Gross margin increased in 2017 compared to 2016 due primarily to a shift in mix to Services and an overall increase in product volumes. Gross margin percentage decreased year-over-year due primarily to higher product costs, partially offset by a favorable shift in mix to Services. The weakness in foreign currencies relative to the U.S. dollar had an unfavorable impact on gross margin and gross margin percentage during 2017.

The Company anticipates gross margin percentage during the first quarter of 2019 to be between 38.0% and 38.5%. The foregoing statement regarding the Company's expected gross margin percentage in the first quarter of 2019 is forward-looking and could differ from actual results. The Company's future gross margins can be impacted by multiple factors including, but not limited to, those set forth in Part I, Item 1A of this Form 10-K under the heading "Risk Factors" and those described in this paragraph. In general, the Company believes gross margins will be subject to volatility and remain under downward pressure due to a variety of factors, including: continued industry-wide global product pricing pressures and product pricing actions that the Company may take in response to such pressures; increased competition; the Company's ability to effectively stimulate demand for certain of its products; compressed product life cycles; potential increases in the cost of components and outside manufacturing services; the Company's ability to manage product quality and warranty costs effectively; shifts in the mix of products and services, or in the geographic, currency or channel mix; fluctuations in exchange rates; and costs associated with the Company's frequent introductions and transitions of products and services.

Operating Expenses

Operating expenses for 2018, 2017 and 2016 were as follows (dollars in millions):

	2018	Change	2017		Change	2016	
Research and development	\$ 14,236	23%	\$	11,581	15%	\$ 10,045	
Percentage of total net sales	5%			5%		5%	
Selling, general and administrative	\$ 16,705	9%	\$	15,261	8%	\$ 14,194	
Percentage of total net sales	6%			7%		7%	
Total operating expenses	\$ 30,941	15%	\$	26,842	11%	\$ 24,239	
Percentage of total net sales	12%			12%		11%	

Research and Development

The year-over-year growth in R&D expense in 2018 was driven primarily by increases in headcount-related expenses, infrastructure-related costs and material costs to support expanded R&D activities. R&D expense increased during 2017 compared to 2016 due primarily to increases in headcount-related expenses and material costs to support expanded R&D activities. The Company continues to believe that focused investments in R&D are critical to its future growth and competitive position in the marketplace, and to the development of new and updated products and services that are central to the Company's core business strategy.

Selling, General and Administrative

The year-over-year growth in selling, general and administrative expense in 2018 was driven primarily by increases in in headcount-related expenses, professional services and infrastructure-related costs. The increase in selling, general and administrative expense in 2017 compared to 2016 was driven primarily by an increase in headcount-related expenses, variable selling expenses and infrastructure-related costs.

Other Income/(Expense), Net

Other income/(expense), net for 2018, 2017 and 2016 was as follows (dollars in millions):

	2018	Change	2017		Change	2016	
Interest and dividend income	\$ 5,686		\$	5,201		\$	3,999
Interest expense	(3,240)			(2,323)			(1,456)
Other expense, net	(441)			(133)			(1,195)
Total other income/(expense), net	\$ 2,005	(27)%	\$	2,745	104%	\$	1,348

The year-over-year decrease in other income/(expense), net during 2018 was due primarily to higher interest expense on debt and the impact of foreign exchange—related items, partially offset by higher interest income. The year-over-year increase in other income/ (expense), net during 2017 was due primarily to higher interest income and the favorable impact of foreign exchange—related items, partially offset by higher interest expense on debt. The weighted-average interest rate earned by the Company on its cash, cash equivalents and marketable securities was 2.16%, 1.99% and 1.73% in 2018, 2017 and 2016, respectively.