which consist only of normal recurring adjustments, necessary for the fair presentation of the results of operations for these periods in accordance with GAAP. This data should be read in conjunction with the Company's audited consolidated financial statements and related notes. These quarterly operating results are not necessarily indicative of the Company's operating results for a full year or any future period.

(in thousands, except per share data)	Three months ended			
	ASC 606			
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018
Total revenue	\$ 113,257	\$ 93,360	\$ 86,751	\$ 103,011
Gross profit	\$ 84,216	\$ 63,903	\$ 59,547	\$ 72,740
Operating income (loss)	\$ 26,146	\$ 175	\$ 1,880	\$ (3,557)
Net income (loss)	\$ 24,684	\$ (1,080)	\$ 934	\$ (10,823)
Net income (loss) per share, basic	\$ 0.39	\$ (0.02)	\$ 0.01	\$ (0.15)
Net income (loss) per share, diluted	\$ 0.34	\$ (0.02)	\$ 0.01	\$ (0.15)

Revenue for the first and fourth quarters of 2018 are higher than the second and third quarters of 2018 as a result of the adoption of ASC 606. The Company typically has higher billings in the first and fourth quarters of each year, and the guidance under ASC 606 accelerates revenue.

Gross profit, operating income, and net income are significantly higher in the first quarter of 2018, than the second, third and fourth quarters of 2018 due to the adoption of ASC 606. See Note 3 – Revenue from contracts with customers for the effect of the adoption of ASC 606 on the Company’s consolidated financial statements.

The net loss in the fourth quarter of 2018 is primarily the result of transaction costs from the acquisition of Datawatch. See Note 4 – Acquisitions.

(in thousands)	Three months ended			
	ASC 605			
	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018
Total revenue	\$ 91,731	\$ 95,566	\$ 93,871	\$ 103,894
Gross profit	\$ 62,689	\$ 66,110	\$ 66,667	\$ 73,623
Operating income (loss)	\$ 4,270	\$ 2,177	\$ 8,968	\$ (2,424)

Operating income in the first quarter of 2018 includes a non-recurring adjustment for a change in estimated legal expenses resulting in \$2.0 million of income.

Operating income in the third quarter of 2018 includes a gain on the sale of a building for \$4.4 million.

(in thousands, except per share data)	Three months ended (1)			
	March 31, 2017	June 30, 2017	September 30, 2017	December 31, 2017
Total revenue	\$ 76,882	\$ 81,646	\$ 84,938	\$ 89,867
Gross profit	\$ 50,128	\$ 54,728	\$ 58,636	\$ 63,250
Operating loss	\$ (1,990)	\$ (7,158)	\$ (20,928)	\$ (3,181)
Net loss	\$ (2,188)	\$ (7,246)	\$ (29,626)	\$ (60,347)
Net loss per share, basic	\$ (0.04)	\$ (0.14)	\$ (0.59)	\$ (1.03)
Net loss per share, diluted	\$ (0.04)	\$ (0.14)	\$ (0.59)	\$ (1.03)

(1) The three months ended March 31, 2017, June 30, 2017, September 30, 2017 and December 31, 2017 have been reported under ASC 605 and have not been adjusted under the modified retrospective approach. See Note 3 – Revenue from contracts with customers for the effect of the adoption of ASC 606 on the Company’s consolidated financial statements.

In the second, third and fourth quarters of 2017, the Company recognized stock-based compensation expense of \$11.2 million, \$25.3 million, and \$8.0 million, respectively.

Income tax expense increased by \$56.6 million for the quarter ended December 31, 2017. This increase is primarily due to a \$47.0 million increase in tax expense related to the recording of a valuation allowance on the U.S. deferred tax assets, and a \$15.4 million increase due to the remeasurement of net deferred tax assets and liabilities as part of the Tax Act offset by other tax accounting benefits in the U.S. in the quarter.

