

THE 2017 M&A REPORT

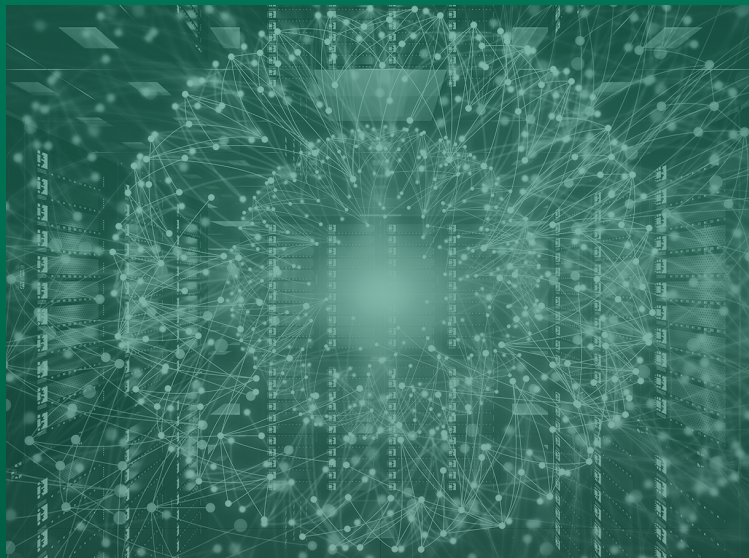
THE TECHNOLOGY TAKEOVER



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THE TECHNOLOGY TAKEOVER

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EXECUTIVE SUMMARY

TECH ISN'T JUST FOR tech companies anymore—and it hasn't been for some time. Nearly every industry has been affected by digital and mobile technologies, and many have been upended. Other advances, such as robotics and additive manufacturing, are also taking hold. No company can afford to ignore the impact of technology on everything from supply chains to customer engagement, and the advent of even more advanced technologies, such as artificial intelligence (AI) and the Internet of Things, portends more far-reaching change. The question is, How do companies rapidly access the technologies that can advance their businesses and integrate them successfully with their current operations?

For an increasing number of organizations, the answer is to buy rather than to build. Acquisitions of high-tech targets have become an instrument of choice for buyers in all sectors looking to boost innovation, streamline operations and processes, shape customer journeys, and personalize products, services, and experiences. High-tech deals represented almost 30% of the total \$2.5 trillion of completed M&A transactions in 2016. Approximately 70% of all tech deals in 2016—9 percentage points more than in 2012—involved buyers from outside the tech sector.

The 2017 M&A report examines three questions:

- **What moves global M&A?** Our analysis of M&A activity in 2016 and during the first half of 2017 highlights three global trends: China's increasing appetite for international M&A, private equity's insatiable need to invest, and, yes, the growing volume of deals involving tech targets.
- **What does the tech M&A marketplace look like?** Big tech deals, such as the acquisition of LinkedIn by Microsoft and the purchase of Germany's KUKA by China's Midea, are hard to ignore. But behind the headlines, little is actually known about the underlying drivers in this booming market when it comes to the key players, their motivations, and the current trends and valuation levels. An analysis based on BCG's

proprietary Technology Deals Database—which includes more than 43,000 high-tech M&A transactions over the past 20 years and which BCG built expressly to examine acquisitions involving high technology targets—sheds light.

- ***Do tech acquisitions pay off for acquirers?*** *Given a median enterprise value (EV)/sales multiple of 2.9 in 2016, and a total deal value almost reaching the levels of 2000, one has to ask whether tech M&A is adding value for shareholders. We look at the announcement returns of more than 37,000 high-tech deals performed by both tech companies and traditional industrial acquirers and review acquisition strategies for technology targets.*

M&A activity remains robust.

- On the basis of completed deal volume, some 26,000 deals took place worldwide in 2016—a level similar to that of the previous year and approaching the boom years of 1999 and 2007. Aggregate deal value totaled about \$2.5 trillion, on par with 2015.
- Valuations remain high. The median EV/EBITDA multiple of about 13.6 has stayed well above the historical average of 12.0, reflecting continuing inexpensive financing and increased competition for targets. Since market trading multiples are already high, buyers struggle to find additional synergies to justify still-higher takeover premiums. But the combination of cheap money and the need to find growth in mature economies weighs heavily on the minds of CEOs.

Three big trends drove M&A activity in 2016.

- China embarked on a global shopping spree in 2016, more than doubling its 2015 announced deal value to reach almost \$200 billion. About two-thirds of China's M&A activity today is outbound, and the past focus on natural resources has broadened; Europe and North America have emerged as the most attractive target regions.
- Continuing a trend of the past several years, private equity firms racked up another record year of deal making while increasing their reserves of dry powder at the same time. These firms face ever-increasing pressure to put their resources to work.
- Deal making in the tech sector, including digital deal volume, has surged. Even as the overall M&A market has grown significantly over the past five years, the share of deals involving a tech target has risen even faster. Today, one out of every five transactions has a clear link to some form of technology.

Tech has emerged as a major driver of overall M&A.

- Deal volume and value involving tech targets have significantly outpaced the overall M&A market since 2012. In 2016, these deals totaled more than \$700 billion.

- Two tech M&A market segments are taking shape, distinguished by size of the deal. Large-cap deals (more than \$500 million) are the main driver of aggregate deal values, but there is also an active marketplace for small acquisitions. More than 80% of the volume of tech M&A is made up of transactions with a target valued at \$100 million or less.
- The biggest factor driving tech M&A is the rise in acquisitions of tech targets by companies from other sectors. The share of acquirers of tech targets from outside the tech industry has grown by 9 percentage points since 2012, to around 70% of all tech transactions. Every industry in our database showed a significant increase in the share of tech deals since 2012.
- Our data indicates that nine trends are driving market growth. Three of the biggest are the rise of Industry 4.0, a big increase in cloud computing and cloud-based solutions, and the search for mobile tech and software application providers.
- While tech EV/EBIT multiples are at lofty levels—an average of 24 over the past three years, well above the long-term average of 20—transaction multiples involving nontech targets have risen by similar amounts. High valuation levels are currently a fact across the full M&A market and not necessarily a sign of an industry-centric tech bubble ahead.

Tech deals add value for the acquirer approximately 50% of the time, which is about the same success rate as for all deals, but companies can push the odds in their favor.

- Investors are wary of large transformational deals and transactions involving minority stakes.
- In the short term, the market rewards first-time tech acquirers more than it does experienced dealmakers; new acquirers earn the largest returns at announcement.
- In the longer term, experience counts. Serial tech-target acquirers outperform, while less experienced companies underperform one year after acquisition.
- Successful acquirers of tech firms do three things right: they follow a focused strategy, they develop a tailor-made M&A process for tech targets, and they build the right corporate organization to find, execute, and integrate innovative tech firms.

WHAT MOVES GLOBAL M&A?

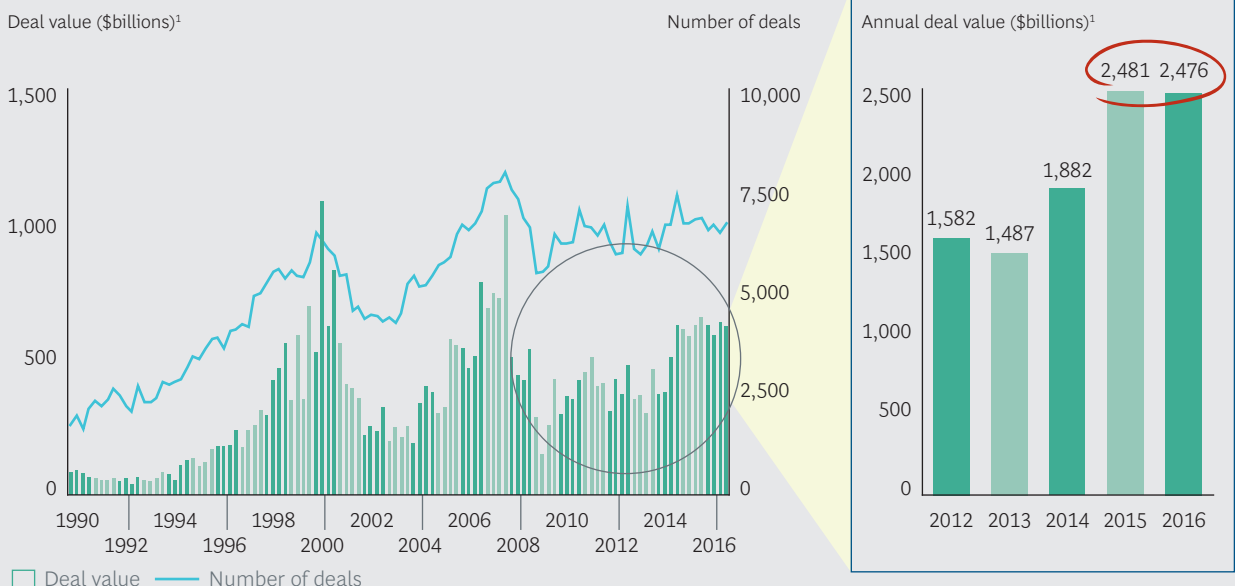
M &A ACTIVITY REMAINS ROBUST. On the basis of completed deal volume, some 26,000 deals took place worldwide in 2016—a level similar to that of the previous year and approaching the boom years of 1999 and 2007. Aggregate deal value totaled about \$2.5 trillion, on par with 2015. (See Exhibit 1.)

The value of closed deals in 2016 was about \$100 billion lower than expected because of several rejected takeover advances (such as that of Medivation by Sanofi and Hershey by Mondelez International), megadeals that did not go through (Deutsche Börse and the London Stock Exchange Group, for example), and

EXHIBIT 1 | Global M&A Activity Remained Strong in 2016

M&A ACTIVITY REMAINS NEAR ALL-TIME HIGHS

DEAL VALUE OF COMPLETED DEALS IN 2016 IS ON PAR WITH 2015



Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 555,131 M&A transactions comprises completed and unconditional deals announced between 1990 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, exchange offers, repurchases, acquisitions of remaining interest, minority stake purchases, privatizations, and spinoffs were excluded.

¹Enterprise values include the net debt of targets.

transactions that were still in regulatory review at year end, including Bayer’s acquisition of Monsanto, China National Chemical’s takeover of Syngenta, AT&T’s purchase of Time Warner, and British American Tobacco’s acquisition of Reynolds American.

In last year’s M&A report, we observed that the direction of the market was not clear, and we questioned how long the heights could be maintained. (See *The 2016 M&A Report: Masters of the Corporate Portfolio*, BCG report, August 2016.) One year later, the path remains unclear, with many of the same fundamental factors in place.

High Valuations

Valuations remain high. The median EV/EBITDA multiple of about 13.6 has stayed well above the historical average of 12.0 and close to the ten-year high of 13.7 in 2007. (See Exhibit 2.) This reflects continuing inexpensive financing and increased competition for targets. The average one-week deal premium (the amount by which the offer price exceeds the target’s closing stock price one

week before the announcement date) of 32% is close to the long-term average of 33%. Market trading multiples are already high, and buyers struggle to find additional synergies to justify significant takeover premiums.

