

FINANCIAL RESULTS

Financial Results

QIAGEN N.V. AND SUBSIDIARIES CONSOLIDATED BALANCE SHEETS (in thousands)

		As of December 31,	
	Note	2018	2017
Assets			
Current assets:			
Cash and cash equivalents	(3)	\$ 1,159,079	\$ 657,714
Short-term investments	(7)	234,606	359,198
Accounts receivable, net of allowance for doubtful accounts of \$9,270 and \$8,008 in 2018 and 2017, respectively	(3, 23)	351,612	329,138
Income taxes receivable		34,936	39,509
Inventories, net	(3)	162,912	155,927
Fair value of derivative instruments — current	(13)	102,754	7,480
Prepaid expenses and other current assets	(8)	109,161	99,007
Total current assets		2,155,060	1,647,973
Long-term assets:			
Property, plant and equipment, net of accumulated depreciation of \$603,430 and \$564,588 in 2018 and 2017, respectively	(9)	511,659	494,321
Goodwill	(11)	2,108,536	2,012,904
Intangible assets, net of accumulated amortization of \$1,194,679 and \$1,117,423 in 2018 and 2017, respectively	(11)	475,043	499,318
Deferred income taxes	(16)	42,896	39,353
Fair value of derivative instruments — long-term	(13)	295,363	224,398
Other long-term assets (of which \$24,300 and \$17,713 in 2018 and 2017 due from related parties, respectively)	(10, 23)	159,775	120,249
Total long-term assets		3,593,272	3,390,543
Total assets		\$ 5,748,332	\$ 5,038,516

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

QIAGEN N.V. AND SUBSIDIARIES CONSOLIDATED BALANCE SHEETS (in thousands, except par value)

		As of December 31,	
	Note	2018	2017
Liabilities and equity			
Current liabilities:			
Current portion of long-term debt	(15)	\$ 503,116	\$ —
Accounts payable	(22)	69,415	59,205
Fair value of derivative instruments — current	(13)	106,594	2,424
Accrued and other current liabilities (of which \$5,488 and \$9,028 due to related parties in 2018 and 2017, respectively)	(10, 22)	263,017	241,690
Income taxes payable		30,047	21,473
Total current liabilities		972,189	324,792
Long-term liabilities:			
Long-term debt, net of current portion	(15)	1,671,090	1,758,258
Deferred income taxes	(16)	63,411	76,727
Fair value of derivative instruments — long-term	(13)	317,393	253,389
Other long-term liabilities (of which \$3,075 due to related parties in 2017)	(10, 22)	89,279	84,354
Total long-term liabilities		2,141,173	2,172,728
Commitments and contingencies	(19)		
Equity:			
Preference shares, 0.01 EUR par value, authorized—450,000 shares, no shares issued and outstanding		—	—
Financing preference shares, 0.01 EUR par value, authorized—40,000 shares, no shares issued and outstanding		—	—
Common Shares, 0.01 EUR par value, authorized—410,000 shares, issued — 230,829 shares in 2018 and 2017, respectively		2,702	2,702
Additional paid-in capital		1,742,191	1,630,095
Retained earnings		1,379,624	1,247,945
Accumulated other comprehensive loss	(17)	(310,644)	(220,759)
Less treasury shares, at cost— 5,320 and 4,272 shares in 2018 and 2017, respectively	(17)	(178,903)	(118,987)
Total equity		2,634,970	2,540,996
Total liabilities and equity		\$ 5,748,332	\$ 5,038,516

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

QIAGEN N.V. AND SUBSIDIARIES CONSOLIDATED STATEMENTS OF INCOME (in thousands, except per share data)

		Years ended December 31,		
	Note	2018	2017	2016
Net sales	(3, 4, 23)	\$ 1,501,848	\$ 1,417,536	\$ 1,337,991
Cost of sales		500,888	494,975	493,338
Gross profit		1,000,960	922,561	844,653
Operating expenses:				
Research and development	(3)	161,852	154,084	149,841
Sales and marketing		392,281	375,562	376,321
General and administrative, restructuring, integration and other, net	(3)	141,214	200,098	180,573
Acquisition-related intangible amortization		39,032	39,398	39,091
Total operating expenses		734,379	769,142	745,826
Income from operations		266,581	153,419	98,827
Other income (expense):				
Interest income		20,851	10,645	6,776
Interest expense		(67,293)	(49,685)	(39,022)
Other income (expense), net	(6)	(5,598)	(4)	(9,673)
Total other expense, net		(40,844)	(39,044)	(41,919)
Income before income taxes		225,737	114,375	56,908
Income taxes	(3, 16)	35,357	73,981	(23,395)
Net income		190,380	40,394	80,303
Net loss attributable to noncontrolling interest		—	—	(101)
Net income attributable to the owners of QIAGEN N.V.		\$ 190,380	\$ 40,394	\$ 80,404
Basic net income per common share attributable to the owners of QIAGEN N.V.		\$ 0.84	\$ 0.18	\$ 0.34
Diluted net income per common share attributable to the owners of QIAGEN N.V.		\$ 0.82	\$ 0.17	\$ 0.34
Weighted-average common shares outstanding				
Basic	(18)	226,640	228,074	234,800
Diluted	(18)	233,456	233,009	238,993

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

QIAGEN N.V. AND SUBSIDIARIES CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (in thousands)

	Note	Years ended December 31,		
		2018	2017	2016
Net income		\$ 190,380	\$ 40,394	\$ 80,303
Other comprehensive income (loss) to be reclassified to profit or loss in subsequent periods:				
Gains (losses) on cash flow hedges, before tax	(13)	25,207	(50,067)	(3,969)
Reclassification adjustments on cash flow hedges, before tax	(13)	(9,774)	26,136	(6,228)
Cash flow hedges, before tax		15,433	(23,931)	(10,197)
Losses on marketable securities, before tax		—	(854)	(1,421)
Gains on pensions, before tax		1,325	886	929
Foreign currency translation adjustments, before tax		(108,045)	135,945	(65,910)
Other comprehensive (loss) income, before tax		(91,287)	112,046	(76,599)
Income tax relating to components of other comprehensive income (loss)		460	1,034	2,562
Total other comprehensive income (loss), after tax		(90,827)	113,080	(74,037)
Comprehensive income		99,553	153,474	6,266
Comprehensive (income) attributable to noncontrolling interest		—	—	(545)
Comprehensive income attributable to the owners of QIAGEN N.V.		\$ 99,553	\$ 153,474	\$ 5,721

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QIAGEN N.V. AND SUBSIDIARIES CONSOLIDATED STATEMENTS OF CHANGES IN EQUITY

(in thousands)	Note	Common Shares		Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Treasury Shares		Equity Attributable to the Owners of QIAGEN N.V.	Non- controlling Interest	Total Equity
		Shares	Amount				Shares	Amount			
Balance at December 31, 2015		239,707	\$ 2,812	\$ 1,765,595	\$ 1,209,197	\$ (259,156)	(6,702)	\$ (152,412)	\$ 2,566,036	\$ 2,034	\$ 2,568,070
Acquisition of QIAGEN Marseille S.A. shares from noncontrolling interests		—	—	—	—	—	—	—	—	(2,624)	(2,624)
Acquisition of Exiqon A/S	(5)	—	—	—	—	—	—	—	—	5,519	5,519
Acquisition of Exiqon shares from noncontrolling interests	(5)	—	—	—	—	—	—	—	—	(5,474)	(5,474)
Net income		—	—	—	80,404	—	—	—	80,404	(101)	80,303
Unrealized gain, net on pension	(17)	—	—	—	—	650	—	—	650	—	650
Unrealized loss, net on hedging contracts	(13)	—	—	—	—	(2,977)	—	—	(2,977)	—	(2,977)
Realized gain, net on hedging contracts	(13)	—	—	—	—	(4,671)	—	—	(4,671)	—	(4,671)
Unrealized loss, net on marketable securities		—	—	—	—	(1,371)	—	—	(1,371)	—	(1,371)
Translation adjustment, net	(17)	—	—	—	—	(66,314)	—	—	(66,314)	646	(65,668)
Issuance of common shares in connection with stock plan	(21)	—	—	—	(26,137)	—	1,555	32,406	6,269	—	6,269
Excess tax benefit of employee stock plans		—	—	782	—	—	—	—	782	—	782
Share-based compensation	(21)	—	—	28,288	—	—	—	—	28,288	—	28,288
Balance at December 31, 2016		239,707	\$ 2,812	\$ 1,794,665	\$ 1,263,464	\$ (333,839)	(5,147)	\$ (120,006)	\$ 2,607,096	\$ —	\$ 2,607,096
Capital repayment		(8,878)	(110)	(244,319)	—	—	191	—	(244,429)	—	(244,429)
Issuance of warrants		—	—	45,307	—	—	—	—	45,307	—	45,307
Net income		—	—	—	40,394	—	—	—	40,394	—	40,394
Unrealized gain, net on pension	(17)	—	—	—	—	620	—	—	620	—	620
Unrealized loss, net on hedging contracts	(13)	—	—	—	—	(42,489)	—	—	(42,489)	—	(42,489)
Realized loss, net on hedging contracts	(13)	—	—	—	—	19,602	—	—	19,602	—	19,602
Unrealized loss, net on marketable securities	(10)	—	—	—	—	(786)	—	—	(786)	—	(786)
Translation adjustment, net	(17)	—	—	—	—	136,133	—	—	136,133	—	136,133
Purchase of treasury shares	(17)	—	—	—	—	—	(1,909)	(60,970)	(60,970)	—	(60,970)
Issuance of common shares in connection with stock plan	(21)	—	—	—	(55,913)	—	2,593	61,989	6,076	—	6,076
Share-based compensation	(21)	—	—	34,442	—	—	—	—	34,442	—	34,442
Balance at December 31, 2017		230,829	\$ 2,702	\$ 1,630,095	\$ 1,247,945	\$ (220,759)	(4,272)	\$ (118,987)	\$ 2,540,996	\$ —	\$ 2,540,996
Balance at January 1, 2018, as previously reported		230,829	2,702	1,630,095	1,247,945	(220,759)	(4,272)	(118,987)	2,540,996	—	2,540,996
ASU 2016-01 impact of change in accounting policy		—	—	—	(942)	942	—	—	—	—	—
ASU 2016-16 impact of change in accounting policy		—	—	—	(16,096)	—	—	—	(16,096)	—	(16,096)
ASC 606 impact of change in accounting policy		—	—	—	(1,306)	—	—	—	(1,306)	—	(1,306)
Adjusted balance at January 1, 2018	(17)	230,829	\$ 2,702	\$ 1,630,095	\$ 1,229,601	\$ (219,817)	(4,272)	\$ (118,987)	\$ 2,523,594	\$ —	\$ 2,523,594
Issuance of warrants	(17)	—	—	71,983	—	—	—	—	71,983	—	71,983
Net income		—	—	—	190,380	—	—	—	190,380	—	190,380
Unrealized gain, net on pension	(17)	—	—	—	—	754	—	—	754	—	754
Unrealized gain, net on hedging contracts	(13)	—	—	—	—	22,365	—	—	22,365	—	22,365
Realized gain, net on hedging contracts	(13)	—	—	—	—	(7,331)	—	—	(7,331)	—	(7,331)
Translation adjustment, net	(17)	—	—	—	—	(106,615)	—	—	(106,615)	—	(106,615)
Purchase of treasury shares	(17)	—	—	—	—	—	(2,871)	(104,685)	(104,685)	—	(104,685)
Issuance of common shares in connection with stock plan	(21)	—	—	—	(40,357)	—	1,823	44,769	4,412	—	4,412
Share-based compensation	(21)	—	—	40,113	—	—	—	—	40,113	—	40,113
Balance at December 31, 2018		230,829	\$ 2,702	\$ 1,742,191	\$ 1,379,624	\$ (310,644)	(5,320)	\$ (178,903)	\$ 2,634,970	\$ —	\$ 2,634,970

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

QIAGEN N.V. AND SUBSIDIARIES CONSOLIDATED STATEMENTS OF CASH FLOWS

		Years ended December 31,		
(in thousands)	Note	2018	2017	2016
Cash flows from operating activities:				
Net income		\$ 190,380	\$ 40,394	\$ 80,303
Adjustments to reconcile net income to net cash provided by operating activities, net of effects of businesses acquired:				
Depreciation and amortization		206,436	216,448	213,056
Non-cash impairments	(6)	17,020	5,137	44,399
Amortization of debt discount and issuance costs		35,537	24,773	20,451
Share-based compensation expense	(21)	40,113	34,442	28,288
Excess tax benefits from share-based compensation		—	—	(782)
Deferred income taxes	(16)	(23,272)	60,176	(63,981)
(Gain) loss on marketable securities		(2,725)	1,055	(1,360)
Reversals of contingent consideration	(14)	—	(3,269)	(6,501)
Other items, net including fair value changes in derivatives		(8,834)	(4,521)	19,435
Net changes in operating assets and liabilities:				
Accounts receivable	(3)	(41,813)	(34,165)	(12,238)
Inventories	(3)	(36,918)	(21,633)	(20,346)
Prepaid expenses and other current assets	(8)	(9,942)	(5,245)	6,640
Other long-term assets		(30,312)	(16,786)	3,549
Accounts payable		6,993	4,321	(1,466)
Accrued and other current liabilities	(12)	(13,317)	2,828	10,618
Income taxes	(16)	14,239	(41,266)	13,483
Other long-term liabilities		15,911	24,090	8,054
Net cash provided by operating activities		359,496	286,779	341,602
Cash flows from investing activities:				
Purchases of property, plant and equipment		(109,773)	(90,081)	(74,536)
Proceeds from sale of equipment		—	42	63
Purchases of intangible assets		(40,990)	(34,324)	(19,388)
Purchases of investments, net		(9,398)	(4,777)	(23,448)
Cash paid for acquisitions, net of cash acquired	(5)	(172,832)	(50,549)	(90,490)
Purchases of short-term investments	(7)	(568,002)	(450,564)	(496,304)
Proceeds from redemptions of short-term investments	(7)	691,765	189,006	533,847
Proceeds from divestiture	(5)	16,394	—	—
Cash paid for collateral asset	(13)	(3,461)	(20,707)	(1,200)
Other investing activities		(15,059)	(2,310)	(7,600)
Net cash used in investing activities		(211,356)	(464,264)	(179,056)
Cash flows from financing activities:				
Proceeds from long-term debt, net of issuance costs	(15)	—	329,875	—

Proceeds from issuance of cash convertible notes, net of issuance costs	(15)	494,879	394,391	—
Purchase of call option related to cash convertible notes	(15)	(97,277)	(73,646)	—
Proceeds from issuance of warrants, net of issuance costs	(17)	72,406	45,396	—
Capital repayment	(17)	—	(243,945)	—
Repayment of long-term debt	(15)	—	—	(6,738)
Principal payments on capital leases		(1,308)	(1,402)	(1,322)
Excess tax benefits from share-based compensation		—	—	782
Proceeds from issuance of common shares		4,412	6,075	6,269
Purchase of treasury shares	(17)	(104,685)	(60,970)	—
Other financing activities		(8,019)	(8,587)	(9,595)
Net cash provided by (used in) financing activities		360,408	387,187	(10,604)
Effect of exchange rate changes on cash and cash equivalents		(7,183)	8,832	(2,773)
Net increase in cash and cash equivalents		501,365	218,534	149,169
Cash and cash equivalents, beginning of period		657,714	439,180	290,011
Cash and cash equivalents, end of period		\$ 1,159,079	\$ 657,714	\$ 439,180
Supplemental cash flow disclosures:				
Cash paid for interest		\$ 25,902	\$ 20,252	\$ 18,227
Cash paid for income taxes		\$ 29,317	\$ 40,499	\$ 22,670
Supplemental disclosure of non-cash investing activities:				
Equipment purchased through capital lease		\$ —	\$ 88	\$ 113

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

FINANCIAL RESULTS

Notes to consolidated financial statements December 31, 2018

1. Corporate Information and Basis of Presentation

Corporate Information

QIAGEN N.V. is a public limited liability company ('naamloze vennootschap') under Dutch law with registered office at Hulsterweg 82, 5912 PL Venlo, The Netherlands. QIAGEN N.V., a Netherlands holding company, and subsidiaries (we, our or the Company) is the leading global provider of Sample to Insight solutions that are used by over 500,000 customers worldwide to transform biological samples into valuable molecular insights. Our sample technologies are used to isolate and process DNA, RNA and proteins - the building blocks of life - from blood, tissue and other materials. Assay technologies are used to make these biomolecules visible and ready for analysis. Bioinformatics software and knowledge bases are used to analyze and interpret complex genomic data to report relevant, actionable insights. Automation solutions are used to tie these technologies together in seamless and cost-effective workflows. We provide this portfolio to four major customer classes: Molecular Diagnostics (human healthcare), Applied Testing (forensics and food safety), Pharma (pharmaceutical and biotechnology companies) and Academia (life sciences research). With approximately 5,000 employees in over 35 locations worldwide, we market our products in more than 130 countries.

Basis of Presentation

The accompanying consolidated financial statements were prepared in accordance with U.S. generally accepted accounting principles (GAAP) and all amounts are presented in U.S. dollars rounded to the nearest thousand, unless otherwise indicated. The consolidated financial statements have been prepared on a historical cost basis, except for derivative financial instruments, contingent consideration and available-for-sale financial instruments that have been measured at fair value.

We undertake acquisitions to complement our own internal product development activities. On April 27, 2018, we acquired all shares in STAT-Dx Life, S.L. (STAT-Dx), a privately-held company located in Barcelona, Spain and on April 19, 2018, we acquired all remaining shares of a privately held entity in which we held a minority interest. On January 6, 2017, we acquired OmicSoft Corporation, located in Cary, North Carolina (U.S.) and on June 28, 2016, we acquired Exiqon A/S, located in Vedbaek, Denmark. Accordingly, at their respective acquisition dates, all the assets acquired and liabilities assumed were recorded at their respective fair values and our consolidated results of operations include the operating results from the acquired companies from the acquisition dates.

2. Effects of New Accounting Pronouncements

Adoption of New Accounting Standards

The following new Financial Accounting Standards Board (FASB) Accounting Standards Updates (ASU) were effective for the year ended December 31, 2018.

ASU 2014-09, Revenue from Contracts with Customers (Topic 606) affects any entity that either enters into contracts with customers to transfer goods or services or enters into contracts for the transfer of nonfinancial assets unless those contracts are within the scope of other standards (e.g., insurance contracts or lease contracts). In August 2015, the FASB issued Accounting Standards Update No. 2015-14 (ASU 2015-14), Revenue from Contracts with Customers (Topic 606): Deferral of the Effective Date which defers the effective date of ASU 2014-09 to interim and annual reporting periods beginning after December 15, 2017. The FASB has continued to issue accounting standard updates to clarify and provide implementation guidance related to Revenue from Contracts with Customers, including ASU 2016-08 Revenue from Contract with Customers: Principal versus Agent Considerations, ASU 2016-10 Revenue from Contracts with Customers: Identifying Performance Obligations and Licensing, ASU 2016-12 Revenue from Contracts with Customers: Narrow-Scope Improvements and Practical Expedients, and ASU 2016-20 Technical Corrections and Improvements to Topic 606, Revenue from Contracts with Customers.

We adopted Topic 606 Revenue from Contracts with Customers with a date of initial application of January 1, 2018. The comparative information has not been adjusted and continues to be reported under ASC Topic 605 Revenue Recognition. As a result, we changed our accounting policy for revenue recognition as detailed below.

We applied Topic 606 using the "modified retrospective method" by recognizing the effect of initially applying Topic 606 as an \$1.3 million adjustment to the opening balance of retained earnings at January 1, 2018, for all contracts not completed at January 1, 2018. The details of the changes and quantitative impact are discussed in Note 4 "Revenue".