Exhibit No.	Description	Incorporated by Reference				
		Form	File No.	Exhibit	Filing Date	Filed Herewith
2.1	Agreement and Plan of Merger, dated as of November 5, 2018, by and among the Registrant, Dallas Merger Sub, Inc. and Datawatch Corporation	8-K	333-220710	2.1	11/5/2018	
3.1	Certificate of Incorporation, as amended and as currently in effect	S-1/A	333-220710	3.1	10/6/2017	
3.2	Bylaws, as currently in effect	S-1/A	333-220710	3.2	10/6/2017	
10.1	Form of Indemnification Agreement between the Registrant and each of its directors and executive officers	S-1	333-220710	10.1	9/29/2017	
10.2+	2001 Incentive and Non-Qualified Stock Option Plan	S-1	333-220710	10.2	9/29/2017	
10.3+	Form of 2001 Incentive and Non-Qualified Stock Option Plan Incentive Stock Option Agreement	S-1	333-220710	10.3	9/29/2017	
10.4+	Form of 2001 Incentive and Non-Qualified Stock Option Plan Stock Restriction and Repurchase Agreement	S-1	333-220710	10.4	9/29/2017	
10.5+	2001 Non-Qualified Stock Option Plan	S-1	333-220710	10.5	9/29/2017	
10.6+	Form of 2001 Non-Qualified Stock Option Plan Non-Qualified Stock Option Agreement	S-1	333-220710	10.6	9/29/2017	
10.7+	Form of 2001 Non-Qualified Stock Option Plan Stock Restriction Agreement	S-1	333-220710	10.7	9/29/2017	
10.8+	2012 Incentive and Non-Qualified Stock Option Plan	S-1	333-220710	10.8	9/29/2017	
10.9+	Form of 2012 Incentive and Non-Qualified Stock Option Plan Option Agreement	S-1	333-220710	10.9	9/29/2017	
10.10+	Form of 2012 Incentive and Non-Qualified Stock Option Plan Stock Restriction and Repurchase Agreement	S-1	333-220710	10.10	9/29/2017	
10.11+	Form of 2012 Incentive and Non-Qualified Stock Option Plan Stock Restriction and Repurchase Agreement (Directors)	S-1	333-220710	10.11	9/29/2017	
10.12+	2017 Equity Incentive Plan and forms of equity agreements thereunder	S-1/A	333-220710	10.12	10/6/2017	
10.13+	Employment Letter, dated January 10, 2013, by and between the Registrant and Howard N. Morof as amended on July 19, 2017	S-1	333-220710	10.13	9/29/2017	
10.14+	Consulting Agreement, effective as of January 1, 2017, by and between the Registrant and Advanced Studies Holding Future SRL, an Italian Company, as amended	S-1	333-220710	10.15	9/29/2017	

10.15	2017 Third Amended and Restated Credit Agreement, dated October 18, 2017, by and among the Registrant, the foreign subsidiary borrowers, the Lenders named therein and JP Morgan Chase Bank, N.A. as administrative agent	S-1/A	333-220710	10.16	10/19/17	
10.16	First Amendment to 2017 Third Amended and Restated Credit Agreement, dated October 31, 2018, by and among the Registrant, the foreign subsidiary borrowers, the Lenders named therein and JP Morgan Chase Bank, N.A. as administrative agent	8-K		10.1	11/5/18	
21.1	List of Subsidiaries of the Registrant					X
23.1	Consent of Independent Registered Public Accounting Firm					X
31.1	Certification of the Chief Executive Officer of Altair Engineering Inc. pursuant to Rule 13a-14(a)/Rule 15d-14(a) under the Securities Exchange Act of 1934, as amended					X
31.2	Certification of the Chief Financial Officer of Altair Engineering Inc. pursuant to Rule 13a-14(a)/Rule 15d-14(a) under the Securities Exchange Act of 1934, as amended					X
32.1**	Certification of the Chief Executive Officer and Chief Financial Officer of Altair Engineering Inc. pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002					X
EX-101.INS	XBRL INSTANCE DOCUMENT					X
EX-101.SCH	XBRL TAXONOMY EXTENSION SCHEMA DOCUMENT					X
EX-101.CAL	XBRL TAXONOMY EXTENSION CALCULATION LINKBASE					X
EX-101.LAB	XBRL TAXONOMY EXTENSION LABELS LINKBASE					X
EX-101.PRE	XBRL TAXONOMY EXTENSION PRESENTATION LINKBASE					X

+ Indicates management contract or compensatory plan.