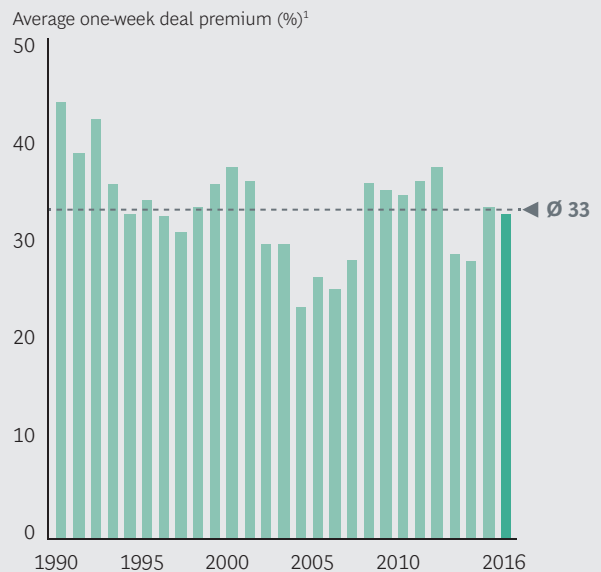
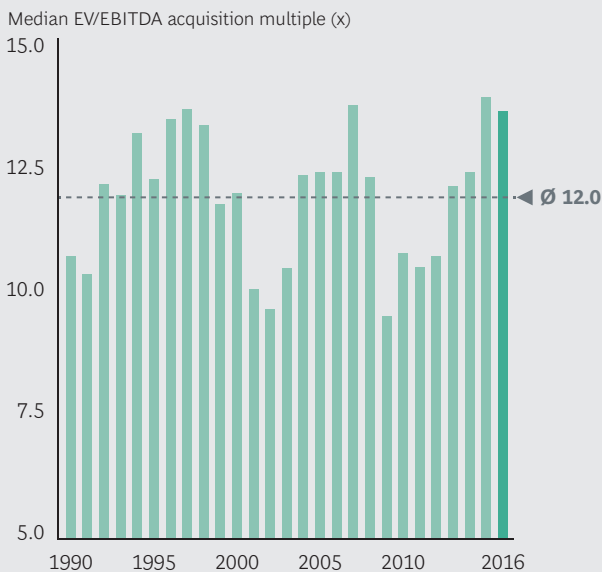
Despite political uncertainty in the US and Europe, global M&A activity has maintained its momentum, with almost \$1.3 trillion in announced deal value in the first half of 2017, well above the historical average of \$1.2 trillion. (See Exhibit 3.) Deal volume has also been running above average, with more than 22,000 deals announced in the first half of the past three years.

We observed last year that several factors were encouraging corporate caution and promoting market unpredictability. These included political uncertainty, volatility in equity markets, expected increases in interest rates, and tightening of regulations, particularly with respect to tax-driven deals. It’s hard to argue that the political seas have calmed in the past 12 months. Indeed, in some areas—such as the prospects for global trade and continued global economic integration—they are more

EXHIBIT 2 | Above-Average Valuation Levels Persist

VALUATION LEVELS ARE COMPARABLE WITH PREVIOUS YEARS...

...WHILE DEAL PREMIUMS ARE SLIGHTLY BELOW THE LONG-TERM AVERAGE



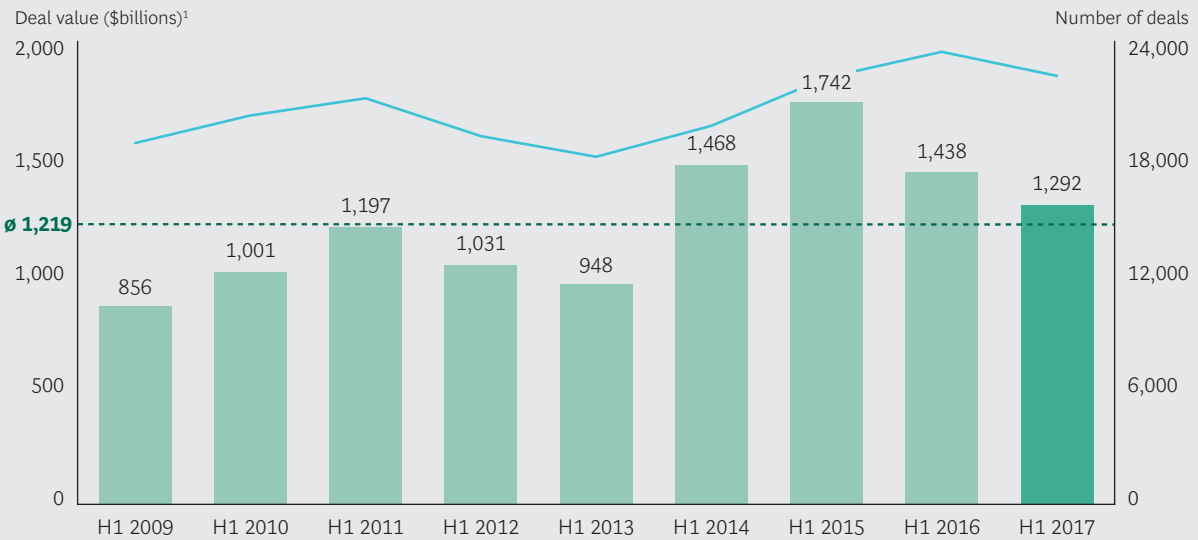
Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 18,493 M&A transactions comprises completed, unconditional, and pending deals announced between 1990 and 2016, with transactions of at least \$25 million and at least a 75% share transfer. Self-tenders, recapitalizations, exchange offers, repurchases, acquisitions of remaining interest, minority stake purchases, privatizations, and spinoffs were excluded. Only deals with a disclosed deal value were considered.

¹The acquisition premium is the amount by which the target’s offer price exceeds its closing stock price one week before the original announcement date; the top 2.5% of deals were excluded to reduce distortion by outliers.

EXHIBIT 3 | Activity in the First Half of 2017 Remained Above the Long-Term Average

ANNOUNCED M&A ACTIVITY IN THE FIRST HALF OF THE YEAR, FROM 2009 THROUGH 2017



Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 184,457 M&A transactions comprises completed, unconditional, and pending deals announced in the first half of each year from 2009 through 2017, with no transaction-size threshold. Self-tenders, recapitalizations, exchange offers, and repurchases were excluded. Only deals with a disclosed deal value were considered.

¹The enterprise values include the net debt of targets.

roiled than ever. Nonetheless, markets seem to have regained confidence, and activity continues at full speed, despite broader uncertainties and increasing concerns about whether or not a peak has been reached or a potential bubble has begun to form.

Two macro factors still weigh heavily on the minds of CEOs: low growth in mature economies and cheap money. With a few exceptions, organic growth is hard to come by, and while shareholders used to look skeptically at attempts to grow inorganically, they now realize that M&A offers one of the few proven avenues to higher revenues and earnings. At current borrowing rates, at least in developed markets, acquisitions are easily and inexpensively financed. The first factor, low growth, is likely to be with us for some time. The second, cheap money, is more likely to reach an expiration date. However, we might observe differences in geographic momentum given that the European Central Bank is staying put while the US Federal Reserve is increasing rates slowly.

Three Big Trends

Embedded in this worldwide investment climate are three major M&A trends.

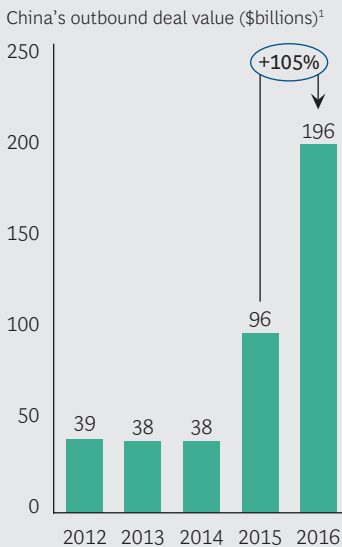
China goes shopping. China embarked on a global shopping spree in 2016, more than doubling, to almost \$200 billion, its 2015 announced deal value. About two-thirds of China's M&A activity today is outbound, with Europe and North America emerging as the most attractive target regions. (See Exhibit 4.)

Several factors are fueling deal activity, including rising consumption by the growing middle class and the execution of the latest five-year plan, which recognizes that M&A is an important means of gaining access to strategic technologies and expanding the country's commercial capabilities. Midea's acquisition of Germany's KUKA, for example, brought robotics expertise to China's (and the world's) largest appliance manufacturer while also providing KUKA with greater access to the world's most important automotive production market. Chinese outbound deal volume slowed somewhat in the first half of 2017, but we attribute this to the record heights achieved during the prior year and see the general trend continuing.

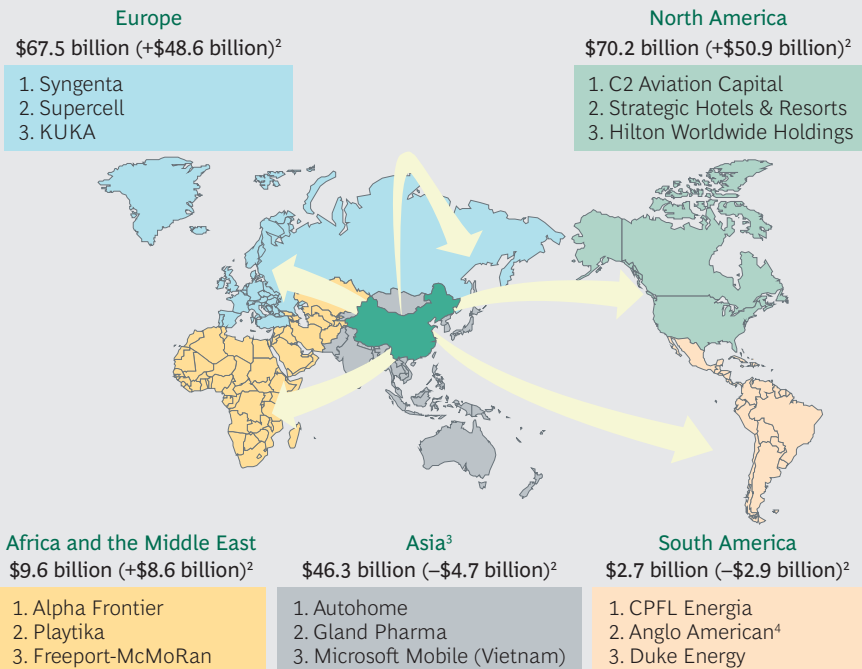
Health care and private equity buyers have been particularly active. The acquisition of Gland Pharma of India strengthens Shanghai

EXHIBIT 4 | China's Increasing Appetite for Deals Fuels Global M&A Activity

THE HIGH DEAL VALUE IN 2016 IS UNPRECEDENTED



THE TOP THREE CHINESE M&A OUTBOUND TRANSACTIONS, BY REGION, IN 2016¹



Sources: Thomson ONE Banker; BCG analysis.

¹Enterprise values include the net debt of targets from completed, unconditional, and pending deals announced between 2012 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, exchange offers, repurchases, acquisitions of remaining interest, minority stake purchases, privatizations, and spinoffs were excluded.

²The amount in parentheses is the change from 2015.

³Excludes China.

⁴Acquisition of the niobium and phosphates businesses.

Fosun Pharmaceutical Development's international business and its position in generics. The acquisition of Playtika by a consortium of several private equity players led by Chongqing New Century Cruise, now known as Shanghai Giant Network Technology, allowed the Chinese firm to enter the online gambling market overseas. (Playtika is headquartered in Israel and has studios in several countries, including Argentina, Australia, Canada, Japan, and the United States.) China is also a player in the rising number of tech deals: approximately 20% of 2016 outbound acquisitions by Chinese companies involved tech companies.