ASU 2016-01, Financial Instruments - Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities will impact certain aspects of recognition, measurement, presentation and disclosure of financial instruments. In February 2018, the FASB issued ASU No. 2018-03, Technical Corrections and Improvements to Financial Instruments—Overall (Subtopic 825-10), which clarified certain aspects of the previously issued ASU 2016-01. The new guidance makes targeted improvements to existing U.S. GAAP by:

- › requiring equity investments (except those accounted for under the equity method of accounting, or those that result in consolidation of the investee) to be measured at fair value with changes in fair value recognized in net income;
- › requiring public business entities to use the exit price notion when measuring the fair value of financial instruments for disclosure purposes;
- › requiring separate presentation of financial assets and financial liabilities by measurement category and form of financial asset (i.e., securities or loans and receivables) on the balance sheet or the accompanying notes to the financial statements;
- › eliminating the requirement for public business entities to disclose the method(s) and significant assumptions used to estimate the fair value that is required to be disclosed for financial instruments measured at amortized cost on the balance sheet; and
- › requiring a reporting organization to present separately in other comprehensive income the portion of the total change in the fair value of a liability resulting from a change in the instrument-specific credit risk (also referred to as "own credit") when the organization has elected to measure the liability at fair value in accordance with the fair value option for financial instruments.

The amendments became effective for our financial statements beginning in the first quarter of 2018 and require adoption using a cumulative-effect adjustment to the balance sheet as of the beginning of the fiscal year of adoption. Accordingly, upon adoption, we recorded a cumulative effect adjustment to decrease opening retained earnings at January 1, 2018, by \$0.9 million as required for our equity investments recorded at fair value. The implementation of the amendments is expected to increase the volatility of net income as gains or losses in future periods will be

recognized in net income; however, the extent of any volatility will be dependent upon the significance of the equity investments.

ASU No. 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments (a consensus of the FASB Emerging Issues Task Force), addresses eight classification issues related to the statement of cash flows:

- › debt prepayment or debt extinguishment costs;
- › settlement of zero-coupon bonds;
- › contingent consideration payments made after a business combination;
- › proceeds from the settlement of insurance claims;
- › proceeds from the settlement of corporate-owned life insurance policies, including bank-owned life insurance policies;
- › distributions received from equity method investees;
- › beneficial interests in securitization transactions; and
- › separately identifiable cash flows and application of the predominance principle.

We adopted ASU 2016-15 on January 1, 2018 without any impact from the adoption on our consolidated financial statements.

ASU 2016-16, Income Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory, aims to improve the accounting for the income tax consequences of intra-entity transfers of assets other than inventory. This amendment requires an entity to recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs. We adopted ASU 2016-16 on a modified retrospective basis resulting in a cumulative-effect reclassification of \$16.1 million for unrecognized income tax effects related to intra-entity transfers of fixed assets and intellectual property rights that occurred prior to adoption from other current and non-current assets to opening retained earnings as of January 1, 2018.

ASU 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash, requires entities to show the changes in the total of cash, cash equivalents, restricted cash and restricted cash equivalents in the statement of cash flows. As a result, entities will no longer present transfers between cash and cash equivalents and restricted cash and restricted cash equivalents in the statement of cash flows. We adopted ASU 2016-18 on January 1, 2018, using a retrospective transition method to each period presented. There is no impact from the adoption of ASU 2016-18 on our consolidated financial statements.

ASU 2017-01, Business Combinations (Topic 805): Clarifying the Definition of a Business, clarifies and provides a more robust framework to use in determining when a set of assets and activities is a business. The amendments in this update should be applied prospectively on or after the effective date. We adopted this update beginning January 1, 2018, without impact.

ASU 2017-09, Compensation-Stock Compensation (Topic 718): Scope of Modification Accounting, clarifies when to account for a change to the terms or conditions of a share-based payment award as a modification. Under the new guidance, modification accounting is required only if the fair value, the vesting conditions, or the classification of the award (as equity or liability) changes as a result of the change in terms or conditions. The guidance is effective prospectively and we adopted ASU 2017-09 as of January 1, 2018.

ASU 2018-02, Income Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income, permits companies to reclassify the stranded tax effects of the U.S. Tax Cuts and Jobs Act on items within accumulated other comprehensive income to retained earnings. This ASU is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. Early adoption is permitted. We early adopted ASU 2018-02 as of April 1, 2018, with no impact as we had no stranded tax effects.

ASU 2018-07, Compensation-Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting, largely aligns the accounting for share-based payment awards issued to employees and nonemployees. ASU 2018-07 is effective for annual periods beginning January 1, 2019. Early adoption is permitted. We early adopted ASU 2018-07 as of July 1, 2018, without material impact.

New Accounting Standards Not Yet Adopted

The following new FASB Accounting Standards Updates, which are not yet adopted as of December 31, 2018, have been grouped by their required effective dates:

First Quarter of 2019

ASU 2016-02, Leases (Topic 842) aims to increase transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheet and disclosing key information about leasing arrangements. ASU 2016-02 is effective for us beginning in the first quarter of 2019. ASU 2018-10, Codification Improvements to Topic 842, Leases, ASU 2018-11, Leases (Topic 842), Targeted Improvements, and ASU 2018-20, Leases (Topic 842), Narrow-Scope Improvements for Lessors, are also effective at the time of adoption of ASU 2016-02. We adopted these standards as per the effective date of January 1, 2019, using the modified retrospective approach and will not restate comparative periods. Under this approach, the cumulative effect of initially applying the standard will be recognized as an adjustment to the opening balance of retained earnings on the date of initial application. As permitted under the transition guidance, we will carry forward the assessment of whether our contracts contain or are leases, classification of our leases and remaining lease terms. Based on our portfolio of leases as of December 31, 2018, approximately \$57 million of lease assets and liabilities will be recognized on our balance sheet upon adoption, primarily relating to leased office space.

ASU 2017-12, Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities, will make more financial and nonfinancial hedging strategies eligible for hedge accounting. It also amends the presentation and disclosure requirements and changes how companies assess effectiveness. It is intended to more closely align hedge accounting with companies' risk management strategies, simplify the application of hedge accounting, and increase transparency as to the scope and results of hedging programs. The new guidance became effective for us beginning on January 1, 2019 by applying a modified retrospective approach to existing hedging relationships as of the adoption date. Under the modified retrospective approach, entities with cash flow or net investment hedges will make (1) a cumulative-effect adjustment to accumulated other comprehensive income so that the adjusted amount represents the cumulative change in the hedging instruments' fair value since hedge inception (less any amounts that should have been recognized in earnings under the new accounting model) and (2) a corresponding adjustment to opening retained earnings as of the most recent period presented on the date of adoption. We adopted ASU 2017-12 on January 1, 2019 without any cumulative effect.

First Quarter of 2020

ASU 2016-13, Financial Instruments-Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments, provides financial statement users with more decision-useful information about the expected credit losses on financial instruments and other commitments to extend credit held by a reporting entity at each reporting date. To achieve this objective, the amendments in ASU 2016-13 replace the incurred loss impairment methodology in current GAAP with a methodology that reflects expected credit losses and requires consideration of a broader range of

reasonable and supportable information to inform credit loss estimates. The FASB has continued to issue accounting standard updates to clarify and provide implementation guidance including ASU 2018-19, Codification Improvements to Topic 326, Financial Instruments - Credit Losses. The new guidance will become effective for us by applying the standard's provisions as a cumulative-effect adjustment to retained earnings beginning on January 1, 2020. We are currently evaluating the potential impact Topic 326 may have on our consolidated financial statements and disclosures.

ASU 2017-04, Intangibles—Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment, removes Step 2 of the goodwill impairment test. A goodwill impairment will now be the amount by which a reporting unit's carrying value exceeds its fair value, not to exceed the carrying amount of goodwill. ASU 2017-04 is effective for us for annual periods beginning January 1, 2020 and early adoption is permitted. The new guidance is required to be applied on a prospective basis. We adopted ASU 2017-04 on January 1, 2019 and will apply the new guidance prospectively as required.

ASU 2018-13, Fair Value Measurement (Topic 820): Disclosure Framework, provides guidance that eliminates, adds and modifies certain disclosure requirements for fair value measurements. ASU 2018-13 is effective for us for annual periods beginning January 1, 2020. Entities are permitted to early adopt either the entire standard or only the provisions that eliminate or modify the requirements. We adopted ASU 2018-13 on January 1, 2019 and will apply the new guidance to disclosures as required beginning in 2019.

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, provides guidance on a customer's accounting for implementation, set-up, and other upfront costs incurred in a cloud computing arrangement that is hosted by the vendor, i.e. a service contract. Under the new guidance, customers will apply the same criteria for capitalizing implementation costs as they would for an arrangement that has a software license. ASU 2018-15 is effective for us for annual periods beginning January 1, 2020, and early adoption is permitted and should be applied either retrospectively or prospectively to all implementation costs incurred after the date of adoption. We early adopted ASU 2018-15 on January 1, 2019, and will apply the guidance to all implementation costs prospectively.

ASU 2018-18, Collaborative Arrangements (Topic 808): Clarifying the Interaction between Topic 808 and Topic 606, precludes an entity from presenting consideration from a transaction in a collaborative arrangement as revenue from contracts with customers if the counterparty is not a customer of that transaction. The guidance amends ASC 808 to refer to unit-of-account guidance in ASC 606 and requires it to be used only when assessing whether a transaction is in the scope of ASC 606. ASU 2018-18 is effective for us for annual periods beginning on January 1, 2020. Early adoption is permitted for entities that have adopted ASC 606. Entities are required to apply the amendments retrospectively to the date they initially applied ASC 606. We are currently evaluating the potential impact ASU 2018-18 may have on our consolidated financial statements.

ASU 2018-17, Consolidation (Topic 810): Targeted Improvements to Related Party Guidance for Variable Interest Entities, amends how a decision maker or service provider determines whether its fee is a variable interest entity (VIE) when a related party under common control also has an interest in the VIE. We adopted ASU 2018-17 on January 1, 2019, without impact.

3. Summary of Significant Accounting Policies and Critical Accounting Estimates

Principles of Consolidation

The consolidated financial statements include the accounts of QIAGEN N.V. and its wholly-owned subsidiaries. All significant intercompany accounts and transactions have been eliminated. Investments in either common stock or in substance common stock of companies where we exercise significant influence over the operations but do not have control, and where we are not the primary beneficiary, are accounted for using the equity method. All other investments are accounted for as discussed under "Non-marketable Investments" below. When there is a portion of equity in an acquired subsidiary not attributable, directly or indirectly, to the Company, we record the fair value of the noncontrolling interests at the acquisition date and classify the amounts attributable to noncontrolling interests separately in equity in the consolidated financial statements. Any subsequent changes in the Company's ownership interest while the Company retains its controlling financial interest in its subsidiary are accounted for as equity transactions.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities and disclosure of contingencies at the date of the financial statements as well as the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Concentrations of Risk

We buy materials for products from many suppliers, and are not dependent on any one supplier or group of suppliers for the business as a whole. However, key components of certain products, including certain instrumentation components and chemicals, are available only from a single source. If supplies from these vendors were delayed or interrupted for any reason, we may not be able to obtain these materials timely or in sufficient quantities in order to produce certain products and sales levels could be negatively affected. Additionally, our customers include researchers at pharmaceutical and biotechnology companies, academic institutions, and government and private laboratories. Fluctuations in the research and development budgets of these researchers and their organizations for applications in which our products are used could have a significant effect on the demand for our products.

The financial instruments used in managing our foreign currency, equity and interest rate exposures have an element of risk in that the counterparties may be unable to meet the terms of the agreements. We attempt to minimize this risk by limiting the counterparties to a diverse group of highly-rated international financial institutions. The carrying values of our financial instruments incorporate the non-performance risk by using market pricing for credit risk. However, we have no reason to believe that any counterparties will default on their obligations. In order to minimize our exposure with any single counterparty, we have entered into master agreements which allow us to manage the exposure with the respective counterparty on a net basis.

Other financial instruments that potentially subject us to concentrations of credit risk are cash and cash equivalents, short-term investments, and accounts receivable. We attempt to minimize the risks related to cash and cash equivalents and short-term investments by dealing with highly-rated financial institutions and investing in a broad and diverse range of financial instruments. We have established guidelines related to credit quality and maturities of investments intended to maintain safety and liquidity. Concentration of credit risk with respect to accounts receivable is limited due to a large and diverse customer base, which is dispersed over different geographic areas. Allowances are maintained for potential credit losses and such losses have historically been within expected ranges.

Foreign Currency Translation

Our reporting currency is the U.S. dollar and the functional currencies of our subsidiaries are generally the local currency of the respective countries in which they are headquartered. All amounts in the financial statements of entities whose functional currency is not the U.S. dollar are translated into U.S. dollar equivalents at exchange rates as follows: (1) assets and liabilities at period-end rates, (2) income statement accounts at average exchange rates for

the period, and (3) components of equity at historical rates. Translation gains or losses are recorded in equity, and transaction gains and losses are reflected in net income as a component of other expense, net. Realized gains or losses on the value of derivative contracts entered into to hedge the exchange rate exposure of receivables and payables are also included in net income as a component of other expense, net. The net (loss) gain on foreign currency transactions was \$(12.3) million, \$(3.3) million, and less than \$0.1 million in 2018, 2017 and 2016, respectively, and is included in other expense, net.

The exchange rates of key currencies were as follows:

(US\$ equivalent for one)	Closing rate at December		Annual average rate		
	2018	2017	2018	2017	2016
Euro (EUR)	1.1450	1.1993	1.1813	1.1292	1.1068
Pound Sterling (GBP)	1.2800	1.3517	1.3356	1.2882	1.3560
Swiss Franc (CHF)	1.0161	1.0249	1.0228	1.0156	1.0153
Australian Dollar (AUD)	0.7059	0.7815	0.7478	0.7666	0.7439
Canadian Dollar (CAD)	0.7337	0.7975	0.7719	0.7710	0.7552
Japanese Yen (JPY)	0.0091	0.0089	0.0091	0.0089	0.0092
Chinese Yuan (CNY)	0.1454	0.1537	0.1514	0.1480	0.1506

Segment Information

We determined that we operate as one operating segment in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Topic 280, Segment Reporting. Our chief operating decision maker (CODM) makes decisions based on the Company as a whole. In addition, we have a common basis of organization and types of products and services which derive revenues and consistent product margins. Accordingly, we operate and make decisions as one reporting unit.

Revenue Recognition

Beginning January 1, 2018, we recognize revenues when control of promised goods or services transfers to our customers in an amount that reflects the consideration that is expected to be received in exchange for those goods or services. The majority of our sales revenue continues to be recognized when products are shipped to the customers. Prior to January 1, 2018, payments for milestones, generally based on the achievement of substantive and at-risk performance criteria, were recognized in full at such time as the specified milestone had been achieved according to the terms of the agreement. See Note 4 "Revenue".

Warranty

We provide warranties on our products against defects in materials and workmanship for a period of 1 year. A provision for estimated future warranty costs is recorded in cost of sales at the time product revenue is recognized. Product warranty obligations are included in accrued and other current liabilities in the accompanying consolidated balance sheets.

Research and Development

Research and product development costs are expensed as incurred. Research and development expenses consist primarily of salaries and related expenses, facility costs, and amounts paid to contract research organizations and laboratories for the provision of services and materials as well as costs for internal use or clinical trials.

Government Grants

We recognize government grants when there is reasonable assurance that all conditions will be complied with and the grant will be received. Our government grants generally represent subsidies for specified activities and are therefore recognized when earned as a reduction of the expenses recorded for the activity that the grants are intended to compensate. Thus, when the grant relates to research and development expense, the grant is recognized over the same period that the related costs are incurred. Otherwise, amounts received under government grants are recorded as liabilities in the balance sheet. When the grant relates to an asset, the nominal amount of the grant is deducted from the carrying amount of the asset and recognized over the same period that the related asset is depreciated.

Borrowing Costs

Borrowing costs directly attributable to the acquisition, construction or production of an asset that takes a substantial period of time to get ready for its intended use or sale are capitalized as part of the cost of the respective assets (qualifying asset) when such borrowing costs are significant. All other borrowing costs are expensed in the period they occur.

Shipping and Handling Income and Costs

Shipping and handling costs charged to customers are recorded as revenue in the period that the related product sale revenue is recorded. Associated costs of shipping and handling are included in sales and marketing expenses. For the years ended December 31, 2018, 2017 and 2016, shipping and handling costs totaled \$28.4 million, \$28.6 million and \$26.5 million, respectively.

Advertising Costs

The costs of advertising are expensed as incurred and are included as a component of sales and marketing expense. Advertising costs for the years ended December 31, 2018, 2017 and 2016 were \$8.1 million, \$7.2 million and \$8.4 million, respectively.

General and Administrative, Restructuring, Integration and Other

General and administrative expenses primarily represent the costs required to support administrative infrastructure. In addition, we incur indirect acquisition and business integration costs in connection with business combinations. These costs represent incremental costs that we believe would not have been incurred absent the business combinations. Major components of these costs include consulting and related fees incurred to integrate or restructure the acquired operations, payroll and related costs for employees remaining with the Company on a transitional basis and public relations, advertising and media costs for re-branding of the combined organization.

Restructuring costs include personnel costs (principally termination benefits), facility closure and contract termination costs. Termination benefits are accounted for in accordance with FASB ASC Topic 712, Compensation - Nonretirement Postemployment Benefits, and are recorded when it is probable that employees will be entitled to benefits and the amounts can be reasonably estimated. Estimates of termination benefits are based on the frequency of past termination benefits, the similarity of benefits under the current plan and prior plans, and the existence of statutory required minimum benefits. Facility closure, some termination benefits and other costs are accounted for in accordance with FASB ASC Topic 420, Exit or Disposal Cost Obligations and are recorded when the liability is incurred. The specific restructuring measures and associated estimated costs are based on management's best business judgment under the existing circumstances at the time the estimates are made. If future events require changes to these estimates, such adjustments will be reflected in the period of the revised estimate.

Income Taxes

We account for income taxes under the liability method. Under this method, total income tax expense is the amount of income taxes expected to be payable for the current year plus the change from the beginning of the year for deferred income tax assets and liabilities established for the expected further tax consequences resulting from differences in the financial reporting and tax basis of assets and liabilities. Deferred tax assets and/or liabilities are determined by multiplying the differences between the financial reporting and tax reporting bases for assets and liabilities by the enacted tax rates expected to be in effect when such differences are recovered or settled. Deferred tax assets are reduced by a valuation allowance to the amount more likely than not to be realized. The effect on deferred taxes of a change in tax rates is recognized in income in the period that includes the enactment date.

Tax benefits are initially recognized in the financial statements when it is more likely than not that the position will be sustained upon examination by the tax authorities. Such tax positions are initially and subsequently measured as the largest amount of tax benefit that is greater than 50 percent likely of being realized upon settlement with the taxing authority using the cumulative probability method, assuming the tax authority has full knowledge of the position and all relevant facts. Our policy is to recognize interest accrued related to unrecognized tax benefits in interest expense and penalties within the income tax expense.

Derivative Instruments

We enter into derivative financial instrument contracts to minimize the variability of cash flows or income statement impact associated with the anticipated transactions being hedged or to hedge fluctuating interest rates. As changes in foreign currency or interest rate impact the value of anticipated transactions, the fair value of the forward or swap contracts also changes, offsetting foreign currency or interest rate fluctuations. Derivative instruments are recorded on the balance sheet at fair value. Changes in fair value of derivatives are recorded in current earnings or other comprehensive income, depending on whether a derivative is designated as part of a hedge transaction.

Share-Based Payments

Compensation cost for all share-based payments is recorded based on the grant date fair value, less an estimate for pre-vesting forfeitures, recognized in expense over the service period using an accelerated method.

Forfeiture Rate—This is the estimated percentage of grants that are expected to be forfeited or canceled on an annual basis before becoming fully vested. We estimated the forfeiture rate based on historical forfeiture experience.

Restricted Stock Units and Performance Stock Units: Restricted stock units and performance stock units represent rights to receive Common Shares at a future date. The fair market value of restricted and performance stock units is determined based on the number of stock units granted and the fair market value of our shares on the grant date. The fair market value at the time of the grant, less an estimate for pre-vesting forfeitures, is recognized in expense over the vesting period. At each reporting period, the estimated performance achievement of the performance stock units is assessed and any change in the estimated achievement is recorded on a cumulative basis in the period of adjustment.

Cash and Cash Equivalents

Cash and cash equivalents consist of cash on deposit in banks and other cash invested temporarily in various instruments that are short-term and highly liquid, and having an original maturity of less than 90 days at the date of purchase.

