

Operating Expenses

Sales and Marketing Expense

	Year Ended December 31,		Change	
	2018	2017	\$	%
	(dollars in thousands)			
Sales and marketing	\$ 69,608	\$ 46,998	\$ 22,610	48.1%
% of revenue	47%	45%		

Sales and marketing expense increased by \$22.6 million in 2018 compared to 2017. The increase was primarily due to a \$20.0 million increase in employee-related costs, which includes stock-based compensation, associated with our increased headcount from 215 employees as of December 31, 2017 to 286 employees as of December 31, 2018. The remaining increase was principally the result of a \$1.8 million increase in trade show and advertising costs and a \$0.8 million increase attributed to office related expenses to support the sales team. The adoption of ASC 606 did not have a material impact on the change in commission expense when compared to year over year.

Research and Development Expense

	Year Ended December 31,		Change	
	2018	2017	\$	%
	(dollars in thousands)			
Research and development	\$ 41,305	\$ 22,241	\$ 19,064	85.7%
% of revenue	28%	21%		

Research and development expense increased by \$19.1 million in 2018 compared to 2017. The increase was primarily due to a \$18.1 million increase in employee-related costs, which includes stock-based compensation, associated with our increased headcount from 159 employees as of December 31, 2017 to 229 employees as of December 31, 2018. The remaining increase was principally the result of a \$2.9 million increase in hosting and software related cost to support research and development activities and an increase of \$0.3 million in software subscription cost which was offset by a \$1.0 million decrease in office related expenses to support research and development activities. A total of \$7.8 million of internally-developed software costs during 2018 and \$6.3 million of internally-developed software costs during 2017 were capitalized, resulting in a decrease of the expense by \$1.4 million compared to 2017.

General and Administrative Expense

	Year Ended December 31,		Change	
	2018	2017	\$	%
	(dollars in thousands)			
General and administrative	\$ 31,462	\$ 22,895	\$ 8,567	37.4%
% of revenue	21%	22%		

General and administrative expense increased by \$8.6 million in 2018 compared to 2017. The increase was primarily due to a \$3.7 million increase in employee-related costs, which includes stock-based compensation, associated with our increased headcount from 79 employees as of December 31, 2017 to 89 employees as of December 31, 2018. There was an additional increase of \$2.8 million in depreciation and amortization, an increase of \$1.5 million to support compliance as a public company, an increase of \$0.4 million in software subscription cost and a \$0.2 million increase in office related expenses to support the administrative team.