Private equity keeps buying. Private equity firms racked up another record year of deal making while increasing their reserves of dry powder at the same time, continuing a trend of the past several years. (See Exhibit 5.) These firms face ever-growing pressure to put their resources to work.

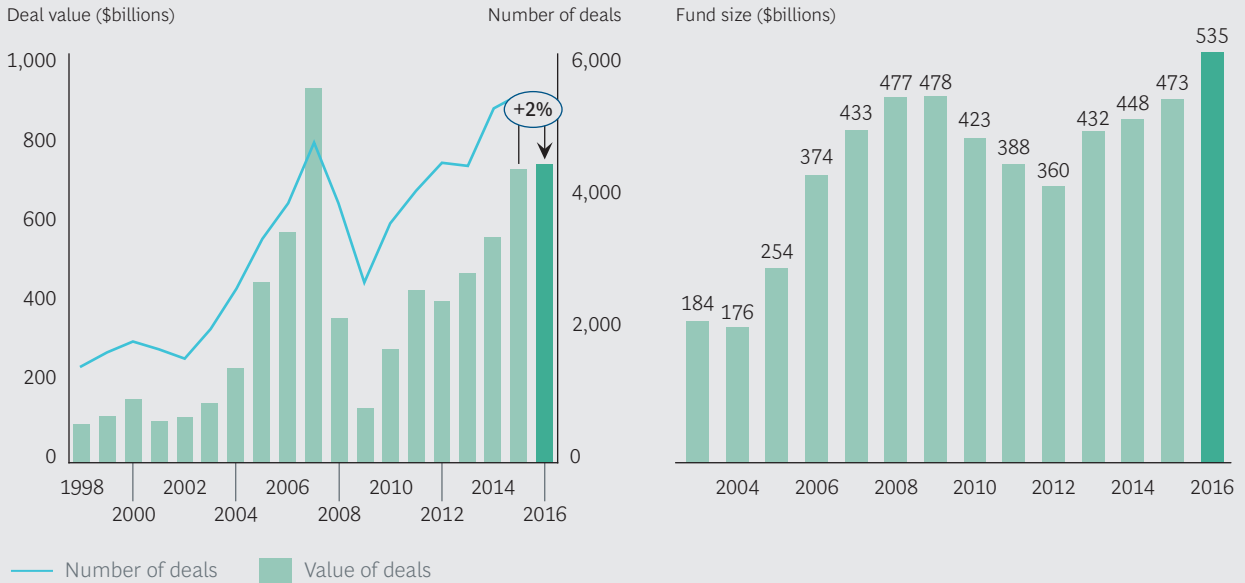
That said, we see an increasingly challenging environment for private equity buyers as they face both record-high target multiples and more competition from cash-rich corporate acquirers. The number of high-quality assets is shrinking, and wary lenders are demanding that firms put up larger equity shares to get transactions done. (See Exhibit 6.) Despite low interest rates, this market environment challenges private equity buyers to execute operationally in order to achieve their target returns.

Tech M&A resurges. "Digital disruption" has evolved from a tech term to a boardroom reality in industry after industry. As the pace of technology-driven change accelerates, a key question for senior executives has become: how do we position ourselves in a highly disruptive ecosystem? More often than not, acquisitions of tech-driven, and especially digital, business models have become the instrument of choice to acquire needed

EXHIBIT 5 | Despite Continued High Spending, Private Equity Dry Powder Is at Unmatched Levels

PRIVATE EQUITY DEAL ACTIVITY CONTINUES TO INCREASE¹

BUT DRY POWDER IS ON A STEADY RISE NEVERTHELESS²



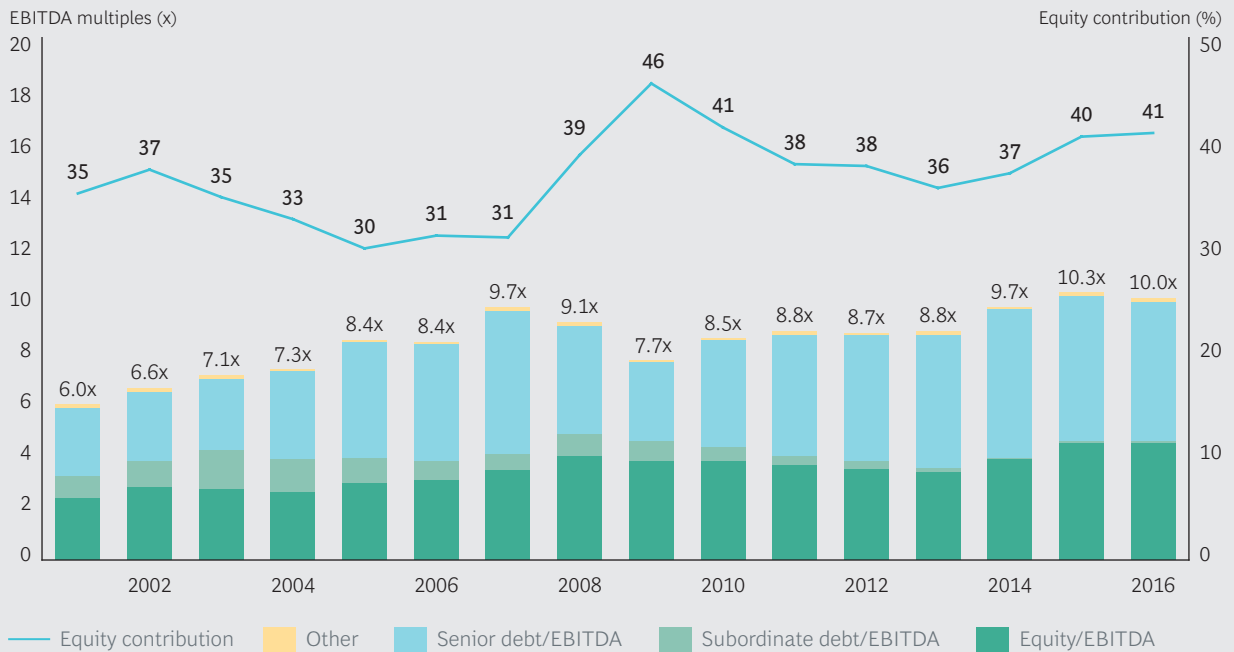
Sources: Thomson ONE Banker; Preqin; BCG analysis.

¹The total of 69,392 private equity transactions comprises completed and unconditional deals announced between 1998 and 2016 involving private equity sponsors with at least 75% of shares acquired or divested. Self-tenders, recapitalizations, exchange offers, repurchases, acquisitions of remaining interest, minority stake purchases, privatizations, and spinoffs were excluded.

²Buyout funds only.

EXHIBIT 6 | Private Equity Acquirers Face Record-High Multiples While Credit Conditions Tighten

EQUITY SHARES HAVE BEEN RISING SINCE 2013



Sources: S&P Capital IQ; BCG analysis.

technologies, capabilities, and products and to close innovation gaps.

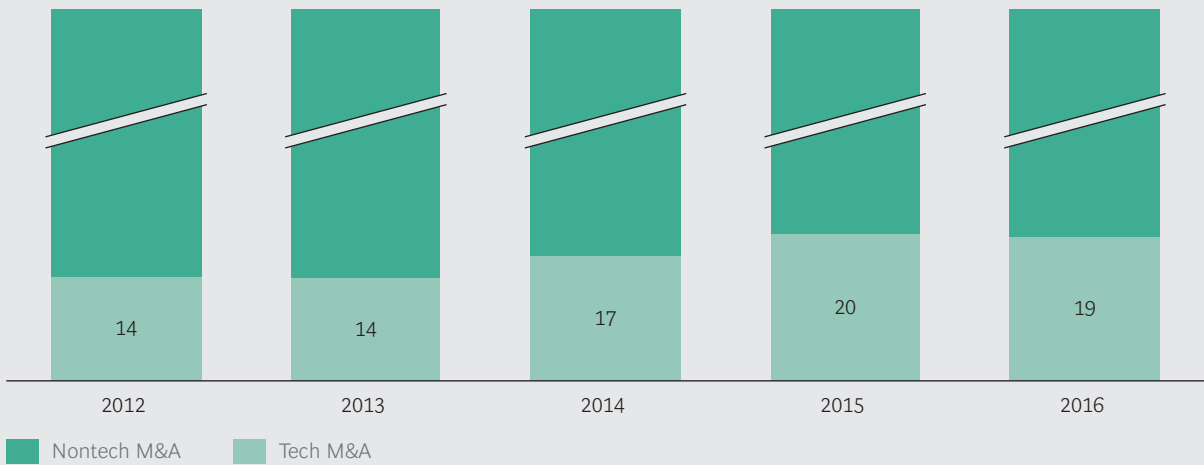
Though the overall M&A market has grown significantly over the past five years, the share of deals involving a tech target has been rising even faster. Today, one out of every five transactions has a clear link to some form of technology, and the value of these deals as a percentage of the overall market is even greater. (See Exhibit 7.)

Deals involving technology targets differ in many respects from traditional M&A. Corporate leaders contemplating tech transactions need to reconsider how they pursue M&A, including deal strategy, deal execution, valuation, synergies, and postmerger integration. We explore the tech M&A marketplace, including the rising prominence of buyers from nontech sectors, in the next chapter.

EXHIBIT 7 | Tech M&A Is on the Rise

ALMOST ONE OUT OF EVERY FIVE TRANSACTIONS INVOLVES A TECH TARGET TODAY

Tech M&A as a share of total M&A deal volume (%)



Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 68,568 tech M&A transactions comprises completed and unconditional deals announced between 2012 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, and repurchases were excluded. Only deals with a disclosed deal value were considered in this analysis.

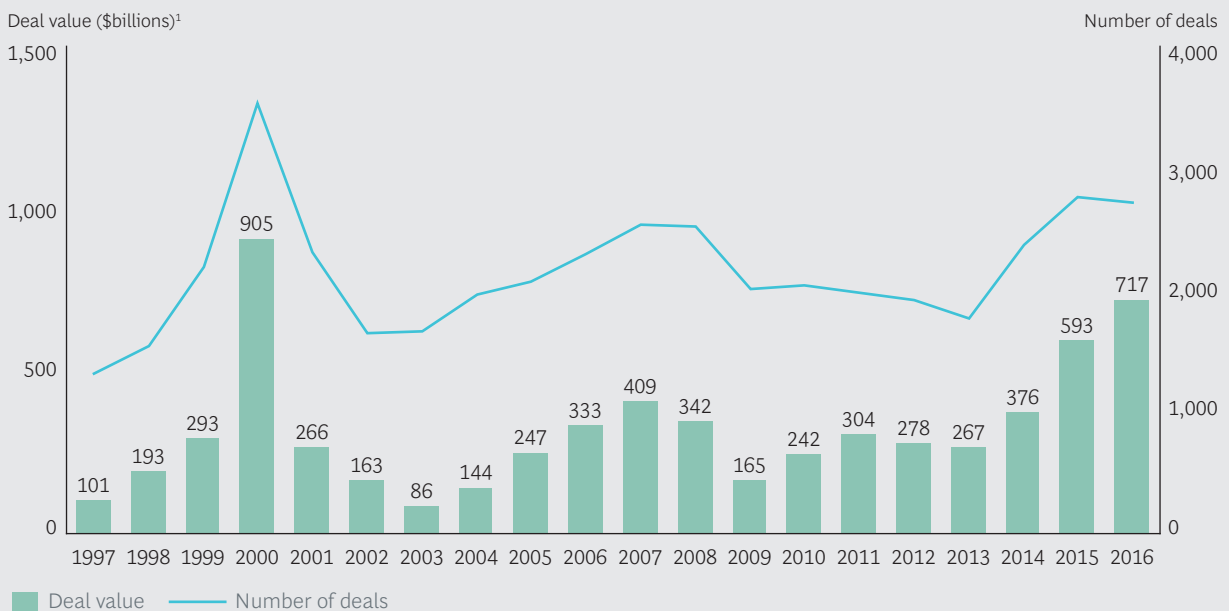
THE RESURGENT HIGH-TECH M&A MARKETPLACE

THE VOLUME AND VALUE of technology-driven deals have approached their current heights only once before—in 2000, right before the dot-com collapse. But then the value of tech M&A plunged from more than \$900 billion to less than \$300 billion in 2001 and to less than \$100 billion in 2003.