(in thousands)	2018	2017
Cash at bank and on hand	\$ 208,083	\$ 139,597
Short-term bank deposits	950,996	518,117
Cash and Cash Equivalents	\$ 1,159,079	\$ 657,714

Short-Term Investments

Short-term investments are classified as “available for sale” and stated at fair value, which is equivalent to the amortized cost, in the accompanying balance sheet. Interest income is accrued when earned and changes in fair market values are reflected in other income (expense), net. The amortization of premiums and accretion of discounts to maturity arising from acquisition is included in interest income. A decline in fair value that is judged to be other-than-temporary is accounted for as a realized loss and the write-down is included in the consolidated statements of income. Realized gains and losses, determined on a specific identification basis on the sale of short-term investments, are included in income.

Fair Value of Financial Instruments

The carrying amount of cash and cash equivalents, notes receivable, accounts receivable, accounts payable and accrued liabilities approximate their fair values because of the short maturities of those instruments. The carrying value of our variable rate debt and capital leases approximates their fair values because of the short maturities and/or interest rates which are comparable to those available to us on similar terms. The fair values of the Cash Convertible Notes are based on an estimation using available over-the-counter market information. The fair values of the Private Placement Senior Notes were estimated using the changes in the U.S. Treasury rates and the fair value of the German Private Placement is based on an estimation using changes in the euro swap rates.

Accounts Receivable

Our accounts receivable are unsecured and we are at risk to the extent such amounts become uncollectible. We continually monitor accounts receivable balances, and provide for an allowance for doubtful accounts at the time collection becomes questionable based on payment history or age of the receivable. Amounts determined to be uncollectible are written off against the reserve. For the years ended December 31, 2018, 2017 and 2016, write-offs of accounts receivable totaled \$2.8 million, \$3.2 million and \$1.6 million, respectively, while provisions for doubtful accounts which were charged to expense totaled \$4.4 million, \$3.1 million and \$2.1 million, respectively. For all years presented, no single customer represented more than ten percent of accounts receivable or consolidated net sales.

Inventories

Inventories are stated at the lower of cost or net realizable value, determined on either a weighted average cost basis or a standard cost basis which is regularly adjusted to actual. Inventories include material, direct labor and overhead costs and are reduced for estimated obsolescence. Inventories consisted of the following as of December 31, 2018 and 2017:

(in thousands)	2018	2017
Raw materials	\$ 25,819	\$ 23,717
Work in process	38,659	33,153
Finished goods	98,434	99,057
Total inventories, net	\$ 162,912	\$ 155,927

Property, Plant and Equipment

Property, plant and equipment, including equipment acquired under capital lease obligations, are stated at cost less accumulated amortization. Capitalized internal-use software costs include only those direct costs associated with the actual development or acquisition of computer software solely to meet internal needs and cloud-based applications to deliver our service and comprise costs associated with the design, coding, installation and testing of the system. Costs associated with preliminary development, such as the evaluation and selection of alternatives, as well as training, maintenance and support are expensed as incurred. Costs for software to be sold, leased or otherwise marketed that are related to the conceptual formulation and design are expensed as incurred. Costs incurred to produce software products and the software components of products to be sold, leased or marketed after technological feasibility is established are capitalized and amortized in accordance with the accounting standards for the costs of software to be sold, leased, or otherwise marketed. All other depreciation is computed using the straight-line method over the estimated useful lives of the assets (3 to 40 years). Amortization of leasehold improvements is computed on a straight-line basis over the lesser of the remaining life of the lease or the estimated useful life of the improvement asset. We have a policy of capitalizing expenditures that materially increase assets' useful lives and charging ordinary maintenance and repairs to operations as incurred. When property or equipment is disposed of, the cost and related accumulated depreciation and amortization are removed from the accounts and any gain or loss is included in earnings.

Acquired Intangibles and Goodwill

Acquired intangibles with alternative future uses are carried at cost less accumulated amortization and consist of licenses to technology held by third parties and other acquired intangible assets. Amortization is computed over the estimated useful life of the underlying patents, which has historically ranged from 1 to 20 years. Purchased intangible assets acquired in business combinations, other than goodwill, are amortized over their estimated useful lives unless these lives are determined to be indefinite. Intangibles are assessed for recoverability considering the contract life and the period of time over which the intangible will contribute to future cash flow. The unamortized cost of intangible assets, where cash flows are independent and identifiable from other assets, is evaluated periodically and adjusted, if necessary, if events and circumstances indicate that a decline in value below the carrying amount has occurred. For the year ended December 31, 2016, we recorded intangible asset impairments of \$21.4 million. Intangible asset impairments recorded during the year ended December 31, 2016 are further discussed in Note 6 "Restructuring".

Amortization expense related to developed technology and patent and license rights which have been acquired in a business combination is included in cost of sales. Amortization of trademarks, customer base and non-compete agreements which have been acquired in a business combination is recorded in operating expense under the caption 'acquisition-related intangible amortization'. Amortization expenses of intangible assets not acquired in a business combination are recorded within either the cost of sales, research and development or sales and marketing line items based on the use of the asset.

The fair value of in-process research and development (IPR&D) acquired in a business combination is capitalized as an indefinite-lived intangible asset until completion or abandonment of the related research and development activities. IPR&D is tested for impairment annually or when any event or circumstance indicates that the fair value may be below the carrying value. If and when research and development is complete, the associated asset is amortized over the estimated useful life.

Goodwill represents the difference between the purchase price and the estimated fair value of the net assets acquired arising from business combinations. Goodwill is subject to impairment tests annually or earlier if indicators of potential impairment exist, using a fair-value-based approach. We have elected to perform our annual test for indications of impairment as of October 1st of each year. Following the annual impairment tests for the years ended December 31, 2018, 2017 and 2016, goodwill has not been impaired. As discussed in Note 6 "Restructuring", in 2016 we recorded a \$2.6 million disposal of goodwill associated to the 2016 restructuring initiative.

Non-Marketable Investments

We have investments in non-marketable equity securities issued by privately held companies. These investments are included in other long-term assets in the accompanying consolidated balance sheets. Non-marketable investments through which we exercise significant influence but do not have control are accounted for using the equity method. We monitor for changes in circumstances that may require a reassessment of the level of influence. Following the adoption of ASU 2016-01 on January 1, 2018, our non-marketable equity securities not accounted for under the equity method are either carried at fair value or under the measurement alternative. Under the measurement alternative, the carrying value is measured at cost, less any impairment, plus or minus changes resulting from observable price changes in orderly transactions for identical or similar investments of the same issuer. Adjustments are determined primarily based on a market approach as of the transaction date.

Investments are evaluated periodically, or when impairment indicators are noted, to determine if declines in value are other-than-temporary. In making that determination, we consider all available evidence relating to the realizable value of a security. This evidence includes, but is not limited to, the following:

- › adverse financial conditions of a specific issuer, segment, industry, region or other variables;
- › the length of time and the extent to which the fair value has been less than cost; and
- › the financial condition and near-term prospects of the issuer.

We consider whether the fair values of any of our non-marketable investments have declined below their carrying value whenever adverse events or changes in circumstances indicate that recorded values may not be recoverable. If any such decline is considered to be other than temporary (based on various factors, including historical financial results, product development activities and the overall health of the affiliate's industry), then a write-down of the investment would be recorded in operating expense to its estimated fair value.

Variable Interest Entities

We evaluate at the inception of each arrangement whether we have made an investment in an entity that is considered a variable interest entity (VIE) or if we hold other variable interests in an arrangement that is considered a variable interest entity (VIE). We consolidate VIEs when we are the primary beneficiary. The primary beneficiary of a VIE is the party that meets both of the following criteria: (1) has the power to make decisions that most significantly affect the economic performance of the VIE; and (2) has the obligation to absorb losses or the right to receive benefits that in either case could potentially be significant to the VIE. Periodically, we assess whether any changes in our interest or relationship with the entity affect our determination of whether the entity is still a VIE and, if so, whether we are the primary beneficiary. If we are not the primary beneficiary in a VIE, we account for the investment or other variable interests in a VIE as an investment in a non-marketable investment or in accordance with other applicable GAAP.

Impairment of Long-Lived Assets

We review our long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset or a group of assets may not be recoverable. We consider, amongst other indicators, a history of operating losses or a change in expected sales levels to be indicators of potential impairment. Assets are grouped and evaluated for impairment at the lowest level for which there are identifiable cash flows that are largely independent of the cash flows of other groups of assets. If an asset is determined to be impaired, the loss is measured as the amount by which the carrying amount of the asset exceeds fair value which is determined by applicable market prices, when available. When market prices are not available, we generally measure fair value by discounting projected future cash flows of the asset. Considerable judgment is necessary to estimate discounted future cash flows. Accordingly, actual results could differ from such estimates.

4. Revenue

Accounting Policies

We adopted Topic 606 Revenue from Contracts with Customers with a date of initial application of January 1, 2018. The comparative information has not been adjusted and continues to be reported under ASC Topic 605 Revenue Recognition. As a result, we changed our accounting policy for revenue recognition as detailed below.

We applied Topic 606 using the modified retrospective method by recognizing the effect of initially applying Topic 606 as an \$1.3 million adjustment to the opening balance of retained earnings at January 1, 2018 for all contracts not completed at January 1, 2018. The following table presents the impact from the adoption of Topic 606 on our consolidated balance sheet:

(in thousands)	Balance at December 31, 2017	Topic 606 Adjustments	Balance at January 1, 2018
Accounts receivable	\$ 329,138	\$ 160	\$ 329,298
Accrued and other current liabilities	\$ 244,114	\$ 765	\$ 244,879
Long-term deferred income tax assets	\$ 39,353	\$ 701	\$ 40,054
Retained earnings	\$ 1,247,945	\$ (1,306)	\$ 1,246,639

The adoption of Topic 606 resulted in higher revenues of \$9.4 million for the year ended December 31, 2018, respectively, following primarily the change in the timing of the recognition of milestone payments. The following table summarizes the impacted line items from our consolidated statements of income for the year ended December 31, 2018:

(in thousands, except per share amounts)	Twelve months ended December 31, 2018 under previous standard	Effect of Topic 606	December 31, 2018 As Reported
Net sales	\$ 1,492,464	\$ 9,384	\$ 1,501,848
Income taxes	\$ 36,827	\$ (1,470)	\$ 35,357
Net income	\$ 182,466	\$ 7,914	\$ 190,380
Basic earnings per common share	\$ 0.81	\$ 0.03	\$ 0.84
Diluted earnings per common share	\$ 0.79	\$ 0.03	\$ 0.82

The impact from the adoption of Topic 606 on our consolidated balance sheet as of December 31, 2018 and consolidated statements of cash flows for the year ended December 31, 2018 was not material.

Nature of Goods and Services

Our revenues are reported net of sales and value added taxes and accruals for estimated rebates and returns and are derived primarily from the sale of consumable and instrumentation products, and to a much lesser extent, from the sale of services, intellectual property and technology. Revenue is recognized upon transfer of control of promised products or services to customers in an amount that reflects the consideration we expect to receive in exchange for those products or services. We enter into contracts that can include various combinations of products and services, which are generally distinct and accounted for as separate performance obligations. The transaction price is allocated to performance obligations based on their relative stand-alone selling prices.

We offer warranties on our products. Certain of our warranties are assurance-type in nature and do not cover anything beyond ensuring that the product is functioning as intended. Based on the guidance in Topic 606,

assurance-type warranties do not represent separate performance obligations. The Company also sells separately-priced service contracts which qualify as service-type warranties and represent separate performance obligations.

We sell our products and services both directly to customers and through distributors generally under agreements with payment terms typically less than 90 days and in most cases not exceeding one year and therefore contracts do not contain a significant financing component.

Consumable and Related Revenue

Consumable Products: In the last three years, revenue from consumable product sales has accounted for approximately 78-80% of our net sales and revenue is recognized when performance obligations under the terms of a contract with a customer are satisfied. The majority of our contracts have a single performance obligation to transfer a product or multiple performance obligations to transfer multiple products concurrently. Accordingly, we recognize revenue when control of the products has transferred to the customer, which is generally at the time of shipment of products as this is when title and risk of loss have been transferred. In addition, invoicing typically occurs at this time so this is when we have a present right to payment. Revenue is measured as the amount of consideration we expect to receive in exchange for transferring products and is generally based upon a negotiated formula, list or fixed price.

Related Revenue: Revenues from related products include software-as-a-service (SaaS), licenses, intellectual property and patent sales, royalties and milestone payments and over the last three years has accounted for approximately 7-9% of our net sales.

SaaS arrangements: Revenue from SaaS arrangements, which allow customers to use hosted software over the contract period without taking possession of the software, is recognized over the duration of the agreement unless the terms of the agreement indicate that revenue should be recognized in a different pattern, for example based on usage.

Licenses: Licenses for on-site software, which allow customers to use the software as it exists when made available, are sold as perpetual licenses or subscriptions. Revenue from on-site licenses are recognized upfront at the point in time at the later of when the software is made available to the customer and the beginning of the license term. When a portion of the transaction price is allocated to a performance obligation to provide support and/or updates, revenue is recognized as the updates/support are provided, generally over the life of the license. Fees from research collaborations include payments for technology transfer and access rights. Royalties from licensees of intellectual property are based on sales of licensed products and revenues are recognized at the later of (i) when the related sales occur, or (ii) when the performance obligation to which some or all of the royalty has been allocated has been satisfied (or partially satisfied).

Milestone Payments: At the inception of each companion diagnostic co-development arrangement that includes development milestone payments, which represent variable consideration, we evaluate whether the milestones are probable of being reached and estimate the amount to be included in the transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within our control, such as milestones which are achieved through regulatory approvals, are considered to be constrained and excluded from the transaction price until those approvals are received. Revenue is recognized following the input method as this is considered to best depict the timing of the transfer of control. This involves measuring actual hours incurred to date as a proportion of the total budgeted hours of the project. At the end of each subsequent reporting period, the proportion of completion is trued-up. We also re-evaluate the probability of achievement of development milestones and any related constraint on a periodic basis, and if necessary, adjust our estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect revenues and earnings in the period of adjustment.

Instruments

Revenue from instrumentation includes the instrumentation equipment, installation, training and other instrumentation services, such as extended warranty services or product maintenance contracts and over the last three years has accounted for approximately 12-13% of net sales. Revenue from instrumentation equipment is recognized when the customer obtains control of the instrument which is predominantly at the time of delivery or when title has transferred to the customer. Service revenue is recognized over the term of the service period as the customers benefit from the service throughout the service period. Revenue related to services performed on a time-and-materials basis is recognized when performed.

Contract Estimates

The majority of our revenue is derived from contracts (i) with an original expected length of one year or less and (ii) contracts for which we recognize revenue at the amount in which we have the right to invoice as product is delivered. We have elected the practical expedient not to disclose the value of remaining performance obligations associated with these types of contracts. In addition, we have elected the practical expedient not to disclose the value of remaining performance obligations associated with licenses of intellectual property for which payment is based on sales of the licensed products.

However, we have certain companion diagnostic co-development contracts to provide research and development activities in which our performance obligations extend over multiple years. As of December 31, 2018, we had \$36.6 million of remaining performance obligations for which the transaction price is not constrained related to these contracts of which we expect to recognize approximately 50% over the next 12 months and the remainder thereafter.

Revenue expected to be recognized in any future year related to remaining performance obligations, excluding revenue pertaining to contracts that have an original expected duration of one year or less, contracts where revenue is recognized as invoiced, contracts for licenses of intellectual property where payment is based on sales of the licensed products and contracts with variable consideration related to undelivered performance obligations, is not material. Additionally, revenue recognized in the reporting period from performance obligations satisfied, or partially satisfied, in a previous period, is not material.

Contract Balances

The timing of revenue recognition, billings and cash collections can result in billed accounts receivable, unbilled receivables (contract assets), and customer advances and deposits (contract liabilities) in the consolidated balance sheet.

Contract assets as of December 31, 2018 totaled \$6.9 million and are included in prepaid expenses and other current assets in the accompanying consolidated balance sheet and relate to the companion diagnostic co-development contracts discussed above. There were no material contract assets as of January 1, 2018.

Contract liabilities primarily relate to advances or deposits received from customers before revenue is recognized and is primarily related to instrument service and software subscription revenue. As of December 31, 2018 and January 1, 2018, the amount of deferred revenue reported as accrued and other current liabilities totaled to \$45.4 million and \$49.4 million, respectively, and \$9.0 million and \$6.2 million are reported as other long-term liabilities, respectively. During the year ended December 31, 2018, we satisfied the associated performance obligations and recognized revenue of \$44.5 million, respectively, related to advance customer payments previously received.

Practical Expedients and Accounting Policy Elections

We exclude from net sales any value add, sales and other taxes which we collect concurrent with revenue-producing activities. If we perform shipping and handling activities after the transfer of control to the customer (e.g., when control transfers prior to delivery), they are considered as fulfillment activities, and accordingly, the costs are accrued when the related revenue is recognized. As such, shipping and handling fees billed to customers in a sales transaction are recorded in net sales and shipping and handling costs incurred are recorded in sales and marketing expenses. We recognize the incremental costs of obtaining contracts (commissions) as an expense when incurred for contracts that have a duration of one year or less. There were no deferred contract costs recorded at December 31, 2018. We apply the practical expedient to not disclose information about remaining performance obligations from contracts that have original expected duration of one year or less, revenue that is recognized as invoiced and revenue that is recognized based on the sales of the licensed products.

Disaggregation of Revenue

We disaggregate our revenue based on product categories and customer class as shown in the tables below for the years ended December 31, 2018, 2017 and 2016:

	2018		
	Consumables and related	Instruments	Total
Molecular Diagnostics	\$ 649,602	\$ 82,197	\$ 731,799
Applied Testing	109,196	27,962	137,158
Pharma	258,487	32,061	290,548
Academia	298,174	44,169	342,343
Total	\$ 1,315,459	\$ 186,389	\$ 1,501,848

	2017		
(in thousands)	Consumables and related	Instruments	Total
Molecular Diagnostics	\$ 605,462	\$ 77,702	\$ 683,164
Applied Testing	106,380	30,654	137,034
Pharma	245,187	29,642	274,829
Academia	285,686	36,823	322,509
Total	\$ 1,242,715	\$ 174,821	\$ 1,417,536

	2016		
(in thousands)	Consumables and related	Instruments	Total
Molecular Diagnostics	\$ 572,300	\$ 76,874	\$ 649,174
Applied Testing	92,770	27,610	120,380
Pharma	226,367	31,089	257,456
Academia	274,694	36,287	310,981
Total	\$ 1,166,131	\$ 171,860	\$ 1,337,991

Refer to Note 20 "Segment Information" for disclosure of revenue by geographic region.

5. Acquisitions and Divestitures

Acquisitions have been accounted for as business combinations, and the acquired companies' results have been included in the accompanying consolidated statements of income from their respective dates of acquisition. Our acquisitions have historically been made at prices above the fair value of the acquired net assets, resulting in goodwill, due to expectations of synergies of combining the businesses. These synergies include use of our existing infrastructure, such as sales force, shared service centers, distribution channels and customer relations; to expand sales of an acquired business' products; use of the infrastructure of the acquired businesses to cost-effectively expand sales of our products; and elimination of duplicative facilities, functions and staffing.

2018 Acquisition

In April 2018, we acquired all shares in STAT-Dx Life, S.L. (STAT-Dx), a privately-held company located in Barcelona, Spain, which is developing the next generation of multiplex diagnostics for one-step, fully integrated molecular analysis of common syndromes using a novel system based on real-time PCR technology and proven QIAGEN chemistries.

The cash consideration totaled \$148.8 million. The acquisition included contingent consideration which is recorded as part of the purchase price based on the acquisition date fair value. Under the purchase agreement, potential contingent payments through 2022 total \$44.3 million, of which the fair value of \$37.4 million was recorded as purchase price using a probability-weighted analysis of the future milestones applying discount rates between 6.5% and 6.9%. For the year ended December 31, 2018, acquisition-related costs total \$7.1 million, of which \$4.8 million are included in general and administrative, restructuring, integration and other expenses, net and \$2.3 million are included in cost of sales in the accompanying consolidated statements of income.

The allocation of the purchase price is preliminary and is not yet finalized. The preliminary allocation of the purchase price is based upon preliminary estimates which used information that was available to management at the time the consolidated financial statements were prepared and these estimates and assumptions are subject to change within the measurement period, up to one year from the acquisition date. Accordingly, the allocation may change. We continue to gather information about the acquired tax balances.