** The certifications furnished in Exhibit 32.1 hereto are deemed to accompany this Annual Report on Form 10-K and will not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, except to the extent that the registrant specifically incorporates it by reference.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

ALTAIR ENGINEERING INC.

Date: March 1, 2019

By: /s/ James Scapa
James R. Scapa
Chief Executive Officer (Principal Executive Officer)

Date: March 1, 2019

By: /s/ Howard N. Morof
Howard N. Morof
Chief Financial Officer (Principal Financial and
Accounting Officer)

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints James R. Scapa and Howard N. Morof, jointly and severally, his or her true and lawful attorneys-in-fact and agent, each with the power of substitution, for him in any and all capacities, to sign any amendments to this report, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorneys-in-fact, or his substitute or substitutes, may do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant in the capacities and on the dates indicated.

Name	Title	Date
<u>/s/ James Scapa</u> James R. Scapa	Chief Executive Officer and Director (Principal Executive Officer)	March 1, 2019
<u>/s/ Howard N. Morof</u> Howard N. Morof	Chief Financial Officer (Principal Financial and Accounting Officer)	March 1, 2019
<u>/s/ Mary C. Boyce</u> Mary C. Boyce	Director	March 1, 2019
<u>/s/ Brett Chouinard</u> Brett Chouinard	Director	March 1, 2019
<u>/s/ Stephen Earhart</u> Stephen Earhart	Director	March 1, 2019
<u>/s/ Trace Harris</u> Trace Harris	Director	March 1, 2019
<u>/s/ Richard Hart</u> Richard Hart	Director	March 1, 2019
<u>/s/ Jan Kowal</u> Jan Kowal	Director	March 1, 2019

LIST OF SUBSIDIARIES**Subsidiary**

Altair Product Design, Inc.
Altair Engineering India Pvt. Ltd.
Altair Engineering Ltd.
Altair Engineering GmbH
Altair Engineering France, Sarl
Altair Engineering Software Co., Ltd.
Altair Engineering Ltd.
Datawatch Corporation
Runtime Design Automation
solidThinking, Inc.
WEYV, Inc.

Jurisdiction of Organization

Michigan, United States
India
Japan
Germany
France
China
United Kingdom
Delaware, United States
California, United States
Michigan, United States
Michigan, United States

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

- (1) Registration Statement (Form S-8 No. 333-221312) pertaining to the 2001 Non-Qualified Stock Option Plan, 2001 Incentive and Non-Qualified Stock Option Plan, 2012 Incentive and Non-Qualified Stock Option Plan, and 2017 Equity Incentive Plan of Altair Engineering Inc., and
- (2) Registration Statement (Form S-8 No. 333-223833) pertaining to the 2017 Equity Incentive Plan of Altair Engineering Inc.

of our reports dated March 1, 2019, with respect to the consolidated financial statements and schedule of Altair Engineering Inc. and the effectiveness of internal control over financial reporting of Altair Engineering Inc. included in this Annual Report (Form 10-K) of Altair Engineering Inc. for the year ended December 31, 2018.

/s/ Ernst & Young LLP

Detroit, Michigan
March 1, 2019

**CERTIFICATION PURSUANT TO
RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, James R. Scapa, certify that:

1. I have reviewed this annual report on Form 10-K of Altair Engineering Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) (paragraph omitted pursuant to the transition period exemption for newly public companies);
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ James Scapa
James R. Scapa
Chief Executive Officer
(Principal Executive Officer)

March 1, 2019

**CERTIFICATION PURSUANT TO
RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Howard N. Morof, certify that:

1. I have reviewed this annual report on Form 10-K of Altair Engineering Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) (paragraph omitted pursuant to the transition period exemption for newly public companies);
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ Howard N. Morof

Howard N. Morof
Chief Financial Officer
(Principal Financial and Accounting Officer)

March 1, 2019

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of Altair Engineering Inc. (the "Company"), on Form 10-K for the year ended December 31, 2018, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned officers of the Company certify to their knowledge and in their respective capacities, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) The Report fully complies with the requirements of section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ James Scapa

James R. Scapa
Chief Executive Officer
(Principal Executive Officer)

/s/ Howard N. Morof

Howard N. Morof
Chief Financial Officer
(Principal Financial and Accounting Officer)

March 1, 2019