Since 2012, the tech deal market has rebounded, with growth in volume and value significantly outpacing the overall M&A market. Deals in tech, including digital, totaled more than \$700 billion in value in 2016, representing almost 30% of the entire M&A market. (See Exhibit 8.)

EXHIBIT 8 | Tech M&A Value and Volume Approach the Heights of 2000

TECH M&A VALUE AND VOLUME SHOW A STRONG TRAJECTORY OVER TIME



Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 43,101 tech M&A transactions with a disclosed deal value comprises completed and unconditional deals announced between 1997 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, and repurchases were excluded.

¹Enterprise values include the net debt of targets.

Today's tech M&A market is very different from its dot-com predecessor. Back in 2000, internet companies went public or were sold despite having no revenue or even, in many cases, a working business model. Today, top tech companies are profitable, and business models are market tested, if not fully mature. Even younger startups, which have yet to pass the profitability threshold, have clear business plans and timetables.

In order to investigate the resurgent tech M&A market, BCG developed a classification taxonomy for tech deals on the basis of the nine high-tech trends shown in Exhibit 9. Our goal was to develop a working definition of a "technology target" that goes beyond broad Standard Industrial Classification-based definitions to include companies that have some form of technology as an essential attribute or part of their business model. To do this, we developed a lexicon of more than 450 technology business terms ("software as a service," for example) that we used to screen companies and transactions for inclusion. (See Appendix II for a detailed explanation.) Data from the resulting database of more

than 43,000 high-tech deals over the past 20 years illustrates the difference between target companies during the era of the dot-com bubble and the more recent past. For example, the average age of a target company in 2000 was 6 years, while in 2016, it was 14 years; median revenues in 2000 were \$83 million, compared with \$206 million in 2016; and only 53% of all tech targets had positive EBIT in 2000, compared with approximately 65% in 2016. Buyers now are also much more knowledgeable about how they plan to make use of new technologies in their own operations and business portfolios.

Given the size and prominence of the M&A tech market today, it's surprising how little about its supporting trends and dynamics has been explored in any depth. For example, which companies, exactly, are the most active buyers, and which technologies are they after? What are current valuation levels in tech M&A, how do they compare with the broader market, and to what extent are they justified? Is the formation of another tech bubble a possibility? At the individual company level, of course, the critical question is, How do

EXHIBIT 9 | Nine Tech Trends Shape the M&A Market

Trend	Number of deals in 2016	Average deal size, 2013–2016	CAGR 2013–2016 ¹ (%)	Landmark deals in 2016	
				Acquirer	Target
Business intelligence and big data and analytics	190	\$376 million	27	Thoma Bravo >	Qlik
Cloud and software as a service	160	\$375 million	29	Oracle >	NetSuite
Data center, infrastructure, and security	125	\$241 million	12	Apollo Global Management >	Rackspace
Fintech	150	\$96 million	6	Société Générale >	TagPay
Gaming	30	\$201 million	49	Vivendi >	Gameloft
Health care IT	12	\$585 million	59	IBM Watson Health >	Truven Health Analytics
Industry 4.0	616	\$349 million	18	Siemens >	Mentor Graphics ²
Mobile tech and software applications	246	\$535 million	6	Microsoft >	LinkedIn
Smart connectivity and mobility	133	\$376 million	23	General Motors >	Cruise Automation
Total	1,662	\$348 million	17		

Sources: Thomson ONE Banker; BCG analysis.

Note: The tech M&A transactions comprise of completed and unconditional deals announced in 2016, with no transaction-size threshold. Self-tenders, recapitalizations, and repurchases were excluded. Only deals with a disclosed deal value were considered in this analysis.

¹The CAGR calculation was based on the number of disclosed deals announced between 2013 and 2016.

²The deal was announced in 2016 and completed in 2017.

buyers, especially buyers from outside the tech sector, make tech deals work? We provide some answers in this chapter.

A Tale of Two Marketplaces

Two tech M&A market segments are emerging, each with its own dynamics. They are distinguished by size of the deal.

The total number of tech deals has been growing at a rate of 9% per year since 2012. Large-cap tech deals (more than \$500 million) have shown the strongest volume growth (more than 13% per year), and they are the main driver of aggregate deal values, which have increased 27% per year during this period, from \$278 billion to \$717 billion. (See Exhibit 10.)

The absolute tech deal value in any given year is driven by a few multibillion-dollar transactions. In 2016, for example, 91 deals—each valued at \$1 billion or more—generated approximately 80% of total tech M&A value. The two largest deals, SoftBank Group’s acquisition of ARM Holdings (\$31.6 billion) and Microsoft’s purchase of LinkedIn (\$26.2 billion), made up 8% of the total market. In the

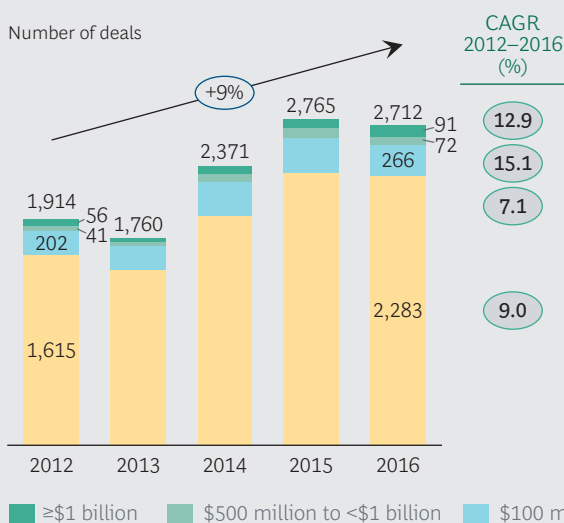
large-cap marketplace, there is a trend toward rising overall valuation levels as competition increases for large-scale, must-have assets and as more traditional buyers, backed by substantial M&A bankrolls, seek technological innovations.

At the same time, there is also a highly active marketplace for small acquisitions. More than 80% of the volume of tech M&A is made up of transactions valued at \$100 million or less. Moreover, there were another 6,000 deals in 2016 in which the value was not disclosed. As our colleagues pointed out earlier this year with respect to “deep tech” (new technologies that advance scientific and technological frontiers), many startups seek corporate support early in their existence for a variety of reasons, and one form that such support can take is acquisition. (See “A Framework for Deep-Tech Collaboration,” BCG article, April 2017.)

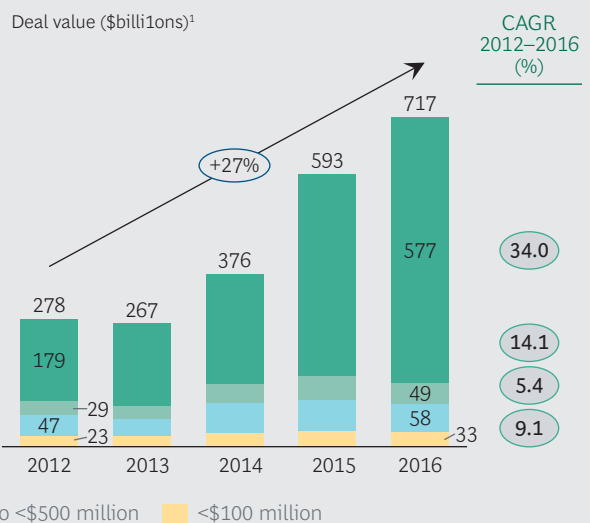
While companies may decide to participate in this market for any number of reasons, one oft-cited motivation is the need to close innovation gaps because they have fallen behind in their own R&D. Our data suggests exactly the opposite. The more innovative companies

EXHIBIT 10 | Large-Cap Deals Drive the Tech M&A Market

DEALS OF MORE THAN \$500 MILLION HAVE THE STRONGEST GROWTH...



... AND DRIVE GLOBAL TECH M&A VOLUMES



Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 11,522 tech M&A transactions comprises completed and unconditional deals announced between 2012 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, and repurchases were excluded. Only deals with a disclosed deal value were considered in this analysis.

¹Enterprise values include the net debt of targets.

are the ones that undertake more tech acquisitions. Acquirers, in both the tech and the nontech sectors, that primarily buy nontech targets have a median R&D-to-sales ratio of 1.2%. Companies that focus on tech acquisitions have a median R&D-to-sales ratio of 5.5%. A more detailed analysis by industry segment confirms that the more a company spends on R&D, the more likely it is to be an active acquirer of tech targets.

Tech Targets Attract a Widening Array of Buyers

The biggest factor driving tech M&A is the increasing role and prominence of buyers in nontech sectors. Digital and advanced technologies have disrupted multiple industries, and they are making their influence felt across most others. Time to market and reaching critical mass are key considerations, and companies often don't have the time—or the talent—to build the capabilities they need themselves. The automotive and financial services sectors are two prime examples: when it comes to M&A, the deals in both today have as much to do with software and technology as they do with powertrains and money. Little surprise, then, that every indus-

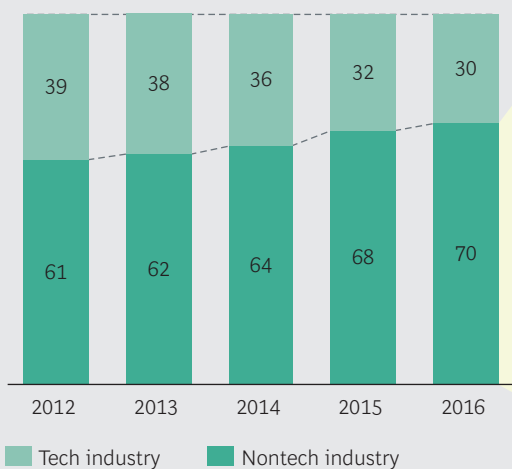
try in our database showed a significant increase in the share of tech targets since 2012 as companies increasingly turned to M&A to acquire new capabilities and close innovation gaps. The share of nontech-sector acquirers has grown by 9 percentage points since 2012 to encompass about 70% of all tech transactions. (See Exhibit 11.)

The industries with the largest share of tech deals include private equity and venture capital, financial services, industrial goods, consumer goods, and retail and health care (which are close to a tie for fifth place). Almost one-third of all private equity and venture capital deals in 2016 involved tech targets. This might be expected for venture capital firms, but a similar trend is developing for private equity overall as financial sponsors increasingly look for technology companies as both standalone acquisitions and add-ons to strengthen portfolio companies.