The preliminary purchase price allocation as of December 31, 2018 differed from the initial preliminary purchase price allocation as follows:

(in thousands)	As of December 31, 2018	As of April 27, 2018	Difference
Purchase Price:			
Cash consideration	\$ 148,780	\$ 148,780	\$ —
Fair value of contingent consideration	37,377	36,751	626
	\$ 186,157	\$ 185,531	\$ 626
Preliminary Allocation:			
Cash and cash equivalents	\$ 7,357	\$ 7,357	\$ —
Prepaid expenses and other current assets	1,432	1,432	—
Inventories	1,868	1,868	—
Income tax receivables	2,213	2,213	—
Accounts payable	(1,412)	(1,412)	—
Accruals and other current liabilities	(1,785)	(560)	(1,225)
Fixed and other long-term assets	6,306	6,434	(128)
Developed technology	31,300	80,100	(48,800)
In-process research and development	24,300	—	24,300
Goodwill	117,621	97,268	20,353
Deferred tax liability on fair value of identifiable intangible assets acquired	(3,043)	(9,169)	6,126
Total	\$ 186,157	\$ 185,531	\$ 626

The in-process research and development recognized relates to technologies that remain in development and have not yet obtained regulatory approval. The technologies within in-process research and development are expected to be completed within the next two years.

The changes in the values of in-process research and development assets and developed technology relate to new information obtained regarding key assumptions in the valuation model since the initial purchase price allocation. This resulted in an immaterial impact to the amortization expense recorded during 2018. The weighted average amortization period for the developed technology is 10 years. The goodwill acquired is not deductible for tax purposes.

Revenue and earnings in the reporting periods since the acquisition date have not been significant. No pro forma financial information has been provided herein as the acquisition of STAT-Dx did not have a material impact to net sales, net income or earnings per share on a pro forma basis.

Other 2018 Acquisition

In April 2018, we acquired all remaining shares of a privately held entity in which we held a minority interest. The value of the minority interest investment was revalued in connection with the acquisition by \$4.8 million and a corresponding gain was recorded in general and administrative, restructuring, integration and other, net in the accompanying consolidated statement of income for the year ended December 31, 2018. The allocation of the purchase price is preliminary and is based upon preliminary estimates which used information that was available to management at the time the financial statements were prepared and these estimates and assumptions are subject to change within the measurement period, up to one year from the acquisition date. Accordingly, the allocation may change. We continue to gather information about the acquired tax balance. This acquisition was not significant to

the overall consolidated financial statements and the acquisition did not have a material impact to net sales, net income or earnings per share and therefore no pro forma information has been provided herein.

2017 Acquisition

In January 2017, we acquired OmicSoft Corporation, a leading provider of omics data management solutions located in Cary, North Carolina (U.S.). This acquisition was not significant to the overall consolidated financial statements and as of December 31, 2017, the allocation of the purchase price was final. The acquisition did not have a material impact to net sales, net income or earnings per share and therefore no pro forma information has been provided herein.

Divestitures

2018 Divestitures

In April 2018, we sold a portfolio of veterinary testing products for a total of €15.1 million (\$18.5 million), of which \$16.4 million was received in cash and the balance due in April 2020. An \$8.0 million gain was recorded on the sale to other income (expense), net in the accompanying consolidated statements of income for the year-ended December 31, 2018.

6. Restructuring

2017 Restructuring

During the fourth quarter of 2017, we initiated restructuring initiatives to mitigate the negative impacts stemming from the U.S. tax legislation as further discussed in Note 16 "Income Taxes". Total pre-tax costs for the program were \$25 million and no additional costs will be incurred related to this program. Cumulative costs for this program were as follows:

(in thousands)	Personnel Related	Contract and Other Costs	Inventory Write-offs & Asset Impairments	Total
Cost of sales	\$ —	\$ —	\$ 3,039	\$ 3,039
General and administrative, restructuring, integration and other, net	6,174	4,583	—	10,757
Total 2017 costs	6,174	4,583	3,039	13,796
Cost of sales	424	1,193	—	1,617
General and administrative, restructuring, integration and other, net	4,207	4,232	1,610	10,049
Total 2018 costs	4,631	5,425	1,610	11,666
Total cumulative costs	\$ 10,805	\$ 10,008	\$ 4,649	\$ 25,462

The following table summarizes the cash components of the restructuring activity.

(in thousands)	Personnel Related	Consulting Costs	Total
Costs incurred in 2017	\$ 6,174	\$ 4,583	\$ 10,757
Foreign currency translation adjustment	48	2	50
Liability at December 31, 2017	6,222	4,585	10,807
Additional costs in 2018	6,468	5,554	12,022
Release of excess accrual	(1,837)	(129)	(1,966)
Payments	(6,892)	(7,149)	(14,041)
Foreign currency translation adjustment	(141)	(17)	(158)
Liability at December 31, 2018	\$ 3,820	\$ 2,844	\$ 6,664

During 2018, fixed asset impairments of \$1.6 million were recorded in connection with this initiative and are included within general and administration, restructuring, integration and other in the accompanying consolidated statements of income. As of December 31, 2018 and 2017, liabilities of \$6.7 million and \$10.8 million, respectively, are included in accrued and other current liabilities in the accompanying consolidated balance sheets.

2016 Restructuring

During the fourth quarter of 2016, we initiated a series of targeted actions to support faster sales momentum and improve efficiency and accountability. The objective with these actions is to ensure that we grow sustainably and consistently in the coming years. Measures include simplifying our geographic presence with site reductions, focusing resources to shared service centers, and streamlining selected organizational structures. No additional costs will be incurred related to this program. Cumulative costs for this program were as follows:

(in thousands)	Personnel Related	Facility Related	Contract and Other Costs	Asset Impairments & Disposals	Total
Cost of sales	\$ 1,222	\$ 205	\$ 43	\$ 10,490	\$ 11,960
General and administrative, restructuring, integration and other, net	17,998	6,960	8,272	22,963	56,193
Other income (expense), net	—	—	—	10,946	10,946
Total 2016 costs	19,220	7,165	8,315	44,399	79,099
Cost of sales	1,141	—	238	—	1,379
General and administrative, restructuring, integration and other, net	8,399	350	9,612	—	18,361
Total 2017 costs	9,540	350	9,850	—	19,740
General and administrative, restructuring, integration and other, net	(343)	(838)	(546)	—	(1,727)
Total 2018 releases	(343)	(838)	(546)	—	(1,727)
Total cumulative costs	\$ 28,417	\$ 6,677	\$ 17,619	\$ 44,399	\$ 97,112

Personnel Related expenses during 2017 and 2016 includes reductions in costs of \$0.7 million and \$2.0 million, respectively, as a result of forfeitures of share-based compensation in connection with terminations. During the year ended December 31, 2016, Asset Impairments and Disposals include \$21.4 million for intangible asset impairments, \$10.9 million for fixed asset abandonments, and \$1.1 million primarily in connection with the write-off of prepaid contract costs. The total \$10.9 million of expense included in other income (expense), net in the accompanying consolidated statements of income is composed of \$8.3 million associated with an impairment of an equity method investment and a disposal of goodwill of \$2.6 million.

The following table summarizes the cash components of the restructuring activity.

(in thousands)	Personnel Related	Facility Related	Contract and Other Costs	Total
Liability at December 31, 2016	\$ 18,480	\$ 7,882	\$ 5,943	\$ 32,305
Additional costs in 2017	13,357	1,798	9,883	25,038
Release of excess accrual	(3,083)	(1,448)	(30)	(4,561)
Payments	(25,586)	(7,478)	(14,887)	(47,951)
Facility deferred rent reclassified to restructuring liability	—	241	—	241
Foreign currency translation adjustment	1,126	57	157	1,340
Liability at December 31, 2017	4,294	1,052	1,066	6,412
Release of excess accrual	(343)	(838)	(546)	(1,727)
Payments	(3,648)	(214)	(494)	(4,356)
Foreign currency translation adjustment	(48)	—	(26)	(74)
Liability at December 31, 2018	\$ 255	\$ —	\$ —	\$ 255

At December 31, 2018, \$0.3 million is included in accrued and other current liabilities in the accompanying consolidated balance sheet. At December 31, 2017, \$5.6 million of the liability is included in accrued and other current liabilities and \$0.8 million is included in other long-term liabilities in the accompanying consolidated balance sheet.

7. Short-Term Investments

At December 31, 2018 and 2017, we had \$234.3 million and \$359.2 million, respectively, of loan receivables and commercial paper due from financial institutions. These loan receivables and commercial paper are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market and are carried at fair market value, which is equal to the cost. At December 31, 2018, these loans consist of \$134.1 million and €87.5 million (\$100.2 million as of December 31, 2018) which mature at various dates through October 2020. At December 31, 2017, these loans and commercial paper consist of \$308.2 million and €42.5 million (\$51.0 million as of December 31, 2017) which matured at various dates through December 2018. All instruments that have an original tenor of more than 12 months include redemption rights on at least a quarterly basis. Interest income is determined using the effective interest rate method. These loans are classified as current assets in the accompanying consolidated balance sheets since we may redeem the loans at our discretion.

For the years ended December 31, 2018, 2017 and 2016, proceeds from sales of short-term investments totaled \$691.8 million, \$189.0 million and \$533.8 million, respectively. During the years ended December 31, 2018, 2017 and 2016, realized gains (losses) totaled \$2.7 million, \$(1.1) million and \$1.4 million, respectively.

8. Prepaid Expenses and Other Current Assets

Prepaid expenses and other current assets are summarized as follows as of December 31, 2018 and 2017:

(in thousands)	2018	2017
Prepaid expenses	\$ 48,250	\$ 41,775
Cash collateral	25,368	21,907
Value added tax	24,416	17,870
Other receivables	11,127	17,455
Total prepaid expenses and other current assets	\$ 109,161	\$ 99,007

9. Property, Plant and Equipment

Property, plant and equipment, including equipment acquired under capital lease obligations, are summarized as follows as of December 31, 2018 and 2017:

(in thousands)	Estimated useful life (in years)	2018	2017
Land	—	\$ 17,938	\$ 18,188
Buildings and improvements	5-40	322,751	328,938
Machinery and equipment	3-10	306,750	299,175
Computer software	3-7	277,006	243,809
Furniture and office equipment	3-10	109,770	103,257
Construction in progress	—	80,874	65,542
		1,115,089	1,058,909
Less: Accumulated depreciation and amortization		(603,430)	(564,588)
Property, plant and equipment, net		\$ 511,659	\$ 494,321

Amortization of assets acquired under capital lease obligations is included within accumulated depreciation and amortization above for the years ended December 31, 2018 and 2017, respectively. For the years ended December 31, 2018, 2017 and 2016 depreciation and amortization expense totaled \$87.9 million, \$82.5 million and \$75.1 million, respectively. For the years ended December 31, 2018, 2017 and 2016 amortization related to computer software to be sold, leased or marketed totaled \$17.2 million, \$13.9 million and \$9.3 million, respectively. As of December 31, 2018 and 2017, the unamortized balance of computer software to be sold, leased or marketed was \$100.5 million and \$95.5 million, respectively.

In 2018, we recorded asset impairment charges of \$7.9 million of internal-use software of which \$1.6 million related to the 2017 Restructuring program discussed in Note 6 "Restructuring" and \$6.3 million related to strategic shifts in our business. In 2016, we recorded asset impairment charges of \$10.9 million related to the 2016 Restructuring program discussed in Note 6 "Restructuring". Impairments included \$7.5 million of computer software to be sold, leased or marketed, \$1.7 million in machinery and equipment, \$1.5 million in internal-use software, \$0.1 million in furniture and office equipment and \$0.1 million in buildings and improvements.

Repairs and maintenance expense was \$12.1 million, \$12.7 million and \$13.0 million in 2018, 2017 and 2016, respectively. For the year ended December 31, 2018 and 2017, construction in progress primarily includes amounts related to ongoing software development projects. For the years ended December 31, 2018, 2017 and 2016, interest capitalized in connection with construction projects was not significant.

10. Investments

The following discusses our marketable investments, non-marketable investments and the realized and unrealized gains and losses on these investments.

Marketable Equity Securities

A summary of our investments in marketable equity securities that have readily determinable fair values that are classified as available-for-sale follows below. These investments are reported at fair value with gains and losses recorded in earnings beginning in January 2018 upon adoption of ASU 2016-01. Prior to adoption, these investments were reported at fair value with unrealized gains and losses recognized in accumulated other comprehensive income on the balance sheet. Accordingly, upon adoption, we recorded a cumulative effect adjustment to decrease opening retained earnings at January 1, 2018 by a net of tax amount of \$0.9 million (pre-tax \$1.1 million) for unrealized losses as of the adoption date.

(in thousands, except shares held)		As of December 31,	
		2018	2017
HTG Molecular Diagnostics, Inc (HTGM)			
Shares held		833,333	833,333
Cost basis		\$ 2,000	\$ 2,000
Fair value		\$ 2,117	\$ 1,692
Total recognized gain during the period		\$ 425	\$ —
Total cumulative unrealized gain (loss)		\$ 117	\$ (308)

During the year ended December 31, 2018, the increase of \$0.4 million in fair market value was recognized as a gain in other income (expense), net in the accompanying consolidated statement of income. These marketable securities are included in other long-term assets in the accompanying consolidated balance sheets.

(in thousands, except shares held)		As of December 31,	
		2018	2017
Curetis N.V.			
Shares held		204,000	320,424
Cost basis		\$ 1,444	\$ 2,268
Fair value		\$ 350	\$ 1,516
Total recognized loss during the period		\$ (572)	\$ —
Total cumulative unrealized loss		\$ (1,094)	\$ (752)

During the year ended December 31, 2018, we sold 116,424 shares of Curetis N.V. and recognized a gain of \$0.3 million in other income (expense), net in the accompanying consolidated statement of income in connection with the sale of these shares. The fair market value of shares held during the year decreased by \$0.6 million and was recognized as a loss in other income (expense), net in the accompanying consolidated statement of income. As of December 31, 2018 and 2017, these marketable securities are included in short-term investments and other long-term assets, respectively, in the accompanying consolidate balance sheets.

Non-Marketable Investments

We have made strategic investments in certain privately-held companies without readily determinable market values.

Non-Marketable Investments Accounted for Under the Equity Method

A summary of our non-marketable investments accounted for as equity method investments is as follows:

(\$ in thousands)	Ownership Percentage	Equity investments as of December 31,		Share of income (loss) for the years ended December 31,		
		2018	2017	2018	2017	2016
PreAnalytiX GmbH	50.00 %	\$ 5,405	\$ 7,562	\$ 4,062	\$ 3,818	\$ 3,067
MAQGEN Biotechnology Co., Ltd	40.00 %	5,154	3,285	(579)	(542)	—
Suzhou Fuda Business Management and Consulting Partnership	33.67 %	3,138	—	—	—	—
Apis Assay Technologies Ltd	19.00 %	770	—	—	—	—
Hombrechtikon Systems Engineering AG	19.00 %	378	1,155	(668)	(346)	—
Biotype Innovation GmbH	0.00 %	—	3,821	(123)	39	(335)
Pyrobett	19.00 %	—	2,639	(100)	195	333
QIAGEN (Suzhou) Institute of Translation Research Co., Ltd.	0.00 %	—	—	—	—	(244)
		\$ 14,845	\$ 18,462	\$ 2,592	\$ 3,164	\$ 2,821

During the year ended December 31, 2018, we recorded impairments of \$6.1 million in other income (expense), net in the accompanying consolidated statements of income, following changes in the investee's circumstances that indicated the carrying value was no longer recoverable. Accordingly, the investments were fully impaired.

During 2017, we acquired a 40% interest in MAQGEN Biotechnology Co., Ltd. for \$4.0 million and contributed an additional \$3.2 million during 2018. We have a commitment to contribute an additional \$4.8 million in future periods. Also, during 2017, we sold our interest in QIAGEN (Suzhou) Institute of Translation Research Co., Ltd., which had no book value at the time of sale, for \$3.5 million and recorded a corresponding gain in other expense, net in the accompanying statements of income.

In connection with the 2016 restructuring activities discussed in Note 6 "Restructuring", in 2016 we transferred the research and development activities of our instrumentation business to a new company, Hombrechtikon Systems Engineering AG (HSE), in which we acquired a 19.0% interest for a total obligation of \$9.8 million payable over three years. In 2016, we recorded an impairment of the investment in HSE of \$8.3 million in other income (expense), net.

Two of our equity method investments are variable interest entities and we are not the primary beneficiary as we do not hold the power to direct the activities that most significantly impact the economic performance. Therefore, these investments are not consolidated. As of December 31, 2018 and 2017, these investments had a total carrying value of \$1.1 million and \$1.2 million, respectively, which is included in other long-term assets in the consolidated balance sheets, representing our maximum exposure to loss.

Non-Marketable Investments Not Accounted for Under the Equity Method

At December 31, 2018 and 2017, we had investments in non-publicly traded companies that do not have readily determinable fair values with carrying amounts that totaled \$59.5 million and \$33.6 million, respectively. The changes in these investments which are measured at cost, less any impairment, plus or minus changes resulting from observable price changes in orderly transactions for the identical or a similar investment of the same issuer for the years ended December 31, 2018 and 2017 are as follows:

(in thousands)	2018	2017
Balance at beginning of year	\$ 33,605	\$ 38,173
Cash investments in equity securities	9,633	278
Net increases due to observable price changes	13,104	—
Conversion of note receivable to equity securities	11,369	—
Sale of equity securities	(5,400)	—
Impairments	—	(5,137)
Full acquisition of equity securities	(2,710)	—
Foreign currency translation adjustments	(117)	291
Balance at end of year	\$ 59,484	\$ 33,605

During 2018, we made investments of \$9.6 million in equity securities, of which \$9.3 million was an additional investment in NeuMoDx Molecular, Inc. (NeuMoDx). The investment is part of a strategic partnership with NeuMoDx to commercialize two new fully integrated systems for automation of PCR (polymerase chain reaction) testing. Under the agreement, we will initially distribute the NeuMoDx™ 288 (high-throughput version) and NeuMoDx™ 96 (mid-throughput version) in Europe and other major markets worldwide outside of the United States. NeuMoDx will distribute these instruments within the United States directly. The two companies have also entered into an agreement under which we can acquire all NeuMoDx shares not currently owned by QIAGEN at a predetermined price of approximately \$234 million, subject to the achievement of certain regulatory and operational milestones.

For the year ended December 31, 2018, we recognized a gain of \$13.1 million in other income (expense), net in the accompanying consolidated statement of income due to upward adjustments resulting from observable price changes. These adjustments were due to equity offerings at a higher price from the issuer in orderly transactions for identical or similar investments as those we hold.

During 2018, we converted a note receivable from a non-publicly traded company, considered a related party, into an equity interest in that company. This note held a balance of \$11.4 million including principal balance and accrued interest at conversion which was a non-cash investing activity and is therefore not included in the consolidated statement of cash flows. Also during 2018, we sold our interest in a non-publicly traded company which had a book value of \$5.4 million. Proceeds from the sale totaled \$10.5 million in cash resulting in a corresponding gain of \$5.1 million recorded in other income (expense), net in the accompanying consolidated statement of income. Additionally during 2018, we acquired all remaining shares of a privately held entity in which we held a minority interest as discussed in Note 5 "Acquisitions and Divestitures".

One of our non-marketable investments not accounted for under the equity method is a variable interest entity and we are not the primary beneficiary as we do not hold the power to direct the activities that most significantly impact the economic performance. Therefore, this investment is not consolidated. As of December 31, 2018 and 2017, this investment had a total carrying value of \$41.0 million and \$20.0 million, respectively, which is included in other long-term assets in the consolidated balance sheets, representing our maximum exposure to loss.

In 2017, we recorded total impairments to non-marketable investments not accounted for under the equity method of \$5.1 million in other income (expense), net in the accompanying consolidated statement of income.