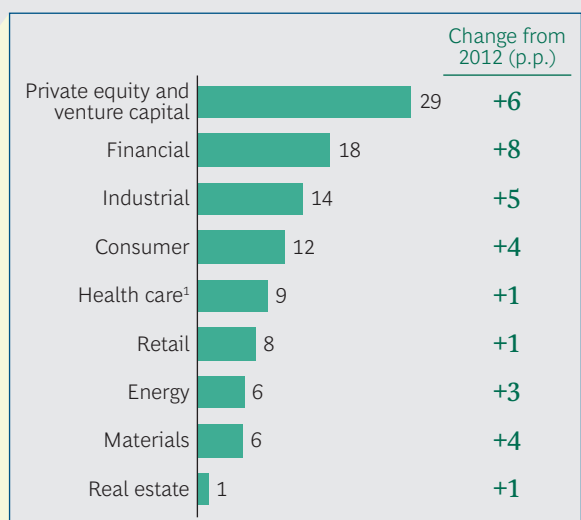
Major private equity deals in 2016 included Apollo Global Management's acquisition of cloud computing services company Rack-space for \$4.3 billion; Thoma Bravo's purchase of Qlik Technologies, a software and

EXHIBIT 11 | The Share of Nontech Buyers Is Rising

SHARE OF TECH M&A BY TYPE OF ACQUIRER (%)



SHARE OF TECH M&A BY NONTECH-INDUSTRY ACQUIRERS, 2016 (%)



Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 28,186 M&A transactions comprises only completed deals announced between 2012 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, and repurchases were excluded. The tech category follows the industry classifications from Thomson ONE Banker covering high-tech and telecommunications acquirers.

¹In 2016, the health care industry had a small number of deals but high deal values; 35% of deal values were associated with high tech.

analytics company, for \$3.0 billion; and Swedish private equity player EQT's acquisition of Press Ganey Holdings, a health care software company, for \$2.4 billion. Private equity transactions tend to involve software more than hardware targets, and many have concentrated on the mobile technologies, app development, social collaboration, big data, and cloud-based services segments. (See *Cracking the Code in Private Equity Software Deals*, BCG Focus, May 2017.)

In financial services, close to one-fifth of all deals involved tech companies. Major transactions included LendingTree's \$130 million purchase of Iron Horse Holdings, which operates the CompareCards consumer credit-card comparison platform; Standard Chartered Bank Principal Finance Real Estate's pending \$73 million acquisition of Chayora Holdings, a data center developer and operator; and Crawford & Co.'s purchase for \$36 million of WeGoLook, an online and mobile collaborative economy platform.

In the industrial goods sector, 14% of all deals had tech targets. Among automotive companies, one-quarter of all deals in 2016 were tech focused, reflecting the rising importance of connected cars and new mobility trends, including autonomous driving. For example, General Motors paid \$1 billion for Cruise Automation and invested \$500 million in Lyft.

The Tech Trends Driving M&A

The tech targets of today are operating in an environment that's very different from the one that existed during the first wave of the digital revolution, and the technology trends have shifted substantially. For example, digital technologies are just beginning to reshape the health care sector, and data and analytics will only increase in importance across all industries. Many established players will need to acquire new technologies and skills to stay current or move ahead. In the wake of recent high-profile cybersecurity incidents, we may see more M&A activity in the infrastructure and security category.

As noted above, our data indicates that nine trends are driving market growth. Three of the biggest are the following.

Industry 4.0. Advanced manufacturing accounted for more than 600 transactions in 2016 as companies snapped up a variety of technologies, including robots, factory automation, 3D printing, and the Internet of Things. Industry 4.0 deals have been growing at a rate of almost 20% per year for the past three years as more traditional companies seek to position themselves for the manufacturing environment of the future. One example is Siemens's \$4.5 billion acquisition of Mentor Graphics, a US-based automation software specialist, which is intended to complement Siemens's existing capabilities in mechanics and software with advanced technology for the design, testing, and simulation of electrical and electronic systems. Technologies such as these are hard to come by; the biggest constraint on Industry 4.0 M&A growth may be the availability of attractive targets.

Established players will need to acquire new technologies and skills to move ahead.

Cloud Computing and Cloud-Based Solutions.

The cloud—along with all the capabilities that it enables, such as software-, platform-, and infrastructure-as-a-service—remains a driving force of the digital revolution. Little surprise that it attracts a lot of acquisition interest. Cloud-based deals have increased by approximately 30% per year since 2013. Cloud players are in high demand by both established tech giants (Oracle's \$9.3 billion acquisition of NetSuite is one example) and private equity firms (Vista Equity Partners' \$153 million acquisition of GovDelivery).

Mobile Tech and Software Application

Providers. Three types of buyers are the principal hunters of these targets. First and foremost, buyers from the tech sector seek to unlock value by increasing their share of wallet through cross-selling and expansion into new customer segments and regions. Among the almost 250 acquisitions in this category is Microsoft's purchase of LinkedIn, which pushed the average deal value to

\$535 million. In fact, most 2016 deals were significantly smaller, such as Converse’s acquisition of Acision UK Limited for \$136 million. (Acision, now known as Mavenir, was a provider of seamless mobile messaging solutions to service providers and telecom operators.) Second, nontech-sector buyers are searching for new product features and functionality improvements for their core products (think auto OEMs and connected cars). Third, investors, especially private equity firms, are attracted by the favorable economics of software companies, which have highly scalable products, low deployment costs, and generous profit margins.

Are We Facing Another Tech Deal Bubble?

Buyers in nontech sectors often have difficulty justifying the valuation multiples of tech industry targets—and for good reason: current valuation multiples are high and getting higher. From 2013 to 2016, median EV/sales multiples for tech targets rose from 2.1 to almost 3.0, about a 50% increase. Acquisition multiples for individual tech stars can easily reach 6 to 8 times sales or even more.

The key factors determining multiples are the target company’s growth rate, gross margin

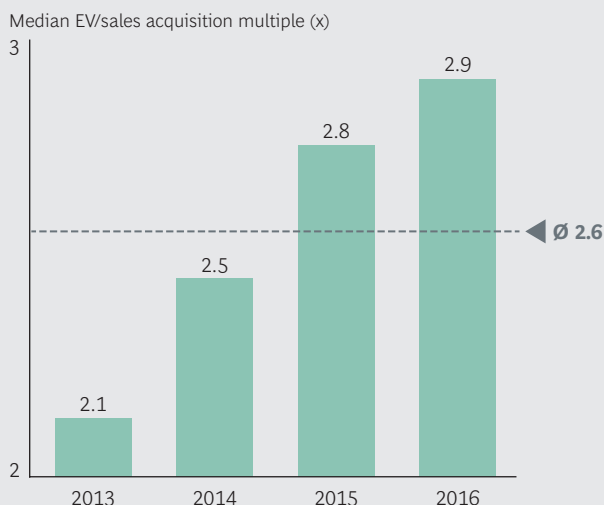
(especially for software firms), and industry segment. Software companies frequently achieve gross margins of 80% of sales or more because of their low cost of goods sold. As a result, these companies easily realize EBIT margins of 25% or more once their revenues surpass the basic costs of R&D, talent, and marketing. Acquirers pay dearly for such levels of profitability. That said, our analysis did not reveal clear-cut evidence that positive EBIT is a major driver of acquisition value (many highly valued targets have yet to achieve profitability on an EBIT basis), indicating that acquirers tend to focus more on gross margins than on bottom-line profitability.

Industry segments are important. From 2013 through 2016, gaming and fintech deals had the highest median valuation multiples, exceeding 3.0 times sales. Typical sector multiples for software-focused firms (including cloud and big-data companies) have ranged between 2.4 and 2.8 times sales. Median Industry 4.0 multiples are lower because many of these transactions involve hardware companies that typically have lower margins than their software counterparts. (See Exhibit 12.)

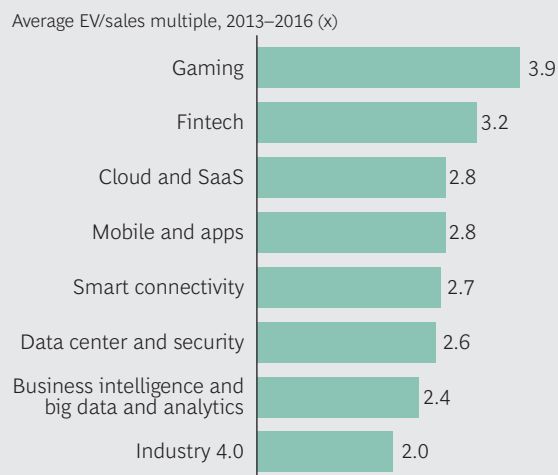
But what does a 50% increase in valuation multiples mean with regard to a potential tech bubble? One reality check is to compare mul-

EXHIBIT 12 | Valuation Multiples for Tech Targets Are Rising

EV/SALES MULTIPLES FOR TECH TARGETS



EV/SALES MULTIPLES FOR TECH TARGETS BY TREND



Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 1,360 tech M&A transactions comprises completed, unconditional, partially completed, and pending deals announced between 2013 and 2016, with transactions of at least \$25 million. Self-tenders, recapitalizations, and repurchases, as well as financial service and real estate firms, were excluded. Only deals with a disclosed deal value were considered in this analysis.

tuples for tech and nontech acquisitions. It provides a telling perspective. (See Exhibit 13).

In hindsight, the inflation of the new-economy bubble from 1998 through 2001 is clear. Median EV/EBIT multiples for tech targets exceeded 25 at times then, almost 50% higher than nontech multiples at the peak and twice the long-term historical spread between tech and nontech multiples of about 5 points.

Today, while EV/EBIT multiples involving tech targets are again at lofty levels—and well above long-term averages—nontech transaction multiples have risen by similar amounts. Common factors that drive all valuation multiples include the continuing availability of cheap financing and the need for many acquirers to buy growth in an otherwise low-growth environment. We see high valuation levels as a current fact across the full M&A market rather than as a sign of an industry-centric tech bubble ahead.

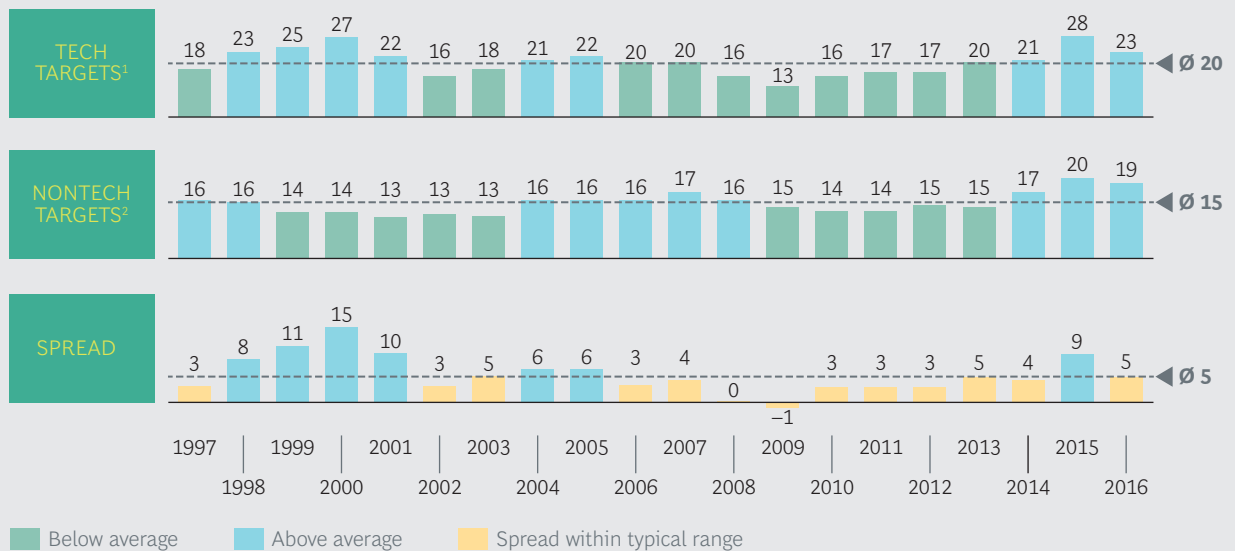
There are, of course, exceptions and outliers. A few tech companies possess what many would-be buyers regard as must-have assets.

Bidding wars for these companies can lead to significantly inflated acquisition multiples when it comes to large-scale transactions, such as those of more than \$250 million and, particularly, those greater than \$1 billion. For instance, Salesforce.com ultimately acquired Demandware following a rumored bidding contest involving several other suitors, which caused Salesforce.com to raise its initial offer by 36%, to \$2.8 billion, to get the deal done. Similarly, a German auto OEM consortium consisting of Mercedes-Benz, Audi, and BMW encountered fierce competition from such global tech giants as Uber, Tencent, and Baidu in the bidding for Nokia’s mapping unit, which the auto OEMs won at a price of about €2.8 billion. For these types of deals, median EV/sales premiums of almost 80% and EV/EBIT premiums of 50% are not uncommon when compared with transactions of less than \$250 million. (See Exhibit 14.)

Tech M&A is expensive. Does buying tech firms add value? If so, how do successful acquirers get their money’s worth? We explore these issues in the next chapter.

EXHIBIT 13 | Lofty Tech EBIT Multiples Reflect the Current Market for All M&A

Median EV/EBIT multiples



Sources: Thomson ONE Banker; BCG analysis.

Note: Because of rounding, not all numbers produce the corresponding spread amount shown.

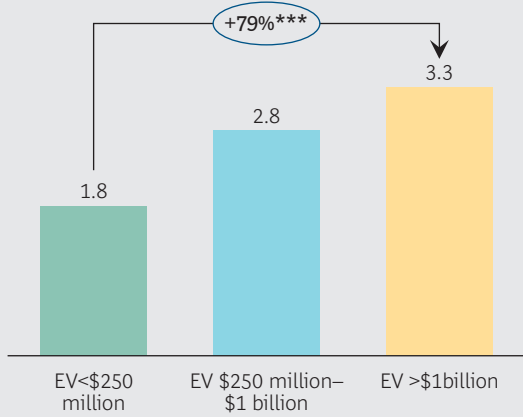
¹The total of 3,483 tech M&A transactions comprises completed, unconditional, partially completed, and pending deals announced between 1997 and 2016. The transactions had a value of at least \$25 million. Self-tenders, recapitalizations, and repurchases, as well as financial service and real estate firms, were excluded. Only deals with a disclosed deal value were considered in this analysis.

²The total of 6,230 M&A transactions comprises completed, unconditional, partially completed, and pending deals announced between 1997 and 2016. The transactions had a value of at least \$25 million and a share transfer of at least 75%. Self-tenders, recapitalizations, and repurchases, as well as financial service and real estate firms, were excluded. Only deals with a disclosed deal value were considered in this analysis.

EXHIBIT 14 | High Premiums for Larger Tech Targets Reflect Must-Have Assets

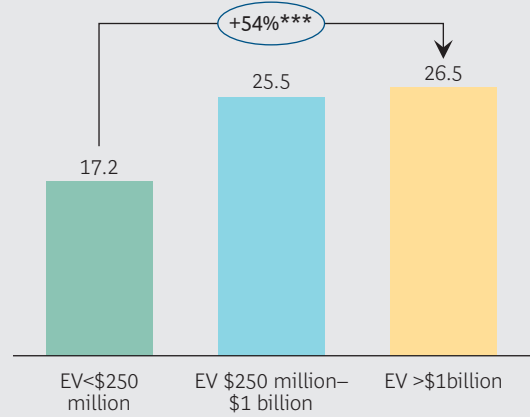
EV/SALES VALUATIONS FOR DEALS OF MORE THAN \$1 BILLION WERE APPROXIMATELY 80% HIGHER THAN THOSE FOR SMALLER DEALS

Median EV/sales, 2013–2016¹



EV/EBIT VALUATIONS FOR DEALS OF MORE THAN \$1 BILLION WERE MORE THAN 50% HIGHER THAN THOSE FOR SMALLER DEALS

Median EV/EBIT, 2013–2016²



Sources: Thomson ONE Banker; BCG analysis.

Note: Transactions comprise completed, unconditional, partially completed, and pending deals announced between 2013 and 2016. The transactions had a value of at least \$25 million. Self-tenders, recapitalizations, and repurchases, as well as financial service and real estate firms, were excluded. Only deals with a disclosed deal value were considered in this analysis. Multiples were winsorized at 10%/90%. Statistically significant multiple differences for EV < \$250 million versus EV > \$1 billion were expressed as: * significant at p < 0.1, ** significant at p < 0.05; and *** significant at p < 0.01.

¹The total of tech M&A transactions in this segment was 1,358.

²The total of tech M&A transactions in this segment was 764.

DOING TECH DEALS RIGHT

DO TECH DEALS ADD value? With median EV/sales multiples well above historical averages, and total deal value in 2016 almost on par with that of 2000, right before the dot-com collapse, it's a good time to ask if shareholders benefit from tech-driven M&A.

The answer is... it depends. We analyzed the announcement returns of more than 37,000 tech acquisitions and found that, overall, such

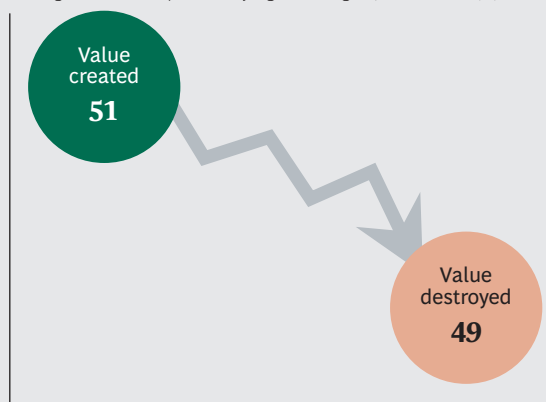
deals are actually a 50-50 gamble. About half of deals involving a technology target (51%) generate positive cumulative abnormal returns (CARs) at announcement—about the same percentage of deals with positive CARs for acquirers in all transactions. (See Exhibit 15.)

At the same time, we found no material difference between tech buyers acquiring targets in their own industry (51% of these deals

EXHIBIT 15 | About Half of All Tech Deals Create Value for the Acquirer at Announcement

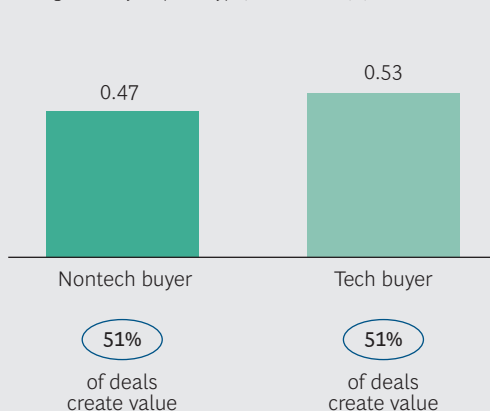
51% OF ALL TECH DEALS CREATE VALUE AT ANNOUNCEMENT...

Average CAR for acquirers buying tech targets, 1997–2016 (%)¹



...WITH VIRTUALLY NO DIFFERENCE BETWEEN ACQUIRER TYPES

Average CAR by acquirer type, 1997–2016 (%)¹



Sources: Thomson ONE Banker; BCG analysis.

Note: The total of 37,623 tech M&A transactions comprises completed, unconditional, partially completed, and pending deals announced between 1997 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, and repurchases were excluded. Deals were considered regardless of whether the deal value was disclosed or undisclosed.

¹CAR = cumulative abnormal return; calculations were made during the seven-day period beginning three days before an announcement date and ending three days after it.

have positive announcement CARs, with an average of 0.53%) and buyers from outside the tech sector doing tech deals (51% have positive announcement CARs, with an average of 0.47%). These findings do not materially differ from the market's reaction to other M&A transactions.

This brings us to a second, equally important, question: can acquirers shift the odds in their favor? Our research and our client experience suggest that they can, but there are a number of factors to consider.

Strategic Considerations

Since M&A can be risky, acquirers should consider their goals carefully. Transformational billion-dollar deals are particularly tricky. As we highlighted in the previous chapter, lofty valuation premiums of 50% to 80%, often driven by bidding wars for must-have assets, heighten the hazards. Investors take a wary view of such transactions, at least until they prove out, and their wariness increases with transaction size: on announcement, deals worth more than \$1 billion yield a negative CAR (on average, -0.33%) compared with a positive CAR (averaging 0.81%) for deals worth less than \$1 billion. (See Exhibit 16.)

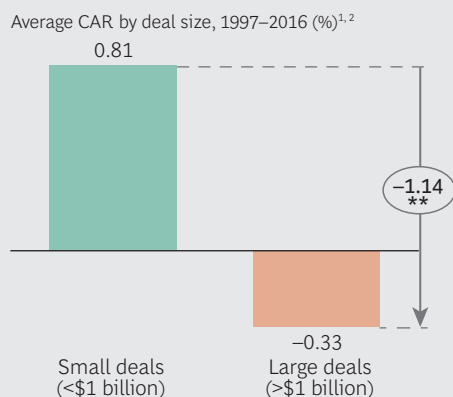
While managements often see acquiring a minority stake in a tech enterprise as a way of moving cautiously into new areas and mitigating risk, investors tend to reward companies that take matters into their own hands. Deals in which the buyer takes control of the target create, on average, higher CARs (0.78%) than minority interest transactions (0.01%). Investors are concerned that corporate minority owners lack the position and resolve to fully exploit the target's technology and thus fail to realize synergies. Disagreements with other investors can get messy, and minority holders may not have the ability to take decisive measures when things go wrong.

Experience Counts in the Longer Term

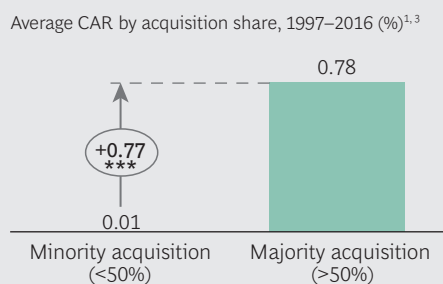
It may seem counterintuitive, but the market rewards first-time tech acquirers—and it rewards them more highly than experienced dealmakers. (See Exhibit 17.) Inexperienced acquirers earn the largest short-term returns at announcement because investors often see a company's first tech acquisition as an indication that the company understands the need to transform, recognizes a once-in-a-lifetime opportunity, or is forming the nucleus of a shift in business model toward more inno-

EXHIBIT 16 | Investors Are Wary of Big Deals and Minority Stakes

LARGE DEALS HAVE SIGNIFICANTLY LOWER CARs¹



MAJORITY DEALS YIELD HIGHER RETURNS



Sources: Thomson ONE Banker; BCG analysis.

Note: Transactions comprise completed, unconditional, partially completed, and pending deals announced between 1997 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, and repurchases were excluded. Deals were considered regardless of whether the deal value was disclosed or undisclosed. Statistically significant differences in CAR were expressed as: * significant at $p < 0.1$, ** significant at $p < 0.05$; and *** significant at $p < 0.01$.

¹CAR = cumulative abnormal return; calculations were made during the seven-day period beginning three days before an announcement date and ending three days after it.