11. Goodwill and Intangible Assets

The following sets forth the intangible assets by major asset class as of December 31, 2018 and 2017:

		2018		2017	
(in thousands)	Weighted Average Life (in years)	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization
Amortized Intangible Assets:					
Patent and license rights	9.07	\$ 448,220	\$ (310,040)	\$ 407,635	\$ (280,434)
Developed technology	11.74	770,955	(561,615)	771,893	(544,633)
Customer base, trademarks, and non-compete agreements	10.87	427,512	(323,024)	437,213	(292,356)
	10.72	\$ 1,646,687	\$ (1,194,679)	\$ 1,616,741	\$ (1,117,423)
Unamortized Intangible Assets:					
In-process research and development		\$ 23,035		\$ —	
Goodwill		2,108,536		2,012,904	
		\$ 2,131,571		\$ 2,012,904	

The changes in intangible assets for the years ended December 31, 2018 and 2017 are as follows:

(in thousands)	2018	2017
Balance at beginning of year	\$ 499,318	\$ 557,159
Additions	32,159	15,527
Additions from acquisitions	81,200	28,700
Amortization	(118,576)	(133,797)
Disposals	(4,426)	(897)
Foreign currency translation adjustments	(14,632)	32,626
Balance at end of year	\$ 475,043	\$ 499,318

Amortization expense on intangible assets totaled approximately \$118.6 million, \$133.8 million and \$137.9 million, respectively, for the years ended December 31, 2018, 2017 and 2016.

Cash paid for purchases of intangible assets during the year ended December 31, 2018 totaled \$41.0 million, of which \$11.9 million is related to current year payments for licenses that were accrued as of December 31, 2017 and \$3.3 million is related to prepayments recorded in other long-term assets in the accompanying consolidated balance sheet. Intangible asset additions of \$32.2 million includes \$25.8 million of cash paid during the year ended December 31, 2018, together with \$4.2 million of additions that were accrued as of December 31, 2018 and \$2.2 million of additions which were previously recorded as prepayments. Cash paid for intangible assets during the year ended December 31, 2017 totaled \$34.3 million of which \$16.5 million is related to current year payments for licenses that were accrued as of December 31, 2016 and \$5.8 million is related to prepayments recorded in other long-term assets in accompanying consolidated balance sheet. Intangible asset additions of \$15.5 million includes \$12.0 million of cash paid during the year ended December 31, 2017, together with \$3.5 million of additions which were previously recorded as prepayments.

Amortization of intangibles for the next five years is expected to be approximately:

(in thousands)	Amortization
Years ended December 31:	
2019	\$ 98,277
2020	\$ 71,308
2021	\$ 62,517
2022	\$ 48,501
2023	\$ 45,229

The changes in goodwill for the years ended December 31, 2018 and 2017 are as follows:

(in thousands)	2018	2017
Balance at beginning of year	\$ 2,012,904	\$ 1,925,518
Additions from acquisitions	142,287	26,934
Disposals	(5,682)	—
Foreign currency translation adjustments	(40,973)	60,452
Balance at end of year	\$ 2,108,536	\$ 2,012,904

The changes in the carrying amount of goodwill during the year ended December 31, 2018 resulted primarily from the acquisition of STAT-Dx and other acquisitions and divestitures discussed in Note 5 "Acquisitions and Divestitures" and changes in foreign currency translation. The changes in goodwill during the year ended December 31, 2017 resulted primarily from changes in foreign currency translation together with acquired goodwill from the 2017 acquisition OmicSoft.

12. Accrued and Other Current Liabilities

Accrued and other current liabilities at December 31, 2018 and 2017 consist of the following:

(in thousands)	2018	2017
Accrued expenses and other liabilities	\$ 103,388	\$ 85,986
Payroll and related accruals	66,871	63,525
Deferred revenue	45,358	49,357
Accrued contingent consideration and milestone payments	27,820	11,539
Restructuring	6,850	14,667
Accrued interest on long-term debt	6,200	5,543
Accrued royalties	5,469	6,714
Cash collateral	1,000	3,000
Current portion of capital lease obligations	61	1,359
Total accrued and other current liabilities	\$ 263,017	\$ 241,690

13. Derivatives and Hedging

In the ordinary course of business, we use derivative instruments, including swaps, forwards and/or options, to manage potential losses from foreign currency exposures and interest bearing assets or liabilities. The principal objective of such derivative instruments is to minimize the risks and/or costs associated with our global financial and operating activities. We do not utilize derivative or other financial instruments for trading or other speculative purposes. We recognize all derivatives as either assets or liabilities on the balance sheet on a gross basis, measure those instruments at fair value and recognize the change in fair value in earnings in the period of change, unless the derivative qualifies as an effective hedge that offsets certain exposures. We have agreed with almost all of our counterparties with whom we had entered into cross-currency swaps, interest rate swaps or foreign exchange contracts, to enter into bilateral collateralization contracts under which we will receive or provide cash collateral, as the case may be, for the net position with each of these counterparties. As of December 31, 2018, cash collateral positions consisted of \$1.0 million recorded in accrued and other current liabilities and \$25.4 million recorded in prepaid expenses and other current assets in the accompanying consolidated balance sheet. As of December 31, 2017, we had a liability position of \$3.0 million recorded in accrued and other current liabilities and \$21.9 million recorded in prepaid expenses and other current assets in the accompanying consolidated balance sheet.

In 2017, we entered into a foreign currency non-derivative hedging instrument that is designated and qualifies as net investment hedge. The objective of the hedge is to protect part of the net investment in foreign operations against adverse changes in the exchange rate between the Euro and the functional currency of the U.S. dollar. The non-derivative hedging instrument is the German private corporate bond ("Schuldschein") which was issued in the total amount of \$331.1 million as described in Note 15 "Lines of Credit and Debt". Of the \$331.1 million, which is held in both U.S. dollars and Euro, €255.0 million is designated as the hedging instrument against a portion of our Euro net investments in our foreign operations. The relative changes in both the hedged item and hedging instrument are calculated by applying the change in spot rate between two assessment dates against the respective notional amount. The effective portion of the hedge is recorded in the cumulative translation adjustment account within other accumulated comprehensive income (loss). Based on the spot rate method, the unrealized loss recorded in equity as of December 31, 2018 and 2017 is \$5.9 million and \$19.8 million, respectively. Since we are using the debt as the hedging instrument, which is also remeasured based on the spot rate method, there is no hedge ineffectiveness related to the net investment hedge as of December 31, 2018.

As of December 31, 2018 and 2017, we held derivative instruments that are designated and qualify as cash flow hedges where the effective portion of the gain or loss on the derivative is reported as a component of other comprehensive income (loss) and reclassified into earnings in the same period or periods during which the hedged transaction affects earnings. Gains and losses on the derivative representing either hedge ineffectiveness or hedge components excluded from the assessment of effectiveness are recognized in current earnings. In 2018 and in 2017, we did not record any hedge ineffectiveness related to any cash-flow hedges in earnings. Based on their valuation as of December 31, 2018, we expect approximately \$9.5 million of derivative losses included in accumulated other comprehensive loss will be reclassified into income during the next 12 months. The cash flows derived from derivatives are classified in the consolidated statements of cash flows in the same category as the consolidated balance sheet account of the underlying item.

As of December 31, 2018 and 2017, we held derivative instruments that qualify for hedge accounting as fair value hedges. For derivative instruments that are designated and qualify as a fair value hedge, the effective portion of the gain or loss on the derivative is reflected in earnings. This earnings effect is offset by the change in the fair value of the hedged item attributable to the risk being hedged that is also recorded in earnings. In 2018 and 2017, we concluded there was no ineffectiveness. The cash flows derived from derivatives are classified in the consolidated statements of cash flows in the same category as the consolidated balance sheet account of the underlying item.

Interest Rate Derivatives

We use interest rate derivative contracts to align our portfolio of interest bearing assets and liabilities with our risk management objectives. During 2015, we entered into five cross currency interest rate swaps through 2025 for a

total notional amount of \$180.0 million which qualify for hedge accounting as cash flow hedges. We determined that no ineffectiveness exists related to these swaps. As of December 31, 2018, the \$180.0 million notional swap amount had a fair value of \$17.6 million recorded in fair value of derivative instruments - long-term liability and a related interest receivable of \$1.4 million recorded in prepaid expenses and other current assets, respectively, in the accompanying consolidated balance sheet. As of December 31, 2017, this swap had a fair value of \$28.9 million recorded in fair value of derivative instruments - long-term liability and a related interest receivable of \$1.2 million recorded in prepaid expenses and other current assets in the accompanying consolidated balance sheet.

During 2014, we entered into interest rate swaps, which effectively fixed the fair value of \$200.0 million of our fixed rate private placement debt and qualify for hedge accounting as fair value hedges. We determined that no ineffectiveness exists related to these swaps. As of December 31, 2018, the \$200.0 million notional swap amounts had a fair value of \$1.2 million in total, of which \$0.5 million is recorded in fair value of derivative instruments - current liability, and \$0.7 million is recorded in fair value of derivative instruments - long-term liability, with accrued and unpaid interest of \$0.1 million recorded in accrued and other current liabilities in the accompanying consolidated balance sheet. As of December 31, 2017, this swap had a net fair value of \$0.9 million, of which \$1.0 million is recorded in fair value of derivative instruments - long-term asset and \$0.2 million is recorded in fair value of derivative instruments - current liability and accrued and unpaid interest of \$0.3 million recorded in prepaid expenses and other current assets, respectively, in the accompanying balance sheet.

Call Options

We entered into Call Options in 2014 which, along with the sale of the Warrants, represent the Call Spread Overlay entered in connection with the 2019 and 2021 Cash Convertible Notes, which are more fully described in Note 15 "Lines of Credit and Debt". We used \$105.2 million of the proceeds from the issuance of the 2019 and 2021 Cash Convertible Notes to pay the premium for the Call Options, and simultaneously received \$68.9 million (net of issuance costs) from the sale of the Warrants, for a net cash outlay of \$36.3 million for the Call Spread Overlay.

We used \$73.7 million of the proceeds from the from the issuance of the 2023 Cash Convertible Notes to pay for the premium for the Call Option, and simultaneously received \$45.3 million from the sale of Warrants, for a net cash outlay of \$28.3 million for the Call Spread Overlay. Issuance costs incurred in connection with the Warrant and the Call Option were \$0.3 million and \$0.1 million respectively, which \$0.1 million was accrued as of December 31, 2017.

During 2018, we used \$97.3 million of the proceeds from the from the issuance of the 2024 Cash Convertible Notes to pay for the premium for the Call Option, and simultaneously received \$72.4 million from the sale of Warrants, for a net cash outlay of \$24.9 million for the Call Spread Overlay. Issuance costs incurred in connection with the Warrant and the Call Option were \$0.5 million and \$0.5 million respectively, which \$0.8 million was accrued as of December 31, 2018.

In these transactions, the Call Options are intended to address the equity price risk inherent in the cash conversion feature of each instrument by offsetting cash payments in excess of the principal amount due upon any conversion of the Cash Convertible Notes.

Aside from the initial payment of a premium of \$105.2 million (2019 and 2021 Notes), \$73.7 million (2023 Notes) and \$97.3 million (2024 Notes) for the Call Options, we will not be required to make any cash payments under the Call Options. We will, however, be entitled to receive under the terms of the Call Options an amount of cash generally equal to the amount by which the market price per share of our common stock exceeds the exercise price of the Call Options during the relevant valuation period. The exercise price under the Call Options is equal to the conversion price of the Cash Convertible Notes.

The Call Options, for which our common stock is the underlying security, are a derivative asset that requires mark-to-market accounting treatment due to the cash settlement features until the Call Options settle or expire. The Call Options are measured and reported at fair value on a recurring basis, within Level 2 of the fair value hierarchy. For further discussion of the inputs used to determine the fair value of the Call Options, refer to Note 14 "Financial Instruments and Fair Value Measurements". The fair value of the Call Options at December 31, 2018 was approximately \$395.1 million, of which \$100.1 million is recorded in fair value of derivative instruments - current asset and \$295.0 million is recorded in fair value of derivative instruments - long-term asset in the accompanying consolidated balance sheet. The fair value of the Call Options at December 31, 2017 was approximately \$223.2 million and is recorded in fair value of derivative instruments - long-term asset in the accompanying consolidated balance sheet.

The Call Options do not qualify for hedge accounting treatment. Therefore, the change in fair value of these instruments is recognized immediately in our consolidated statements of income in other expense, net. For the years ended December 31, 2018 and 2017, the changes in the fair value of the Call Options resulted in gains of \$74.7 million and \$37.4 million, respectively. Because the terms of the Call Options are substantially similar to those of the Cash Convertible Notes' embedded cash conversion option, discussed below, we expect the effect on earnings from those two derivative instruments to mostly offset each other.

Cash Convertible Notes Embedded Cash Conversion Option

The embedded cash conversion option within the Cash Convertible Notes is required to be separated from the Cash Convertible Notes and accounted for separately as a derivative liability, with changes in fair value reported in our consolidated statements of income in other expense, net until the cash conversion option settles or expires. For further discussion of the Cash Convertible Notes, refer to Note 15 "Lines of Credit and Debt". The initial fair value liability of the embedded cash conversion option for the 2019 and 2021 Notes was \$105.2 million, for the 2023 Notes was \$74.5 million and for the 2024 Notes was \$98.5 million, which simultaneously reduced the carrying value of the Cash Convertible Notes (effectively an original issuance discount). The embedded cash conversion option is measured and reported at fair value on a recurring basis, within Level 2 of the fair value hierarchy. For further discussion of the inputs used to determine the fair value of the embedded cash conversion options, refer to Note 14 "Fair Value Measurements". The fair value of the embedded cash conversion options at December 31, 2018 was \$399.3 million, which \$100.2 million is recorded in fair value of derivative instruments - current liability and \$299.1 million is recorded in fair value of derivative instruments - long-term liability in the accompanying balance sheet. The fair value of the embedded cash conversion options at December 31, 2017 was \$224.3 million, which is recorded in fair value of derivative instruments - long-term liability in the accompanying balance sheet. For the years ended December 31, 2018 and 2017 the change in the fair value of the embedded cash conversion options resulted in losses of \$76.5 million and \$36.7 million, respectively, recognized in our consolidated statements of income in other expense, net.

Embedded Conversion Option

During 2017, we purchased a convertible note for \$3.0 million from a publicly listed company considered a related party. The embedded derivative, that is bifurcated and measured at fair value, associated to a convertible feature of this note had a fair value of \$0.3 million and \$0.2 million as of December 31, 2018 and 2017, respectively, included in fair value of derivative instruments - long-term asset.

Foreign Currency Derivatives

As a globally active enterprise, we are subject to risks associated with fluctuations in foreign currencies in our ordinary operations. This includes foreign currency-denominated receivables, payables, debt, and other balance sheet positions including intercompany items. We manage balance sheet exposure on a group-wide basis using foreign exchange forward contracts, foreign exchange options and cross-currency swaps.

Undesignated Derivative Instruments

We are party to various foreign exchange forward, option and swap arrangements which had, at December 31, 2018, an aggregate notional value of \$792.7 million and fair values of \$2.7 million and \$6.0 million included in fair value of derivative instruments - current asset and fair value of derivative instruments - current liability, respectively, which expire at various dates through November 2019. We were party to various foreign exchange forward and swap arrangements which had, at December 31, 2017, an aggregate notional value of \$587.3 million and fair values of \$7.5 million and \$2.4 million included in fair value of derivative instruments - current asset and fair value of derivative instruments - current liability, respectively, which expired at various dates through March 2018. The transactions have been entered into to offset the effects from short-term balance sheet exposure to foreign currency exchange risk. Changes in the fair value of these arrangements have been recognized in other expense, net.

Fair Values of Derivative Instruments

The following table summarizes the fair value amounts of derivative instruments reported in the consolidated balance sheets as of December 31, 2018 and 2017:

(in thousands)	Derivatives in Asset Positions Fair value		Derivatives in Liability Positions Fair value	
	2018	2017	2018	2017
Derivative instruments designated as hedges				
Interest rate contracts ¹	\$ —	\$ 1,017	\$ (18,768)	\$ (29,103)
Total derivative instruments designated as hedges	\$ —	\$ 1,017	\$ (18,768)	\$ (29,103)
Undesignated derivative instruments				
Embedded conversion option	\$ 349	\$ 217	\$ —	\$ —
Call spread overlay	395,095	223,164	(399,262)	(224,286)
Foreign exchange contracts	2,673	7,480	(5,957)	(2,424)
Total derivative instruments	\$ 398,117	\$ 230,861	\$ (405,219)	\$ (226,710)

⁽¹⁾ The fair value amounts for the interest rate contracts do not include accrued interest of \$1.4 million and \$1.6 million included in prepaid expenses and other current assets in the consolidated balance sheets as of December 31, 2018 and 2017, respectively.

Gains and Losses on Derivative Instruments

The following tables summarize the classification and gains and losses on derivative instruments for the years ended December 31, 2018, 2017 and 2016:

Year Ended December 31, 2018 (in thousands)	Gain/(loss) recognized in AOCI	Location of (gain) loss in income statement	(Gain) loss reclassified from AOCI into income	Gain (loss) recognized in income
Non-derivative instruments				
Net investment hedge	\$ 13,839	Other expense, net	\$ —	n/a
Cash flow hedges				
Interest rate contracts	\$ 11,368	Other expense, net	\$ (9,774)	n/a
Fair value hedges				
Interest rate contracts	\$ —	Other expense, net	\$ —	\$ (2,051)
Undesignated derivative instruments				
Call spread overlay	n/a	Other expense, net	n/a	\$ (1,818)
Foreign exchange contracts	n/a	Other expense, net	n/a	(19,857)
				\$ (21,675)

Year Ended December 31, 2017 (in thousands)	Gain/(loss) recognized in AOCI	Location of (gain) loss in income statement	(Gain) loss reclassified from AOCI into income	Gain (loss) recognized in income
Non-derivative instruments				
Net investment hedge	\$ (19,757)	Other expense, net	\$ —	n/a
Cash flow hedges				
Interest rate contracts	\$ (30,310)	Other expense, net	\$ 26,136	n/a
Fair value hedges				
Interest rate contracts	\$ —	Other expense, net	\$ —	\$ (2,199)
Undesignated derivative instruments				
Call spread overlay	n/a	Other expense, net	n/a	\$ 1,573
Foreign exchange contracts	n/a	Other expense, net	n/a	11,813
				\$ 13,386

Year Ended December 31, 2016 (in thousands)	Gain/(loss) recognized in AOCI	Location of (gain) loss in income statement	(Gain) loss reclassified from AOCI into income	Gain (loss) recognized in income
Cash flow hedges				
Interest rate contracts	\$ (3,969)	Other expense, net	\$ (6,228)	n/a
Fair value hedges				
Interest rate contracts	\$ —	Other expense, net	\$ —	\$ (1,930)
Undesignated derivative instruments				
Call spread overlay	n/a	Other expense, net	n/a	\$ 118
Foreign exchange contracts	n/a	Other expense, net	n/a	(6,072)
				\$ (5,954)

The amounts noted in the table above for accumulated other comprehensive income (AOCI) do not include any adjustment for the impact of deferred income taxes.

14. Financial Instruments and Fair Value Measurements

Assets and liabilities are measured at fair value according to a three-tier fair value hierarchy which prioritizes the inputs used in measuring fair value as follows:

Level 1. Observable inputs, such as quoted prices in active markets;

Level 2. Inputs, other than the quoted price 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.

Our assets and liabilities measured at fair value on a recurring basis consist of short-term investments, which are classified in Level 1 and Level 2 of the fair value hierarchy, marketable securities discussed in Note 10 "Investments", which are classified in Level 1, derivative contracts used to hedge currency and interest rate risk and derivative financial instruments entered into in connection with the Cash Convertible Notes discussed in Note 15 "Lines of Credit and Debt", which are classified in Level 2 of the fair value hierarchy, and contingent consideration accruals which are classified in Level 3 of the fair value hierarchy, and are shown in the tables below. Non-marketable equity securities remeasured during the year ended December 31, 2018 are classified within Level 3 in the fair value hierarchy following the adoption of ASU 2016-01. There have been no transfers between levels.