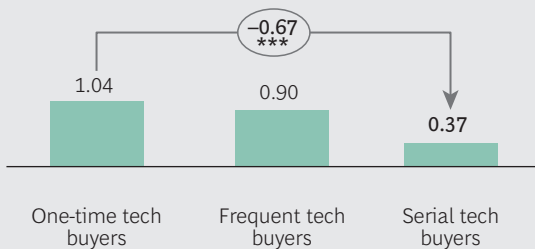
²The total number of tech M&A deals in this segment was 20,751.

³The total number of tech M&A deals in this segment was 29,914.

EXHIBIT 17 | Serial Tech Buyers Outperform in the Medium Term

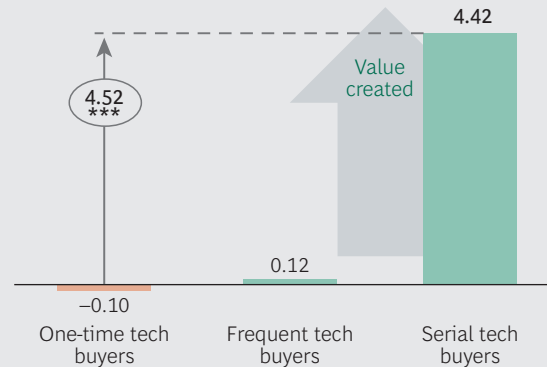
INEXPERIENCED ACQUIRERS OF TECH TARGETS HAVE THE HIGHEST SHORT-TERM CARs...¹

Average CAR (%)¹



... BUT FREQUENT ACQUIRERS OF TECH TARGETS OUTPERFORM ON ONE-YEAR RTSR²

Average annual RTSR, 1997–2016 (%)²



Sources: Thomson ONE Banker; BCG analysis.

Note: Transactions comprise completed, unconditional, partially completed, and pending deals announced between 1997 and 2016, with no transaction-size threshold. Self-tenders, recapitalizations, and repurchases were excluded. Only deals with a disclosed deal value were considered in this analysis. One-time tech buyers announced one tech acquisition during the period, frequent tech buyers announced two to five tech acquisitions, and serial tech buyers announced at least six tech acquisitions. Statistically significant differences in CAR or RTSR for one-time tech buyers versus serial tech buyers were expressed as: * significant at $p < 0.1$; ** significant at $p < 0.05$; and *** significant at $p < 0.01$.

¹CAR = cumulative abnormal return; calculations were made during the seven-day period beginning three days before an announcement date and ending three days after it.

²RTSR = relative total shareholder return.

vative products or services. The average market capitalization of one-time acquirers in our sample is \$5.4 billion, and the 1.04% CAR that they achieve on announcement equals a net gain of approximately \$60 million—simply from announcing an acquisition with an average deal value of about \$200 million (which represents a 27% announcement return). Frequent buyers of tech targets (firms that completed two to five deals over a ten-year horizon) also achieve a significant positive CAR, 0.90%, while the CAR for serial tech acquirers (those that completed more than five tech deals over ten years) is much lower, only 0.37%. This could be because investors consider a tech acquisition for this type of firm as part of the company’s ongoing business strategy, therefore constituting a less significant corporate event.

One year after announcement however, a different picture emerges. Neither one-time acquirers nor frequent buyers outperform the market, while serial tech-target acquirers outperform the relevant index by 4.4 percentage points. This holds true for acquirers in both the tech and nontech sectors.

We have written before about the advantages that serial acquirers gain from experience in

sourcing, executing, and integrating acquisitions, and it appears that the benefits of experience extend to tech deals as well. (See, for example, *From Buying Growth to Building Value: Increasing Returns with M&A*, BCG report, October 2015, and “Unlocking Acquisitive Growth: Lessons from Successful Serial Acquirers,” BCG Perspective, October 2014.) Indeed, many of the companies in BCG’s annual ranking of the world’s most innovative companies are serial acquirers of both tech and nontech assets. (See Exhibit 18.)

Some companies—such as General Electric, Daimler, Dow Chemical, Under Armour, and Axa—use tech M&A as a core component of their innovation strategies. Over the past five years, for example, General Electric executed 125 acquisitions of which more than 20% involved tech targets, including industrial internet front-runners Bit Stew Systems and Meridium, as well as a string of small to mid-size deals that have helped build GE’s digital platform.

Three Keys to Unlocking Value

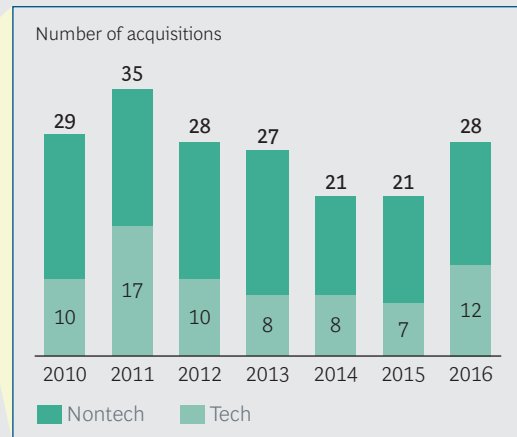
Successful tech acquirers do three things right: they follow an explicit and focused strategy, they develop a tailor-made M&A

EXHIBIT 18 | Many of BCG's Most Innovative Nontech Companies Are Serial Tech Acquirers

MOST INNOVATIVE NONTECH COMPANIES

Global innovation rank ¹	Market cap (\$billions) ²	Number of deals 2012–2016	Tech deals (%)	TSR 2012–2016 (%)
General Electric	245.5	125	22	16
Daimler	80.7	24	38	21
Dow Chemical	75.8	22	18	19
Under Armour	8.7	3	100	26
Axa	64.1	90	9	25

GE IS A SERIAL ACQUIRER LINKING TECH ACQUISITIONS TO CORE TECH STRATEGY



Sources: Thomson ONE; S&P Capital IQ; BCG analysis.

Note: Only deals in which the most innovative companies were the acquirer, or the parent company of the acquirer, of a tech target were considered.

¹Global innovation rank according to *The Most Innovative Companies 2016: Getting Past "Not Invented Here,"* BCG report, January 2017.

²Market cap as of May 15, 2017.

process for tech targets, and they build the right corporate organization to find, execute, and integrate innovative tech targets.

Tech Deal Strategy. Successful digital buyers combine four best practices into a coherent strategic approach for tech deal making. First, they look at tech M&A as an integrated part of their strategic arsenal; deals are part and parcel of doing business, not appendices or pet projects. These companies have ongoing strategic processes that include discussions of tech M&A targets as part of advancing their core business portfolio.

Second, tech M&A complements their in-house innovation work and R&D. These companies don't treat tech acquisitions as a substitute, or one-time remedy, for an aging product portfolio. Acquisitions form only one pillar of a clearly articulated technology transformation plan, and these companies have an underlying organizational structure for integrating and supporting acquisition targets.

Third, tech M&A is governed by a customized, and often very lean, structure to facilitate the speedy execution of tech deals. These companies recognize that tech M&A differs from traditional M&A in certain respects, such as the

need for shorter due diligence time frames and for key decision makers to be involved early on.

Finally, these acquirers are flexible in the way they structure and execute deals. They are willing to pursue alternative deal structures, such as minority investments, earn outs, and stock options that enable targets to maintain their entrepreneurial culture and incentives, even within large corporate structures. Perhaps more important, smart buyers also look at the deal from the target's point of view. They understand that success ultimately requires effective collaboration extending through the transaction process and beyond, and that this means developing an understanding of the business model and cultural drivers of an organization very different from their own. (See the sidebar, "Understanding the Target's Perspective.")

Targeted Processes for Tech M&A. While tech deals follow the same general processes as traditional transactions—target identification, transaction execution, and a decision about the right level of postmerger integration (PMI)—each phase presents its own wrinkles. Successful tech buyers make the following adjustments to their playbook:

UNDERSTANDING THE TARGET'S PERSPECTIVE

Traditional companies and tech firms have plenty of differences. Business models, cultures, organizations, metrics and compensation schemes, and ways of working are just a few. The match between large, often bureaucratic corporations in traditional industries and nimble, fast-moving startups often appears ill-conceived. Yet in 2016, more than 8,800 tech firms found new owners or major investors, approximately 70% of which were outside the tech sector.

Tech startups often have specific reasons for selling to a nontech buyer that go well beyond the financial aspects of the transaction. (See “What Deep-Tech Startups Want from Corporate Partners,” BCG article, April 2017.) In our experience, the acquirers that make the effort to understand what their targets are looking for and how they see the fit with their new parent gain a big leg up in making the acquisition work. Considering the following questions before embarking on a tech transaction can help set acquirers’ expectations with the prospective target and smooth the M&A process and postdeal transition.

Why do so many tech companies sell to buyers from other sectors? Money is one reason, of course. Founders and their backers often want to cash in, and in many instances, nontech-industry buyers are often the ones that are willing to write the biggest checks. But multiple other factors come into play as well. Industry veterans

provide access to existing products and services that the technology firm would hardly be able to build out on its own. Established companies from outside the tech sector can provide access to new markets through the acquirer’s core product line. Cruise Automation, for example, was able to deploy its autonomous-driving technology overnight through GM’s global vehicle base rather than retrofitting cars one by one.

Buyers from other industries also give targets access to an established customer base, enabling the target to leapfrog in sales growth. When Walmart acquired Jet.com, for example, Jet.com gained access to the fast-growing e-commerce marketplace run by the world’s biggest brick-and-mortar retailer and added muscle to compete with such internet retail giants as Amazon.

Nontech partners provide the trust and brand recognition of an established major industry player. This enhances the target’s visibility and reputation as a reliable business platform. For instance, brand recognition for the app mytaxi rose with the first investment by Daimler in 2013, and today, mytaxi is the world’s most successful taxi intermediary, with more than 10 million downloads.

What do tech companies expect in the M&A process? Agreeing on a deal can be complicated by the different perspectives

- **Expanded Resources for Identifying Targets.** Internal M&A teams tend to specialize more in industry segments and technologies that are close to home. Sourcing tech targets requires wider search parameters and expertise. Successful companies augment existing teams with internal and external resources, including their own corporate venture capital departments and outside tech industry experts, to broaden the search for targets in emerging technologies and industry segments.
- **More Agile Deal Execution.** All aspects of executing a tech transaction require flexibility. For example, acquirers need to adjust to, and get comfortable with, shorter due diligence time frames (or risk being outbid by more fleet-footed competitors), different performance metrics (hit rates and customer churn rather than cash conversion or free cash flow), and generally less depth of information. Serial tech acquirers often borrow a tactic from the private equity sector. They augment their deal teams with senior advisors, such as

that buyers and startups bring to the negotiating table. Often, the acquirer will ask hundreds of questions about the target's business plan, with a strong focus on scaling up operations or bottom-line profitability measures, while the target is much more interested in talking about top-line growth, new-customer acquisition cost, and churn rates. Management presentations and expert sessions often leave both sides wondering if they are headed for a difficult future. A frequent issue is when the acquiring company's M&A team has a limited understanding of the tech firm's technical architecture, hardware, or software and how it can be integrated with the industrial player's products and services.

Acquirers that are not tech companies can advance the process by showing an early understanding of the target's technology, business model, and success factors, which is especially important in a competitive auction situation. Buyers should not rely on price alone to carry the day; they need to win over the target's management team with a compelling case for synergy and a vision for the combined operations. Open and candid discussions about potential culture clashes and how to solve them can help. Acquirers also have to clearly outline their cooperation and integration model for the target as part of the wider company—this is frequently a key concern for the technology firm's management.

former CEOs, from the target industry, who can give the entire deal team a head start by providing insights into the target company's business environment and identifying key success factors for the team to focus on.