In determining fair value for Level 2 instruments, we apply a market approach, using quoted active market prices relevant to the particular instrument under valuation, giving consideration to the credit risk of both the respective counterparty to the contract and the Company. To determine our credit risk, we estimated our credit rating by benchmarking the price of outstanding debt to publicly-available comparable data from rated companies. Using the estimated rating, our credit risk was quantified by reference to publicly-traded debt with a corresponding rating. The Level 2 derivative financial instruments include the Call Options asset and the embedded conversion option liability. See Note 15 "Lines of Credit and Debt", and Note 13 "Derivatives and Hedging", for further information. The derivatives are not actively traded and are valued based on an option pricing model that uses observable market data for inputs. Significant market data inputs used to determine fair values included our common stock price, the risk-free interest rate, and the implied volatility of our common stock. The Call Options asset and the embedded cash conversion option liability were designed with the intent that changes in their fair values would substantially offset, with limited net impact to our earnings. Therefore, the sensitivity of changes in the unobservable inputs to the option pricing model for such instruments is substantially mitigated.

Our Level 3 instruments include non-marketable equity security investments for which we estimate the value based on valuation methods using the observable transaction price at the transaction date and other unobservable inputs. These investments are carried at fair value or under the measurement alternative. Under the measurement alternative, the carrying value is measured at cost, less any impairment, plus or minus changes resulting from observable price changes in orderly transactions for identical or similar investments of the same issuer. Adjustments are determined primarily based on a market approach as of the transaction date.

Our Level 3 instruments also include contingent consideration liabilities. We value contingent consideration liabilities using unobservable inputs, applying the income approach, such as the discounted cash flow technique, or the probability-weighted scenario method. Contingent consideration arrangements obligate us to pay the sellers of an acquired entity if specified future events occur or conditions are met such as the achievement of technological or revenue milestones. We use various key assumptions, such as the probability of achievement of the milestones (0% to 100%) and the discount rate (between 6.5% and 17.2%), to represent the non-performing risk factors and time value when applying the income approach. We regularly review the fair value of the contingent consideration, and reflect any change in the accrual in the consolidated statements of income in the line items commensurate with the underlying nature of milestone arrangements.

The following table presents our fair value hierarchy for our financial assets and liabilities measured at fair value on a recurring basis:

(in thousands)	As of December 31, 2018				As of December 31, 2017			
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
Assets:								
Short-term investments	\$ 350	\$ 234,256	\$ —	\$ 234,606	\$ —	\$ 359,198	\$ —	\$ 359,198
Marketable equity securities	2,117	—	—	2,117	3,208	—	—	3,208
Non-marketable equity securities	—	—	59,484	59,484	—	—	—	—
Call option	—	395,095	—	395,095	—	223,164	—	223,164
Foreign exchange contracts	—	2,673	—	2,673	—	7,480	—	7,480
Embedded conversion option	—	349	—	349	—	217	—	217
Interest rate contracts	—	—	—	—	—	1,017	—	1,017
	\$ 2,467	\$ 632,373	\$ 59,484	\$ 694,324	\$ 3,208	\$ 591,076	\$ —	\$ 594,284
Liabilities:								
Foreign exchange contracts	\$ —	\$ (5,957)	\$ —	\$ (5,957)	\$ —	\$ (2,424)	\$ —	\$ (2,424)
Interest rate contracts	—	(18,768)	—	(18,768)	—	(29,103)	—	(29,103)
Cash conversion option	—	(399,262)	—	(399,262)	—	(224,286)	—	(224,286)
Contingent consideration	—	—	(48,971)	(48,971)	—	—	(11,539)	(11,539)
	\$ —	\$ (423,987)	\$ (48,971)	\$ (472,958)	\$ —	\$ (255,813)	\$ (11,539)	\$ (267,352)

Refer to Note 10 "Investments" for the change in non-marketable equity securities with Level 3 inputs during the year ended December 31, 2018. For contingent consideration liabilities with Level 3 inputs, the following table summarizes the activity for the years ended December 31, 2018 and 2017:

(in thousands)	2018	2017
Balance at beginning of year	\$ (11,539)	\$ (8,754)
Additions from acquisitions	(53,962)	(10,954)
Payments	16,530	4,900
Gain included in earnings	—	3,269
Balance at end of year	\$ 48,971	\$ 11,539

For the year ended December 31, 2018, of the total \$49.0 million accrued for contingent consideration, \$27.5 million is included in accrued and other current liabilities and \$21.5 million is included in other long-term liabilities in the accompanying consolidated balance sheet. During 2017, gain for the reduction in the fair value of contingent consideration related to unmet milestones of \$3.3 million was recognized in general and administrative, restructuring, integration and other, net in the accompanying consolidated statements of income.

The carrying values of financial instruments, including cash and cash equivalents, accounts receivable, accounts payable and other accrued liabilities, approximate their fair values due to their short-term maturities. The estimated fair value of long-term debt as disclosed in Note 15 "Lines of Credit and Debt" was based on current interest rates for similar types of borrowings. The estimated fair values may not represent actual values of the financial instruments that could be realized as of the balance sheet date or that will be realized in the future. There were no fair value differences in the years ended December 31, 2018 and 2017 for nonfinancial assets or liabilities required to be measured at fair value on a nonrecurring basis other than the impairment of cost-method investments as discussed in Note 10.

The table below presents the carrying values and the estimated fair values of financial instruments not presented in the tables above.

(in thousands)	As of December 31, 2018			As of December 31, 2017		
	Carrying Amount	Level 1	Level 2	Carrying Amount	Level 1	Level 2
Long-term debt including current portion:						
Cash convertible notes	\$ 1,439,931	\$ 1,794,000	\$ —	\$ 1,008,507	\$ —	\$ 1269,613
U.S. Private placement	398,107	—	391,700	399,939	—	394,669
German private placement	336,168	—	337,768	349,812	—	349,977
	\$ 2,174,206	\$ 1,794,000	\$ 729,468	\$ 1,758,258	\$ —	\$ 2,014,259

The fair values of the financial instruments presented in the tables above were determined as follows:

Cash Convertible Notes: Fair value is based on an estimation using available over-the-counter market information on the Cash Convertible Notes due in 2019, 2021, 2023 and 2024. During 2018, we determined that the quoted prices were from active markets and accordingly moved the fair value from level 2 to level 1 of the fair value hierarchy.

U.S. Private Placement: Fair value of the outstanding bonds is based on an estimation using the changes in the U.S. Treasury rates.

German Private Placement: Fair value is based on an estimation using changes in the euro swap rates.

The estimated fair values may not represent actual values of the financial instruments that could be realized as of the balance sheet date or that will be realized in the future. There were no adjustments in the twelve months ended periods ended December 31, 2018 and 2017 for nonfinancial assets or liabilities required to be measured at fair value on a nonrecurring basis.

15. Lines of Credit and Debt

Our credit facilities available and undrawn at December 31, 2018 total €426.6 million (approximately \$488.5 million). This includes a €400.0 million syndicated multi-currency revolving credit facility expiring December 2021 of which no amounts were utilized at December 31, 2018 or at December 31, 2017, and three other lines of credit amounting to €26.6 million with no expiration date, none of which were utilized as of December 31, 2018 or as of December 31, 2017. The €400.0 million facility can be utilized in Euro, British pounds sterling, Swiss franc or U.S. dollar and bears interest of 0.4% to 1.2% above three months EURIBOR, or LIBOR in relation to any loan not in euro, and is offered with interest periods of one, two, three or six months. The commitment fee is calculated based on 35% of the applicable margin. In 2018 and 2017, \$1.0 million and \$0.9 million of commitment fees were paid, respectively. The revolving facility agreement contains certain financial and non-financial covenants, including but not limited to, restrictions on the encumbrance of assets and the maintenance of certain financial ratios. We were in compliance with these covenants at December 31, 2018. The credit facilities are for general corporate purposes.

At December 31, 2018 and 2017, total current long-term debt, net of debt issuance costs of \$14.2 million and \$12.4 million, respectively, consists of the following:

(in thousands)	2018	2017
0.375% Senior Unsecured Cash Convertible Notes due 2019	\$ 427,445	\$ 414,843
0.875% Senior Unsecured Cash Convertible Notes due 2021	279,492	270,762
0.500% Senior Unsecured Cash Convertible Notes due 2023	335,201	322,902
1.000% Senior Unsecured Cash Convertible Notes due 2024	397,793	—
3.19% Series A Senior Notes due October 16, 2019	72,483	72,742
3.75% Series B Senior Notes due October 16, 2022	298,691	300,276
3.90% Series C Senior Notes due October 16, 2024	26,933	26,921
German Private Placement (Schuldschein)	336,168	349,812
Total long-term debt	\$ 2,174,206	\$ 1,758,258
Less current portion	503,116	—
Long-term portion	\$ 1,671,090	\$ 1,758,258

The notes are all unsecured obligations that rank pari passu. Interest expense on long-term debt was \$61.2 million, \$43.6 million and \$35.8 million for the years ended December 31, 2018, 2017 and 2016, respectively.

Future maturities (stated at the carrying values) of long-term debt as of December 31, 2018, are as follows:

Year ending December 31,	(in thousands)
2019	\$ 503,116
2020	—
2021	315,732
2022	470,371
2023	335,201
thereafter	549,786
	\$ 2,174,206

Cash Convertible Notes due 2019, 2021, 2023 and 2024

On March 19, 2014, we issued \$730.0 million aggregate principal amount of Cash Convertible Senior Notes of which \$430.0 million is due in 2019 (2019 Notes) and \$300.0 million is due in 2021 (2021 Notes). The aggregate net proceeds of the 2019 and 2021 Convertible Notes were \$680.7 million, after payment of the net cost of the Call Spread Overlay described below and transaction costs. Additionally, we used \$372.5 million of the net proceeds to repay other debt.

On September 13, 2017, we issued \$400.0 million aggregate principal amount of Cash Convertible Senior Notes which is due in 2023 (2023 Notes). The net proceeds of the 2023 Notes were \$365.6 million, after payment of the net cost of the Call Spread Overlay described below and transaction costs paid through December 31, 2018.

On November 13, 2018, we issued \$500.0 million aggregate principal amount of Cash Convertible Senior Notes which is due in 2024 (2024 Notes). The net proceeds of the 2024 Notes were \$470.0 million, after payment of the net cost of the Call Spread Overlay described below and transaction costs paid through December 31, 2018.

We refer to the 2019 Notes, 2021 Notes 2023 Notes and 2024 Notes, collectively as the “Cash Convertible Notes”. Interest on the Cash Convertible Notes is payable semi-annually in arrears and will mature on the maturity date unless repurchased or converted with their terms prior to such date. The interest rate and corresponding maturity of each Note are summarized as follows:

Cash Convertible Notes	Annual Interest Rate	Date of Interest Payments	Interest Payment Start Date	Maturity Date
2019 Notes	0.375%	March 19 and September 19	September 19, 2014	March 19, 2019
2021 Notes	0.875%	March 19 and September 19	September 19, 2014	March 19, 2021
2023 Notes	0.500%	March 13 and September 13	March 13, 2018	September 13, 2023
2024 Notes	1.000%	March 13 and November 13	March 13, 2019	November 13, 2024

The Cash Convertible Notes are solely convertible into cash in whole, but not in part, at the option of noteholders under the circumstances described below and during the following contingent conversion periods:

Cash Convertible Notes	Contingent Conversion Period
2019 Notes	From April 29, 2014 to September 18, 2018
2021 Notes	From April 29, 2014 to September 18, 2020
2023 Notes	From October 24, 2017 to March 13, 2023
2024 Notes	From December 24, 2018 to August 2, 2024

Additionally, conversion may occur at any time following a Contingent Conversion Period through the fifth business day immediately preceding the applicable maturity date. The Contingent Conversion Period for the 2019 Notes has passed and the noteholders may convert at anytime until March 14, 2019.

Upon conversion, noteholders will receive an amount in cash equal to the Cash Settlement Amount, calculated as described below. The Cash Convertible Notes are not convertible into shares of our common stock or any other securities.

Noteholders may convert of the Cash Convertible Notes into cash at their option at any time during the Contingent Conversion Periods described above only under the following circumstances (Contingent Conversion Conditions):

- › during any calendar quarter commencing after the calendar quarter (and only during such calendar quarter) ending on March 31, 2014 for 2019 and 2021 Cash Convertible Notes, on September 30, 2017 for 2023 Cash Convertible Notes, and on September 30, 2018 for 2024 Cash Convertible Notes; if the last reported sale price of our common stock for at least 20 trading days during a period of 30 consecutive trading days ending on the last trading day of the immediately preceding calendar quarter is greater than or equal to 130% of the conversion price on each applicable trading day;
- › if we undergo certain fundamental changes as defined in the agreement;
- › during the five business day period immediately after any 10 consecutive trading day period in which the quoted price for the 2019 Cash Convertible Notes or the 2021 Cash Convertible Notes for each trading day of the measurement period was less than 98% of the product of the last reported sale price of our common stock and the conversion rate on each such trading day;
- › if parity event or trading price unavailability event, as the case maybe occurs for the 2023 Cash Convertible Notes and 2024 Cash Convertible Notes during the period of 10 days, including the first business day following the relevant trading price notification date.
- › if we elect to distribute assets or property to all or substantially all of the holders of our common stock and those assets or other property have a value of more than 25% of the average daily volume-weighted average trading price of our common stock for the prior 20 consecutive trading days;
- › if we elect to redeem the Cash Convertible Notes; or
- › if we experience certain customary events of default, including defaults under certain other indebtedness until such event has been cured or waived or the payment of the Notes have been accelerated.

The Contingent Conversion Conditions in the 2019, 2021, 2023 and 2024 Notes noted above have been analyzed under ASC 815, Derivatives and Hedging, and, based on our analysis, we determined that each of the embedded features listed above are clearly and closely related to the 2019, 2021, 2023 and 2024 Notes (i.e., the host contracts). As a result, pursuant to the accounting provisions of ASC 815, Derivatives and Hedging, these features noted above are not required to be bifurcated as separate instruments. As of December 31, 2018, no contingent conversion condition was triggered.

The initial conversion rate for 2024 Notes is 4,360.3098 shares of our common stock per \$200,000 principal amount of 2024 Notes (reflecting an initial conversion price of approximately \$45.8683 per share of common stock). For the 2023 Notes, the initial conversion rate is 4,829.7279 shares of our common stock per \$200,000 principal amount of the 2023 Notes (reflecting an initial conversion price of approximately \$42.4102 per share of common stock). As adjusted by the synthetic share repurchase discussed in Note 17 "Equity", the conversion rate for the 2019 Notes and 2021 Notes is 7,063.1647 shares of our common stock per \$200,000 principal amount of Cash Convertible Notes (reflecting an adjusted conversion price of approximately \$28.32 per share of common stock). Upon conversion, holders are entitled to a cash payment (Cash Settlement Amount) equal to the average of the conversion rate multiplied by the daily volume-weighted average trading price for our common stock over a 50-day period. The conversion rate is subject to adjustment in certain instances but will not be adjusted for any accrued and unpaid interest. In addition, following the occurrence of certain corporate events that may occur prior to the applicable maturity date, we may be required to pay a cash make-whole premium by increasing the conversion rate for any holder who elects to convert Cash Convertible Notes in connection with the occurrence of such a corporate event.

We may redeem the Cash Convertible Notes in their entirety at a price equal to 100% of the principal amount of the applicable Cash Convertible Notes plus accrued interest at any time when 20% or less of the aggregate principal amount of the applicable Cash Convertible Notes originally issued remain outstanding.

Because the Cash Convertible Notes contain an embedded cash conversion option, we have determined that the embedded cash conversion option is a derivative financial instrument, which is required to be separated from the Cash Convertible Notes and accounted for separately as a derivative liability, with changes in fair value reported in our consolidated statements of income until the cash conversion option transaction settles or expires. The initial fair value liability of the embedded cash conversion option was \$105.2 million for the 2019 and 2021 Notes, \$74.5 million for the 2023 Notes, and \$98.5 million for the 2024 Notes, which simultaneously reduced the carrying value of the Cash Convertible Notes (effectively an original issuance discount). For further discussion of the derivative financial instruments relating to the Cash Convertible Notes, refer to Note 13 "Derivatives and Hedging".

As noted above, the reduced carrying value on the Cash Convertible Notes resulted in a debt discount that is amortized to the principal amount through the recognition of non-cash interest expense using the effective interest method over the expected life of the debt, which is five and seven for the 2019 Notes and 2021 Notes, and six years for the 2023 Notes and 2024 Notes, respectively. This resulted in our recognition of interest expense on the Cash Convertible Notes at an effective rate approximating what we would have incurred had nonconvertible debt with otherwise similar terms been issued. The effective interest rate of the 2019 Notes, 2021 Notes, 2023 Notes and 2024 Notes is 2.937%, 3.809%, 3.997% and 4.782% respectively, which is imputed based on the amortization of the fair value of the embedded cash conversion option over the remaining term of the Cash Convertible Notes.

Beginning on October 1, 2018 and ending at the close of business on December 31, 2018, the 2021 Notes became convertible pursuant to the indenture. The 2021 Notes became convertible pursuant to Section 12.01(b)(iv) of the indenture because the arithmetic mean of the last reported sale prices of our common stock, in each trading day in at least one 20 consecutive trading day period during the 30 consecutive trading day period ending on the last trading day of the preceding fiscal quarter, was greater than 130% of the conversion price in effect on such last trading day. The 2021 Notes were convertible at a conversion ratio of 7,063.1647 per \$200,000 principal amount of 2021 Notes, which is equivalent to a conversion price of approximately \$28.32 per share of our common stock. During this period, \$3.2 million of our 2021 Notes was converted and will be paid in March of 2019.

No Contingent Conversion Conditions were triggered for the Cash Convertible Notes as of December 31, 2018.

In connection with the issuance of the 2019 and 2021 Cash Convertible Notes, we incurred approximately \$13.1 million in transaction costs. We incurred approximately \$6.2 million in transaction costs for the 2023 Cash Convertible Notes. For 2024 Cash Convertible Notes, we incurred \$5.7 million transaction costs of which \$0.6 million was accrued as of December 31, 2018. Such costs have been allocated to the Cash Convertible Notes and deferred and are being amortized to interest expense over the terms of the Cash Convertible Notes using the effective interest method.

Interest expense related to the Cash Convertible Notes was comprised of the following:

(in thousands)	Year-Ended December 31	
	2018	2017
Coupon interest	\$ 6,890	\$ 4,832
Amortization of original issuance discount	32,114	270,762
Amortization of debt issuance costs	3,485	2,615
Total interest expense related to the Cash Convertible Notes	\$ 42,489	\$ 28,824

Cash Convertible Notes Call Spread Overlay

Concurrent with the issuance of the Cash Convertible Notes, we entered into privately negotiated hedge transactions (Call Options) with, and issued warrants to purchase shares of our common stock (Warrants) to, certain financial institutions. We refer to the Call Options and Warrants collectively as the "Call Spread Overlay". The Call Options are intended to offset any cash payments payable by us in excess of the principal amount due upon any conversion of the Cash Convertible Notes. During 2014, we used \$105.2 million of the proceeds from the issuance of the 2019 and 2021 Cash Convertible Notes to pay for the Call Options, and simultaneously received \$69.4 million from the sale of the Warrants, for a net cash outlay of \$35.8 million for the Call Spread Overlay.

During 2017, we used \$73.7 million of the proceeds from the from the issuance of the 2023 Cash Convertible Notes to pay for the premium for the Call Option, and simultaneously received \$45.3 million from the sale of Warrants, for a net cash outlay of \$28.3 million for the Call Spread Overlay. Issuance costs incurred in connection with the Warrant and the Call Option were \$0.3 million and \$0.1 million respectively.

In November 2018, we used \$97.3 million of the proceeds from the from the issuance of the 2024 Cash Convertible Notes to pay for the premium for the Call Option, and simultaneously received \$72.4 million from the sale of Warrants, for a net cash outlay of \$24.9 million for the Call Spread Overlay. Issuance costs incurred in connection with the Warrant and the Call Option were \$0.5 million and \$0.5 million respectively, of which \$0.8 million was accrued as of December 31, 2018.

The Call Options are derivative financial instruments and are discussed further in Note 13 "Derivatives and Hedging". The Warrants are equity instruments and are further discussed in Note 17 "Equity".

Aside from the initial payment of a premium of \$105.2 million (2019 and 2021 Notes), \$73.7 million (2023 Notes), and \$97.3 million (2024 Notes) for the Call Option, we will not be required to make any cash payments under the Call Options, and will be entitled to receive an amount of cash, generally equal to the amount by which the market price per share of our common stock exceeds the exercise price of the Call Options during the relevant valuation period. The exercise price under the Call Options is initially equal to the conversion price of the Cash Convertible Notes.

The Warrants that were issued with our Cash Convertible Notes, could have a dilutive effect to the extent that the price of our common stock exceeds the applicable strike price of the Warrants. For each Warrant that is exercised, we will deliver to the holder a number of shares of our common stock equal to the amount by which the settlement price exceeds the exercise price, plus cash in lieu of any fractional shares. We will not receive any proceeds if the Warrants are exercised.

U.S. Private Placement

In October 2012, we completed a private placement through the issuance of new senior unsecured notes at a total amount of \$400.0 million with a weighted average interest rate of 3.66% (settled on October 16, 2012). The notes were issued in three series: (1) \$73.0 million 7-year term due in 2019 (3.19%); (2) \$300.0 million 10-year term due in 2022 (3.75%); and (3) \$27.0 million 12-year term due in 2024 (3.90%). We paid \$2.1 million in debt issuance costs which will be amortized through interest expense using the effective interest method over the lifetime of the notes. The note purchase agreement contains certain financial and non-financial covenants, including but not limited to, restrictions on priority indebtedness and the maintenance of certain financial ratios. We were in compliance with these covenants at December 31, 2018. Based on an estimation using the changes in the U.S. Treasury rates, the Level 2 fair value of these senior notes as of December 31, 2018 and December 31, 2017 was approximately \$391.7 million and \$394.7 million, respectively. During 2014, we entered into interest rate swaps, which effectively fixed the fair value of \$200.0 million of this debt and qualify for hedge accounting as fair value hedges as described in Note 13 "Derivatives and Hedging".

German Private Placement (Schuldschein)

In 2017, we completed a German private placement bond ("Schuldschein") which was issued in several tranches totaling \$331.1 million due in various periods through 2027. The Schuldschein consists of U.S. dollar and Euro denominated tranches. The Euro tranches are designated as a foreign currency non-derivative hedging instrument that qualifies as a net investment hedge as described in Note 13 "Derivatives and Hedging". Based on the spot rate method, the change in the carrying value of the Euro denominated tranches attributed to the net investment hedge as of December 31, 2018 totaled \$5.9 million of unrealized loss and is recorded in equity. We paid \$1.2 million in debt issuance costs which are being amortized through interest expense over the lifetime of the notes. A summary of the tranches as of December 31, 2018 is as follows:

Currency	Notional Amount	Interest Rate	Maturity	Carrying Value as of December 31, 2018 (in thousands)
EUR	€11.5 million	Fixed 0.4%	March 2021	\$ 13,143
EUR	€23.0 million	Floating EURIBOR + 0.4%	March 2021	26,286
EUR	€21.5 million	Fixed 0.68%	October 2022	24,561
EUR	€64.5 million	Floating EURIBOR + 0.5%	October 2022	73,684
USD	\$45.0 million	Floating LIBOR + 1.2%	October 2022	44,891
EUR	€25.0 million	Floating EURIBOR + 0.5%	October 2022	28,543
EUR	€64.0 million	Fixed 1.09%	June 2024	73,097
EUR	€31.0 million	Floating EURIBOR + 0.7%	June 2024	35,406
EUR	€14.5 million	Fixed 1.61%	June 2024	16,557
				\$ 336,168

The Financial Conduct Authority of the United Kingdom plans to phase out the London Interbank Offered Rate (LIBOR) by the end of 2021. Presently, the future of LIBOR is unclear, yet the Schuldschein agreements do contain language for the determination of interest rates in the event the LIBOR rate is not available. Changes to these agreements may be required should an alternative benchmark be required.

16. Income Taxes

Income before income taxes for the years ended December 31, 2018, 2017 and 2016 consisted of:

(in thousands)	2018	2017	2016
Pretax income in The Netherlands	\$ (1,675)	\$ 42,220	\$ 20,695
Pretax income from foreign operations	227,412	72,155	36,213
	<u>\$ 225,737</u>	<u>\$ 114,375</u>	<u>\$ 56,908</u>

Income taxes for the years ended December 31, 2018, 2017 and 2016 are as follows:

(in thousands)	2018	2017	2016
Current—The Netherlands	\$ (5,794)	\$ 3,430	\$ 6,043
—Foreign	52,835	10,375	34,543
	<u>58,629</u>	<u>13,805</u>	<u>40,586</u>
Deferred—The Netherlands	2,551	151	188
—Foreign	(25,823)	60,025	(64,169)
	<u>(23,272)</u>	<u>60,176</u>	<u>(63,981)</u>
Total income tax expense (benefit)	<u>35,357</u>	<u>73,981</u>	<u>(23,395)</u>

The Netherlands statutory income tax rate was 25% for the years ended December 31, 2018, 2017 and 2016. Income from foreign subsidiaries is generally taxed at the statutory income tax rates applicable in the respective countries of domicile. The principal items comprising the differences between income taxes computed at The Netherlands statutory rate and our reported income taxes and effective tax rate for the years ended December 31, 2018, 2017 and 2016 are as follows:

2018

2017

2016

(in thousands)	Amount	Percent	Amount	Percent	Amount	Percent
Income taxes at The Netherlands statutory rate	\$ 56,434	25.0%	\$ 28,594	25.0%	\$ 14,227	25.0%
Taxation of foreign operations, net ⁽¹⁾	(33,994)	(15.1)	(38,635)	(33.8)	(43,265)	(76.0)
Tax impact from permanent items	2,949	1.3	(1,586)	(1.4)	5,938	10.4
Tax impact from tax-exempt income	(2,326)	(1.0)	(1,558)	(1.4)	(3,331)	(5.9)
Tax contingencies, net ⁽²⁾	13,570	6.0	23,189	20.3	1,761	3.1
Changes in tax laws and rates ⁽³⁾	1,907	0.8	12,958	11.3	399	0.7
Stock Compensation ⁽⁴⁾	(4,740)	(2.1)	(5,237)	(4.6)	—	—
Government incentives and other deductions ⁽⁵⁾	(2,892)	(1.2)	(4,949)	(4.3)	(2,543)	(4.5)
Prior year taxes	494	0.2	(2,319)	(2.0)	1,411	2.5
Valuation allowance ⁽³⁾	3,293	1.5	62,644	54.8	1,521	2.7
Other items, net	662	0.3	880	0.8	487	0.9
Total income tax expense (benefit)	\$ 35,357	15.7%	\$ 73,981	64.7%	\$ (23,395)	(41.1)%

⁽¹⁾ Our effective tax rate reflects the benefit of our global operations where certain income or loss is taxed at rates higher or lower than The Netherlands' statutory rate of 25% as well as the benefit of some income being partially exempt from income taxes due to various intercompany operating and financing activities. The most significant tax benefits from these foreign operating and financing activities are attributable to subsidiaries in Germany, Singapore, Switzerland, Ireland and Luxembourg. These foreign tax benefits are due to a combination of favorable tax laws, regulations, rulings, and exemptions in these jurisdictions. Additionally in 2016, in certain foreign jurisdictions (primarily Germany and the U.S.), we recorded acquisition related and impairment charges which reduced pretax income in these higher tax jurisdictions.

⁽²⁾ During 2018, we reassessed accruals for tax contingencies, primarily related to ongoing income tax audits.

⁽³⁾ The Netherlands' top statutory corporate income tax rate will be reduced in steps from 25% to 22.55% in 2020 and to 20.5% in 2021. In 2017, we recorded a valuation allowance of \$60.8 million against deferred tax assets related to U.S. disallowed interest carryforwards. We also recorded full valuation allowances against other deferred tax assets on tax losses due to unlikely future profits in other jurisdictions.

⁽⁴⁾ Beginning in 2017, the excess tax benefits from share-based payments activity are reflected as a reduction of income tax expense, whereas previously they were recognized directly in equity.

⁽⁵⁾ Government incentives include favorable tax regulations in the U.S. and the U.K. relating to research and development expense as well as the U.S. Internal Revenue Code Section 199 domestic production activities deduction.

We conduct business globally and, as a result, file numerous consolidated and separate income tax returns in The Netherlands, Germany, and the U.S. Federal jurisdiction, as well as in various other state and foreign jurisdictions. In the normal course of business, we are subject to examination by taxing authorities throughout the world. Tax years in The Netherlands are potentially open back to 2006 for income tax examinations by tax authorities. The German group is open to audit for the tax years starting in 2010. The U.S. consolidated group is subject to Federal and most state income tax examinations by tax authorities beginning with the year ending December 31, 2015 through the current period. Our subsidiaries, with few exceptions, are no longer subject to income tax examinations by tax authorities for years before 2014.

In February 2014, the U.S. tax authorities (Internal Revenue Service) began the audit of our U.S. Federal tax returns for 2011 and 2012 years and the audit was closed in 2016 without any tax adjustments. As a result, we released \$6.6 million of unrecognized tax benefit due to closure of the tax audit. In February 2016, German tax authorities began the audit of the German tax returns for the 2010-2013 tax years and we expect the audit to close in the first half of 2019. The German Tax authority began the audit for the 2014-2016 tax years beginning in February 2019.

Changes in the amount of unrecognized tax benefits for the years ended December 31, 2018, 2017, and 2016 are as follows:

(in thousands)	2018	2017	2016
Balance at beginning of year	\$ 44,033	\$ 18,294	\$ 16,735
Additions based on tax positions related to the current year	3,359	12,212	4,218
Additions for tax positions of prior years	11,984	9,933	5,162
Decrease for tax position of prior years	—	—	(6,796)
Reductions due to lapse of statute of limitations	(1,238)	—	(288)
(Decrease) increase from currency translation	(2,358)	3,594	(737)
Balance at end of year	\$ 55,780	\$ 44,033	\$ 18,294

At December 31, 2018 and 2017, our net unrecognized tax benefits totaled approximately \$55.8 million and \$44.0 million, respectively, of which \$55.8 million and \$44.0 million in benefits, if recognized, would favorably affect our effective tax rate in any future period. It is reasonably possible that approximately \$22.5 million of the unrecognized tax benefits may be released during the next 12 months due to lapse of statute of limitations or settlements with tax authorities; however, various events could cause our current expectations to change in the future. The above unrecognized tax benefits, if ever recognized in the financial statements, would be recorded in the statements of income as part of the income tax expense.

Our policy is to recognize interest accrued related to unrecognized tax benefits in interest expense and penalties within income tax expense. For the years ended December 31, 2018, 2017 and 2016, we have net interest expense and penalties of \$1.1 million, \$1.5 million and \$0.1 million, respectively. At December 31, 2018 and 2017, we have accrued interest of \$4.1 million and \$3.0 million, respectively, which are not included in the table above.

We have recorded net deferred tax liabilities of \$20.5 million and \$37.4 million at December 31, 2018 and 2017, respectively. The components of the net deferred tax asset and liability at December 31, 2018 and 2017 are as follows:

	2018		2017	
(in thousands)	Deferred Tax Asset	Deferred Tax Liability	Deferred Tax Asset	Deferred Tax Liability
Net operating loss and credit carryforward	\$ 27,293	\$ —	\$ 32,530	\$ —
Accrued and other liabilities	15,480	—	15,748	—
Bad debts, inventory and revaluation	8,324	(7,074)	8,997	(1,420)
Property, plant and equipment	3,604	(25,448)	1,103	(23,649)
Intangible assets	1,721	(63,990)	1,289	(93,771)
Share-based compensation	17,998	—	18,143	—
Deferred interest deductions	60,458	—	60,790	—
Convertible debt	8,102	—	10,865	—
Other	4,788	(3,120)	3,162	(3,313)
	147,768	(99,632)	152,627	(122,153)
Valuation allowance	(68,651)	—	(67,849)	—
	\$ 79,117	\$ (99,632)	\$ 84,778	\$ (122,153)
Net deferred tax assets (liabilities)		\$ (20,515)		\$ (37,375)

At December 31, 2018, we had \$408.7 million in total net operating loss (NOL) carryforwards which included the Netherlands, the U.S. and other foreign net operating loss carryforwards of \$30.4 million, \$112.2 million and \$266.1 million, respectively. The entire NOL in the U.S. is subject to limitations under Section 382 of the U.S. Internal Revenue Code. The NOLs in the U.S. will expire beginning December 31, 2024 through December 31, 2034. At December 31, 2018, we recorded \$30.4 million of Netherlands net operating loss, which will expire beginning December 31, 2027. Of the total \$266.1 million foreign NOL carryforwards, \$3.8 million will expire beginning in 2027 through 2028 while the rest of NOL will not expire.

For the years ended December 31, 2018, 2017 and 2016, the net additions charged to income tax expense for the changes in the valuation allowance totaled \$0.8 million, \$62.3 million and \$1.8 million, respectively. The valuation allowance relates to disallowed interest carryforwards and net operating loss carryforwards. The Company can only recognize a deferred tax asset to the extent this is "more likely than not" that these assets will be realized. Judgments around realizability depend on the availability and weight of both positive and negative evidence.

As of December 31, 2018, a deferred tax liability has not been recognized for residual income taxes in The Netherlands on the undistributed earnings of the majority of our foreign subsidiaries as these earnings are considered to be either indefinitely reinvested or can be repatriated tax free under the Dutch participation exemption. The indefinitely reinvested earnings retained by subsidiaries amounted to \$476.2 million at December 31, 2018. Estimating the amount of the unrecognized deferred tax liability on indefinitely reinvested foreign earnings is not practicable. Should the earnings be remitted as dividends, we may be subject to taxes including withholding tax. We have \$25.3 million of undistributed earnings that we do not consider indefinitely reinvested and have recorded deferred taxes or withholding taxes at December 31, 2018 and December 31, 2017, of \$0.9 million and \$1.0 million, respectively.

In December 2017, the SEC staff issued Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cuts and Jobs Act ("SAB 118"). In 2017, we recognized the provisional tax impacts related to the interest expense deduction limitation and the revaluation of deferred tax assets and liabilities and included these amounts in our consolidated financial statements for the year ended December 31, 2017. We completed our analysis within the SAB measurement period and determined there is no change.

17. Equity

Issuance of Warrants

In connection with the issuance of the Cash Convertible Notes as described in Note 15 "Lines of Credit and Debt", we issued Warrants as summarized in the table below. The number of warrants and exercise prices are subject to customary adjustments under certain circumstances. The proceeds, net of issuance costs, from the sale of the Warrants are included as additional paid in capital in the accompanying consolidated balance sheets.

Cash convertible notes	Issued on	Number of share warrants (in millions)	Exercise price per share	Proceeds from issuance of warrants, net of issuance costs (in millions)	Warrants expire over a period of 50 trading days beginning on
2019	March 19, 2014	15.2	\$32.0560	\$40.6	December 27, 2018
2021	March 19, 2014	10.6	\$32.0560	\$28.3	December 29, 2020
2023	September 13, 2017	9.7	\$50.9664	\$45.3	June 26, 2023
2024	November 13, 2018	10.9	\$52.1639	\$72.4	August 27, 2024

The Warrants are exercisable only upon expiration. For each Warrant that is exercised, we will deliver to the holder a number of shares of our common stock equal to the amount by which the settlement price exceeds the exercise price, divided by the settlement price, plus cash in lieu of any fractional shares. The Warrants could separately have a dilutive effect on shares of our common stock to the extent that the market value per share of our common stock exceeds the applicable exercise price of the Warrants (as measured under the terms of the Warrants).

Share Repurchase Programs

On January 31, 2018, we announced our fifth share repurchase program of up to \$200 million of our common shares. During 2018, we repurchased 2.9 million QIAGEN shares for \$104.7 million (including transaction costs).

On April 27, 2016, we announced the launch of our fourth \$100 million share repurchase program. During 2017, 1.9 million QIAGEN shares were repurchased for \$61.0 million (including transaction costs).

The cost of repurchased shares is included in treasury stock and reported as a reduction in total equity when a repurchase occurs. Repurchased shares will be held in treasury in order to satisfy various obligations, which include exchangeable debt instruments, warrants and employee share-based remuneration plans.

Synthetic Share Repurchase

In August 2016, we announced our plan to return approximately \$250.0 million to shareholders through a synthetic share repurchase program that combines a direct capital repayment with a reverse stock split. The synthetic share repurchase was implemented through a series of amendments to our Articles of Association which were approved by our shareholders at an Extraordinary General Meeting (EGM) held on October 26, 2016. The first amendment involved an increase in share capital by an increase in the nominal value per common share from EUR 0.01 to EUR 1.04 and a corresponding reduction in additional paid in capital. The second amendment involved a reduction in stock whereby 27 existing common shares with a nominal value of EUR 1.04 each were consolidated into 26 new common shares with a nominal value of EUR 1.08 each. The third amendment was a reduction of the nominal value per common share from EUR 1.08 to EUR 0.01. As a result of these amendments, which in substance constitute a synthetic share buyback, \$243.9 million was repaid to our shareholders and the outstanding number of common shares was reduced by 8.9, or 3.7%. The capital repayment program was completed in January 2017. Expenses incurred related to the capital repayment and share consolidation amounted to \$0.5 million and were charged to equity.

Accumulated Other Comprehensive Loss

The following table is a summary of the components of accumulated other comprehensive loss as of December 31, 2018 and 2017:

(in thousands)	2018	2017
Net unrealized loss on hedging contracts, net of tax	\$ (15,453)	\$ (30,487)
Net unrealized loss on marketable securities, net of tax	—	(942)
Net unrealized loss on pension, net of tax	(124)	(878)
Foreign currency effects from intercompany long-term investment transactions, net of tax of \$9.3 million and \$7.9 million in 2018 and 2017, respectively	(21,662)	(16,144)
Foreign currency translation adjustments	(273,405)	(172,308)
Accumulated other comprehensive loss	\$ (310,644)	\$ (220,759)

18. Earnings per Common Share

We present basic and diluted earnings per share. Basic earnings per share is calculated by dividing the net income attributable to the owners of QIAGEN N.V. by the weighted average number of common shares outstanding. Diluted earnings per share reflect the potential dilution that would occur if all “in the money” options and warrants to issue common shares were exercised. The following schedule summarizes the information used to compute earnings per common share:

	Years ended December 31,		
(in thousands, except per share data)	2018	2017	2016
Net income attributable to the owners of QIAGEN N.V.	\$ 190,380	\$ 40,394	\$ 80,404
Weighted average number of common shares used to compute basic net income per common share	226,640	228,074	234,800
Dilutive effect of stock options and restrictive stock units	4,613	4,760	4,193
Dilutive effect of outstanding warrants	2,203	175	—
Weighted average number of common shares used to compute diluted net income per common share	233,456	233,009	238,993
Outstanding options and awards having no dilutive effect, not included in above calculation	272	52	210
Outstanding warrants having no dilutive effect, not included in above calculation	35,939	30,434	25,800
Basic earnings per common share attributable to the owners of QIAGEN N.V.	\$ 0.84	\$ 0.18	\$ 0.34
Diluted earnings per common share attributable to the owners of QIAGEN N.V.	\$ 0.82	\$ 0.17	\$ 0.34

19. Commitments and Contingencies

Lease Commitments

We lease facilities and equipment under operating lease arrangements expiring in various years through 2028. Certain rental commitments provide for escalating rental payments or have renewal options extending through

various years. Certain facility and equipment leases constitute capital leases expiring in various years through 2020. The accompanying consolidated balance sheets include the assets and liabilities arising from these capital lease obligations. Rent expense under operating lease agreements not including facility related costs accrued in association with the restructuring activities discussed in Note 6 "Restructuring" was \$25.1 million, \$24.5 million and \$22.4 million for the years ended December 31, 2018, 2017 and 2016, respectively.

Minimum future obligations under capital and operating leases at December 31, 2018 are as follows:

(in thousands)	Capital Leases	Operating Leases
2019	\$ 63	\$ 20,235
2020	23	14,845
2021	—	10,745
2022	—	6,839
2023	—	3,854
Thereafter	—	4,148
	86	\$ 60,666
Less: Amount representing interest	(3)	
	83	
Less: Current portion	(61)	
Long-term portion	\$ 22	

We have licensing agreements with companies, universities and individuals, some of which require certain up-front payments. Royalty payments are required on net product sales ranging from 0.45 percent to 25 percent of covered products or based on quantities sold. Several of these agreements have minimum royalty requirements. The accompanying consolidated balance sheets include accrued royalties relating to these agreements in the amount of \$5.5 million and \$6.7 million at December 31, 2018 and 2017, respectively. Royalty expense relating to these agreements amounted to \$14.0 million, \$16.8 million, and \$35.9 million for the years ended December 31, 2018, 2017 and 2016, respectively. Royalty expense is primarily recorded in cost of sales, with a small portion recorded as research and development expense depending on the use of the technology under license. Some of these agreements also have minimum raw material purchase requirements and requirements to perform specific types of research.

At December 31, 2018, we had commitments to purchase goods or services, and for future license and royalty payments. They are as follows:

(in thousands)	Purchase Commitments	License & Royalty Commitments
2019	\$ 93,214	\$ 11,973
2020	20,804	11,613
2021	8,883	9,167
2022	2,690	6,731
2023	2,690	4,704
Thereafter	—	4,443
	\$ 128,281	\$ 48,631

As of December 31, 2018, future license payments of \$10.5 million and \$24.3 million are included in accrued and other current liabilities and other long-term liabilities, respectively.

Contingent Consideration Commitments

Pursuant to the purchase agreements for certain acquisitions and other contractual arrangements, we could be required to make additional contingent cash payments totaling up to \$57.3 million based on the achievement of certain revenue and operating results milestones as follows: \$23.7 million in 2019, \$22.7 million in 2020, \$5.9 million in 2022 and \$5.0 million, payable in any 12-month period from now until 2028 based on the accomplishment of certain revenue or other milestones, regulatory approvals or clearances. Of the \$57.3 million total contingent obligation as discussed further in Note 14 "Financial Instruments and Fair Value Measurements", we have assessed the fair value at December 31, 2018 to be \$49.0 million, of which \$27.5 million is included in accrued and other current liabilities and \$21.5 million is included in other long-term liabilities in the accompanying consolidated balance sheet.

Employment Agreements

Certain of our employment contracts contain provisions which guarantee the payments of certain amounts in the event of a change in control, as defined in the agreements, or if the executive is terminated for reasons other than cause, as defined in the agreements. At December 31, 2018, the commitment under these agreements totaled \$16.9 million. The employment agreements with the Managing Directors and the German affiliate include a clause, whereby the affiliate will compensate the Managing Directors for potential deductions under Dutch law which, since 2014, has introduced a duty to deduct from a Managing Director's remuneration any increase in the value of shares or options that were part of his pay to the extent that such increase is based on a public offer, merger or other identity changing transaction.

Contingencies

In the ordinary course of business, we provide a warranty to customers that our products are free of defects and will conform to published specifications. Generally, the applicable product warranty period is one year from the date of delivery of the product to the customer or of site acceptance, if required. Additionally, we typically provide limited warranties with respect to our services. From time to time, we also make other warranties to customers, including warranties that our products are manufactured in accordance with applicable laws and not in violation of third-party rights. We provide for estimated warranty costs at the time of the product sale. We believe our warranty reserves as of December 31, 2018 and 2017 appropriately reflect the estimated cost of such warranty obligations. The changes in the carrying amount of warranty obligations for the years ended December 31, 2018 and 2017 are as follows:

(in thousands)	2018	2017
Balance at beginning of year	\$ 3,051	\$ 2,779
Provision charged to cost of sales	2,892	3,024
Usage	(2,760)	(2,859)
Adjustments to previously provided warranties, net	(243)	(54)
Currency translation	(92)	161
Balance at end of year	\$ 2,848	\$ 3,051

Litigation

From time to time, we may be party to legal proceedings incidental to our business. As of December 31, 2018, certain claims, suits or legal proceedings arising out of the normal course of business have been filed or were pending against QIAGEN or our subsidiaries. These matters have arisen in the ordinary course and conduct of

business, as well as through acquisition. Although it is not possible to predict the outcome of such litigation, we assess the degree of probability and evaluate the reasonably possible losses that we could incur as a result of these matters. We accrue for any estimated loss when it is probable that a liability has been incurred and the amount of probable loss can be estimated.

Litigation accruals recorded in accrued and other current liabilities totaled \$6.0 million as of December 31, 2018. The estimated amount of a range of possible losses is between \$5.7 million and \$7.4 million. Based on the facts known to QIAGEN and after consultation with legal counsel, management believes that such litigation will not have a material adverse effect on our financial position or results of operations above the amounts accrued. However, the outcome of these matters is ultimately uncertain, thus any settlements or judgments against us in excess of management's expectations could have a material adverse effect on our financial position, results of operations or cash flows.

For the year ended December 31, 2017, we had settlement amounts related to various acquisition-related litigation matters totaling \$49.2 million, primarily related to PCR-based biomarker disputes and patent litigation, which were settled during 2017 of which \$45.3 million was recorded to general and administrative, restructuring, integration and other expense and \$3.9 million was recorded as a license right. \$44.8 million of the settlement amounts were paid during 2017 and as of December 31, 2017, \$4.4 million was accrued in accrued and other current liabilities.

20. Segment Information

We operate as one operating segment in accordance with the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Topic 280, Segment Reporting. We have a common basis of organization and our products and services are offered globally. Considering the acquisitions made during 2018 and our continued restructuring and streamlining of the growing organization, our chief operating decision maker (CODM) continues to make decisions with regards to business operations and resource allocation based on evaluations of QIAGEN as a whole. Accordingly, we operate and make decisions as one business segment. Summarized product category and geographic information are shown in the tables below.

Product Category Information

Net sales for the product categories are attributed based on those revenues related to sample and assay products and similarly related revenues including bioinformatics solutions, and revenues derived from instrumentation sales. Refer to Note 4 "Revenue" for disaggregation of revenue based on product categories and customer class.

Geographical Information

Net sales are attributed to countries based on the location of the customer. QIAGEN operates manufacturing facilities in Germany, China, and the United States that supply products to customers as well as QIAGEN subsidiaries in other countries. The intersegment portions of such net sales are excluded to derive consolidated net sales. No single customer represents more than ten percent of consolidated net sales. Our country of domicile is the Netherlands, which reported net sales of \$15.9 million, \$15.0 million and \$12.4 million for the years ended 2018, 2017 and 2016, respectively, and these amounts are included in the line item Europe, Middle East and Africa as shown in the table below.

(in thousands)	2018	2017	2016
Net Sales			
Americas:			
United States	\$ 632,660	\$ 579,906	\$ 555,676
Other Americas	60,359	73,478	71,797
Total Americas	693,019	653,384	627,473
Europe, Middle East and Africa	490,301	462,980	428,055
Asia Pacific, Japan and Rest of World	318,528	301,172	282,463
Total	\$ 1,501,848	\$ 1,417,536	\$ 1,337,991

Long-lived assets include property, plant and equipment. The Netherlands, which is included in the balances for Europe, reported long-lived assets of \$1.8 million and \$1.7 million as of December 31, 2018 and 2017, respectively.

(in thousands)	2018	2017
Long-lived assets		
Americas:		
United States	\$ 152,381	\$ 148,694
Other Americas	3,748	4,488
Total Americas	156,129	153,182
Europe, Middle East and Africa:		
Germany	284,601	286,567
Other Europe, Middle East and Africa	50,051	41,188
Total Europe, Middle East and Africa	334,652	327,755
Asia Pacific and Japan	20,878	13,384
Total	\$ 511,659	\$ 494,321

21. Share-Based Compensation

We adopted the QIAGEN N.V. Amended and Restated 2005 Stock Plan (the 2005 Plan) in 2005 and the QIAGEN N.V. 2014 Stock Plan (the 2014 Plan) in 2014. The 2005 Plan expired by its terms in April 2015 and no further awards will be granted under the 2005 Plan. The plans allow for the granting of stock rights and incentive stock options, as well as non-qualified options, stock grants and stock-based awards, generally with terms of up to 5 or 10 years, subject to earlier termination in certain situations. The vesting and exercisability of certain stock rights will be accelerated in the event of a Change of Control, as defined in the plans. All option grants have been at the market value on the grant date or at a premium above the closing market price on the grant date. We issue Treasury Shares to satisfy option exercises and award releases and had approximately 19.9 million Common Shares reserved and available for issuance under the 2005 and 2014 Plans at December 31, 2018.

Stock Options

We have not granted stock options since 2013. A summary of the status of employee stock options as of December 31, 2018 and changes during the year then ended is presented below:

All Employee Options	Number of Shares (in thousands)	Weighted Average Exercise Price	Weighted Average Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
Outstanding at January 1, 2018	1,149	\$ 19.54		
Exercised	(249)	\$ 17.77		
Expired	(2)	\$ 15.84		
Outstanding at December 31, 2018	898	\$ 20.04	2.75	\$ 12,946
Vested at December 31, 2018	898	\$ 20.04	2.75	\$ 12,946
Vested and expected to vest at December 31, 2018	898	\$ 20.04	2.75	\$ 12,946

The total intrinsic value of options exercised during the years ended December 31, 2018, 2017 and 2016 was \$5.0 million, \$3.3 million and \$3.2 million, respectively. The actual tax benefit for the tax deductions from option exercises totaled \$0.8 million, \$0.7 million, and \$0.8 million during the years ended December 31, 2018, 2017 and 2016, respectively. At December 31, 2018, there was no unrecognized share-based compensation expense related to employee stock option awards.

At December 31, 2018, 2017 and 2016, 0.9 million, 1.1 million and 1.4 million options were exercisable at a weighted average price of \$20.04, \$19.54 and \$19.84 per share, respectively. The options outstanding at December 31, 2018 expire in various years through 2023.

Stock Units

Stock units represent rights to receive Common Shares at a future date and include restricted stock units which are subject to time-vesting only and performance stock units which include performance conditions in addition to time-vesting. The final number of performance stock units earned is based on the performance achievement which for some grants can reach up to 120% of the granted shares. There is no exercise price and the fair market value at the time of the grant is recognized over the requisite vesting period, generally up to 5 or 10 years. The fair market value is determined based on the number of stock units granted and the market value of our shares on the grant date. Pre-vesting forfeitures were estimated to be approximately 6.6%. At December 31, 2018, there was \$95.2 million remaining in unrecognized compensation cost including estimated forfeitures related to these awards, which is expected to be recognized over a weighted average period of 2.40 years. The weighted average grant date fair value of stock units granted during the years ended December 31, 2018, 2017 and 2016 was \$35.37, \$31.12 and \$23.81, respectively. The total fair value of stock units that vested during the years ended December 31, 2018, 2017 and 2016 was \$54.3 million, \$69.2 million and \$27.4 million, respectively.

A summary of stock units as of December 31, 2018 and changes during the year are presented below:

Stock Units	Stock Units (in thousands)	Weighted Average Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
Outstanding at January 1, 2018	8,102		
Granted	2,344		
Vested	(1,575)		
Forfeited	(528)		
Outstanding at December 31, 2018	8,343	2.40	\$ 287,419
Vested and expected to vest at December 31, 2018	7,238	2.23	\$ 249,366

Compensation Expense

Share-based compensation expense before taxes for the years ended December 31, 2018, 2017 and 2016 totaled approximately \$40.1 million, \$34.4 million and \$28.3 million, respectively, as shown in the table below.

Compensation Expense (in thousands)	2018	2017	2016
Cost of sales	\$ 2,879	\$ 2,641	\$ 2,553
Research and development	6,457	5,367	4,735
Sales and marketing	9,372	6,820	4,824
General and administrative	21,405	19,614	16,176
Share-based compensation expense	40,113	34,442	28,288
Less: income tax benefit ⁽¹⁾	8,277	7,407	6,223
Net share-based compensation expense	\$ 31,836	\$ 27,035	\$ 22,065

⁽¹⁾ Does not include the excess tax benefit realized for the tax deductions of the share-based payment arrangements which totaled \$4.7 million, \$5.2 million and \$0.8 million, respectively, for the years ended December 31, 2018, 2017 and 2016.

Following the 2016 restructuring program discussed in Note 6 "Restructuring", share-based compensation expense in 2017 and 2016 includes forfeitures of \$0.7 million and \$2.0 million, respectively, in connection with the restructuring terminations. No share-based compensation costs were capitalized for the years ended December 31, 2018, 2017 or 2016 as the amounts were not material.

22. Employee Benefits

We maintain various benefit plans, including defined contribution and defined benefit plans. Our U.S. defined contribution plan is qualified under Section 401(k) of the Internal Revenue Code, and covers substantially all U.S. employees. Participants may contribute a portion of their compensation not exceeding a limit set annually by the Internal Revenue Service. This plan includes a provision for us to match a portion of employee contributions. Total expense under the 401(k) plans, including the plans acquired via business acquisitions, was \$4.0 million, \$3.6 million and \$2.5 million for the years ended December 31, 2018, 2017 and 2016, respectively. We also have a defined contribution plan which covers certain executives. We make matching contributions up to an established maximum. Matching contributions made to the plan, and expensed, totaled approximately \$0.2 million in each year ended December 31, 2018 and approximately \$0.3 million in each year ended December 31, 2017 and 2016.

We have five defined benefit, non-contributory retirement or termination plans that cover certain employees in Germany, France, Japan, Italy and the United Arab Emirates. These defined benefit plans provide benefits to covered individuals satisfying certain age and/or service requirements. For certain plans, we calculate the vested benefits to which employees are entitled if they separate immediately. The benefits accrued on a pro-rata basis during the employees' employment period are based on the individuals' salaries, adjusted for inflation. The liability under the defined benefit plans was \$7.4 million at December 31, 2018 and \$8.0 million at December 31, 2017, and is included as a component of other long-term liabilities on the accompanying consolidated balance sheets.

23. Related Party Transactions

From time to time, we have transactions with other companies in which we hold an interest, all of which are individually and in the aggregate immaterial, as summarized in the table below.

	For the years ended December 31,		
(in thousands)	2018	2017	2016
Net sales	\$ 23,358	\$ 3,852	\$ 1,360

Net sales with related parties primarily reflects our ventures in China including our joint venture with Sichuan Maccura Biotechnology Co., Ltd with a focus on accelerating the growth of our GeneReader NGS System as well as the partnership to externalize the HPV test franchise for cervical cancer screening in China. Accounts receivable from related parties totaled \$10.1 million and \$3.8 million as of December 31, 2018 and 2017, respectively.

	As of December 31,	
(in thousands)	2018	2017
Other long-term assets	\$ 24,300	\$ 17,713
Accrued and other current liabilities	\$ 5,488	\$ 9,028
Other long-term liabilities	\$ —	\$ 3,075

Other long-term assets include long-term loan receivables from companies with which we have an investment or partnership interest.

During 2018, we purchased a convertible note for \$15.0 million from a privately held company. The note is due in December 2021 and bears interest at 8%. In the event the company goes public, the note will convert into common shares in the company ranking pari-passu with existing common shares.

During 2018, we converted a note receivable from a non-publicly traded company, considered a related party, into an equity interest in that company. This note held a balance of \$11.4 million including principal balance and accrued interest at conversion.

During 2017, we purchased a convertible note for \$3.0 million from a publicly listed company considered a related party. The note is due in October 2020 and bears interest of 3.0%. As of December 31, 2018, the principal and accrued interest of this note totals \$2.9 million and is included in other long-term assets, while the remaining \$0.3 million is attributable to the embedded derivative, that is bifurcated and measured at fair value, associated to a convertible feature of this note.

As discussed in Note 10 "Investments", during 2016 we acquired a 19.0% interest in Hombrechtikon Systems Engineering AG (HSE) for a total obligation of \$9.8 million payable over 3 years. During the year ended December 31, 2018, we had research and development expense incurred with HSE for a total of \$12.2 million. As of December 31, 2018, the remaining obligation from the acquisition together with amounts payable from research and development services totaled \$5.3 million, of which \$3.5 million was included in accounts payable and \$1.8 million was included in accrued and other current liabilities in the accompanying consolidated balance sheet. As of December 31, 2017, the total remaining obligation was \$6.2 million, of which \$3.1 million was included in accrued and other current liabilities and \$3.1 million was included in other long-term liabilities in the accompanying consolidated balance sheet.

24. Subsequent Events

On January 7, 2019, we announced the acquisition of N-of-One, Inc, a privately-held U.S. molecular decision support company and pioneer in clinical interpretation services for complex genomic data. The cash consideration totaled approximately \$26.0 million. The acquisition included contingent consideration which is recorded as part of the purchase price based on the acquisition date fair value. The addition of N-of-One will enable QIAGEN to significantly expand its decision-support solutions while offering a broader range of software, content and service-based solutions. It will also enable QIAGEN to provide customers with greater access to valuable genomic data assets and service offerings. N-of-One is not expected to provide a significant contribution to our results in 2019.

January 31, 2019, we acquired the digital PCR assets of Formulatrix, Inc., a developer of laboratory automation solutions. Combining the Formulatrix assets with QIAGEN technologies and automation, we expect to bring to market a fully integrated digital PCR solution with a targeted launch in 2020. We agreed to pay Formulatrix \$125.0 million in cash upon closing and future milestone payments of \$135.9 million in 2020.

FINANCIAL RESULTS

Auditor's Report

Report of independent registered public accounting firm

To the Stockholders and Supervisory Board

QIAGEN N.V.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of QIAGEN N.V. and subsidiaries (the "Company") as of December 31, 2018 and 2017, the related consolidated statements of income, comprehensive income, changes in equity, and cash flows for each of the years in the three-year period ended December 31, 2018, and the related notes and financial statement schedule as listed in Item 18 (A) (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the years in the three-year 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 (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated March 5, 2019 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 2 to the consolidated financial statements, the Company has changed its method of accounting for revenue from contracts with customers in 2018 due to the adoption of Accounting Standards Codification Topic 606 - Revenue from Contracts with Customers.

Basis for Opinion

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

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing

procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ KPMG AG Wirtschaftsprüfungsgesellschaft

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

Düsseldorf, Germany

March 5, 2019

Report of independent registered public accounting firm

To the Stockholders and Supervisory Board

QIAGEN N.V.:

Opinion on Internal Control Over Financial Reporting

We have audited QIAGEN N.V.'s and subsidiaries' (the "Company") internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2018 and 2017, the related consolidated statements of income, comprehensive income, changes in equity, and cash flows for each of the years in the three-year period ended December 31, 2018, and the related notes and financial statement schedule as listed in Item 18 (A) (collectively, the consolidated financial statements), and our report dated March 5, 2019 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our

audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

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

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

/s/ KPMG AG Wirtschaftsprüfungsgesellschaft

Düsseldorf, Germany

March 5, 2019

FINANCIAL RESULTS

List of Subsidiaries

The following is a list of the Registrant's subsidiaries as of December 31, 2018, other than certain subsidiaries that did not in the aggregate constitute a significant subsidiary.

Company Name	Jurisdiction of Incorporation
Amnisure International, LLC	USA
Cellestis Pty. Ltd.	Australia
QIAGEN Aarhus A/S	Denmark
QIAGEN AB	Sweden
QIAGEN AG	Switzerland
QIAGEN Australia Holding Pty. Ltd.	Australia
QIAGEN Benelux B.V.	Netherlands
QIAGEN Beverly, LLC	USA
QIAGEN China (Shanghai) Co. Ltd.	China
QIAGEN Deutschland Finance Holding (Luxembourg) SARL	Luxembourg
QIAGEN Deutschland Holding GmbH	Germany
QIAGEN Finance (Ireland) Ltd.	Ireland
QIAGEN Finance (Malta) Ltd.	Malta
QIAGEN France S.A.S.	France
QIAGEN Gaithersburg, LLC	USA
QIAGEN GmbH	Germany
QIAGEN Hamburg GmbH	Germany
QIAGEN Inc. (Canada)	Canada
QIAGEN Instruments AG	Switzerland
QIAGEN K.K.	Japan
QIAGEN Lake Constance GmbH	Germany
QIAGEN, LLC	USA
QIAGEN Ltd.	UK
QIAGEN Manchester Ltd.	UK
QIAGEN Marseille SA	France
QIAGEN North American Holdings Inc.	USA
QIAGEN Pty. Ltd.	Australia
QIAGEN Redwood City, Inc.	USA
QIAGEN Sciences, LLC	USA
QIAGEN S.r.l.	Italy
QIAGEN U.S. Finance Holdings (Luxembourg) SARL	Luxembourg
QIAGEN U.S. Finance, Inc.	USA