- **PMI with a Lighter Touch.** Reaping synergies in M&A typically involves full and close integration of the target. But experienced buyers of tech assets often opt not to integrate the acquisition at all. Instead, they manage it at arm's length in

What do tech firms expect after the closing? Tech deals frequently founder because of misunderstanding over post-merger integration and how the target will operate once the deal closes. Target company management teams typically expect a high degree of continuing entrepreneurial freedom, which is what they are used to and which they (accurately) view as vital for top-talent acquisition and retention. These expectations often include maintaining the target's standalone P&L and having the ability to financially motivate key decision makers in ways that do not fit into typical corporate compensation schemes.

Targets also look for their new parents to make decisions fast, often much faster than allowed by the lengthy decision-making processes that result from corporate policies and politics. Successful acquirers often establish separate governance procedures and mechanisms for their tech acquisitions.

Moreover, tech companies expect ready access to the acquirer's product base and distribution network in order to achieve early, tangible win-win results. One big reason for failed technology acquisitions, in our experience, is when the acquirer treats the target's technology as a pilot or as a fig leaf for the acquirer's tech agenda, rather than as a means of strengthening its core business.

order to avoid smothering innovative drive with corporate bureaucracy or undermining a successful, entrepreneurial culture. Many serial buyers set up incubators or accelerators for just this purpose. (See *Corporate Venturing Shifts Gears: How the Largest Companies Apply a Broad Set of Tools to Speed Innovation*, BCG Focus, April 2016.)

Organizing for Tech M&A. There is no one right way to organize the internal M&A function for tech transactions. We have seen

several successful approaches taken by savvy clients, but these approaches do have some common components. For one thing, smart buyers are highly flexible with respect to where ideas come from and how transactions are handled: in the corporate center, in the business units, or even in separate organizations, such as corporate venture or innovation labs. Outcomes—identifying and executing good deals—are more important than organizational structures. Flexibility is also important for M&A team members; former traditional investment bankers are often matched up with entrepreneurs in residence. Because transactions involve different kinds of due diligence analyses and deal structures, these companies also make a point of including expertise from a wider range of expert functions (such as finance, HR, IT, and legal) earlier in the deal process and consistently throughout.

EXPERIENCE counts in tech M&A as it does in all M&A, and so do flexibility, nimbleness, and a clear focus on specific M&A goals and outcomes and how tech acquisitions support corporate strategy. Smart buyers of tech assets tend to fine-tune all aspects of their corporate M&A machinery—aspects as varied as strategy, process, and the makeup of the team—to suit the agility required in tech deals.

APPENDIX I

METHODOLOGY

The research that underpins this report was conducted by the BCG Transaction Center during the first half of 2017. The results are based on analyses of more than 390,000 M&A transactions. In assessing general market trends, we analyzed all reported M&A transactions from 1990 through the beginning of 2017. For the analysis of deal values and volumes, we excluded those marked as repurchases, exchange offers, recapitalizations, and spin-offs.

Short-Term Value Creation

Although distinct samples were required in order to analyze different issues, all valuation analyses employed the same econometric methodology. For any given company i and day t , the abnormal (that is, unexpected) returns ($AR_{i,t}$) were calculated as the deviation of the observed returns $E(R_{i,t})$. AR are the difference between actual stock returns and those predicted by the market model. (See Equation 1.)

EQUATION 1

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

Following the most commonly used approach, we employed a market model estimation to calculate expected returns.¹ (See Equation 2.)

EQUATION 2

$$E(R_{i,t}) = \alpha_i + \beta_i R_{m,t} + \epsilon_{i,t}$$

The derived alpha (α_i) and beta (β_i) factors are then combined with the observed market returns ($R_{m,t}$). (See Equation 3.)

EQUATION 3

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t})$$

(See the exhibit below for a graphic representation.²) We derive the cumulative abnormal return, or CAR, by aggregating the abnormal returns day by day, starting three days before the announcement date and ending three days after it. (See Equation 4.)

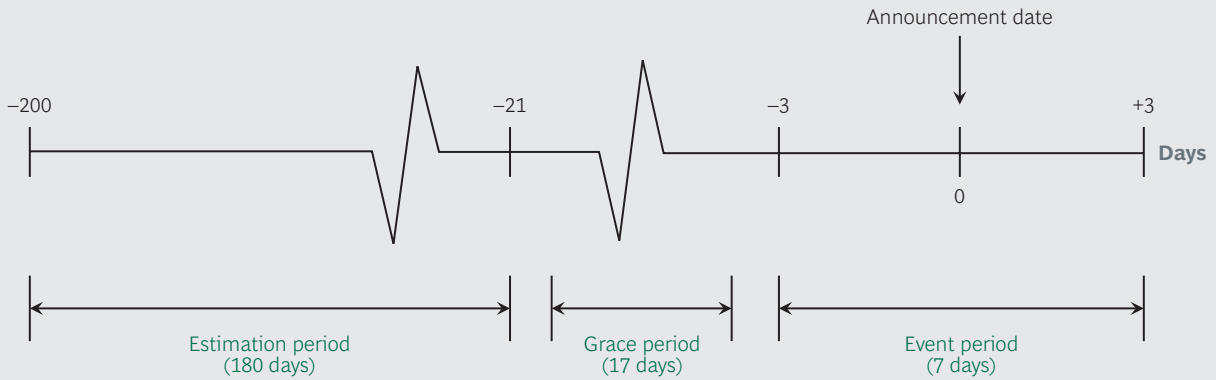
EQUATION 4

$$CAR_i = \sum_{t=-3}^{+3} (R_{i,t} - E(R_{i,t}))$$

Long-Term Value Creation

We track the stock market performance of the acquirers over a one-year period following the acquisition announcement. Note that we cannot track the targets because, in most cases, they are delisted from the public-equity markets.

Event Study Setup



Source: BCG analysis.

First, we measure the total shareholder return (TSR) generated by the acquirer from the starting price (P_{start}) over a 365-day period. (See Equation 5.) To avoid short-term distortions, we use the same periods and averages as for the market performance of the acquirers.

EQUATION 5

$$P_{start} = \text{average} [P_{t-40}, P_{t-20}]$$

$$P_{1yr} = \text{average} [P_{t+360}, P_{t+380}]$$

Second, we subtract from the TSR the return made by a benchmark index over the same period in order to find the relative total shareholder return (RTSR) generated by the acquirer *acq*—in other words, the return in excess of the benchmark return.³ (See Equation 6.)

EQUATION 6

$$TSR_{acq} = P_{1yr, acq} / P_{start, acq} - 1$$

$$TSR_{index} = P_{1yr, index} / P_{start, index} - 1$$

$$RTSR_{acq} = (TSR_{acq} / TSR_{index}) - 1$$

Note that we could not include deals undertaken after December 31, 2015, because the time elapsed since the announcement was too short to calculate the one-year relative returns.

NOTES

1. See Eugene F. Fama, Lawrence Fisher, Michael C. Jensen, and Richard Roll, "The Adjustment of Stock Prices to New Information," *International Economic Review* 10, February 1969; and Stephen J. Brown and Jerold B. Warner, "Using Daily Stock Returns: The Case of Event Studies," *Journal of Financial Economics* 14, 1985.
2. We apply Thomson Reuters sector indexes as proxies for the market portfolio, thus controlling for industry idiosyncrasies.
3. The benchmark indexes we apply are the relevant worldwide Thomson Reuters sector indexes.

APPENDIX II

DEFINING TECH DEALS

We used a proprietary data set of tech M&A transactions as the basis for this year’s M&A report. The sample covers the years 1997 through 2016 and was gathered from state-of-the-art databases, including Thomson ONE Banker, Thomson Reuters Worldscope, and S&P Capital IQ, which are regularly used by practitioners and researchers in the M&A field.

Identifying tech deals demands careful analysis and expert knowledge. BCG developed its own classification taxonomy for tech transactions based on the nine digital and high-tech trends cited in Exhibit 9. Our goal was to develop a working definition of technology targets that goes beyond the broad categories of the Standard Industrial Classification (SIC) system to include companies that have some form of technology as an essential attribute or part of their business model.

To do this, we developed a lexicon of 467 technology business terms (“software as a service,” for example) that we used to screen companies and transactions for inclusion. Each expression was reviewed and approved by at least two BCG experts in the field and then entered into the “targets business description” or “deal synopsis” search fields provided by the databases. Each tech transaction

that was returned was further filtered into one of the nine high-tech trends.

We excluded all deals that were not consistent with the high-tech SIC code classification established by Charles O. Kile and Mary E. Phillips in 2009.¹ This generated a database of 46,777 digital deals. We added 98,280 deals on the basis of Thomson ONE Banker’s “High Tech” industry classification.

In total, this year’s deal sample included 145,057 tech M&A transactions. However, we excluded such transactions as self-tenders, recapitalizations, and repurchases because they were not pertinent to our analysis, and we focused only on the period 1997–2016. As a result, our active sample consisted of 43,101 completed and unconditional deals. Depending on the analysis, the sample size varies due to additional data requirements.




















NOTE

1. See “Using Industry Classification Codes to Sample High-Technology Firms: Analysis and Recommendations,” *Journal of Accounting, Auditing & Finance* 24, no. 1 (January 1, 2009): 35–58.

APPENDIX III

SELECTED TRANSACTIONS, 2017, 2016, AND 2015

Corporate Transactions



<p>2017</p>  <p>JOHN DEERE</p> <p>WIRTGEN GROUP</p> <p>Strategic advisor to the buyer</p> <p>\$5.2 billion</p> <p>BCG The Boston Consulting Group</p>	<p>2017</p>  <p>LAVAZZA TORINO • ITALIA 1878</p>  <p>KICKING HORSE COFFEE</p> <p>Strategic advisor to the buyer</p> <p>\$160 million</p> <p>BCG The Boston Consulting Group</p>	<p>2017</p>  <p>nkt cables</p>  <p>ABB</p> <p>Subsea cables</p> <p>Strategic advisor to the buyer</p> <p>\$0.9 billion</p> <p>BCG The Boston Consulting Group</p>	<p>2017</p>  <p>NSW GOVERNMENT</p> <p>NSW Land & Property Information</p> <p>Strategic advisor to the seller</p> <p>\$1.9 billion</p> <p>BCG The Boston Consulting Group</p>	<p>2017</p>  <p>i'm lovin' it</p> <p>Sale of restaurants in the Nordics</p> <p>Strategic advisor to the seller</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>
<p>2016</p>  <p>RINA SERVICES</p>  <p>Edif</p> <p>Strategic advisor to the buyer</p> <p>\$173 million</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>  <p>Exelon</p>  <p>Pepco Holdings Inc</p> <p>Strategic advisor to the buyer</p> <p>\$6.8 billion</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>  <p>Refresco-gerber</p>  <p>DAS</p> <p>Strategic advisor to the buyer</p> <p>\$80 million</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>  <p>Currencies Direct</p>  <p>azibo group</p> <p>Strategic advisor to the seller</p> <p>\$310 million</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>  <p>VOITH</p>  <p>leadec</p> <p>Strategic advisor to the seller</p> <p>Value not disclose</p> <p>BCG The Boston Consulting Group</p>
<p>2016</p>  <p>KONEGRANES</p>  <p>TEREX Material Handling & Pulp Solutions</p> <p>Strategic advisor to the buyer</p> <p>€1.3 billion</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>  <p>Universal Services of America</p>  <p>ALLIED BARTON SECURITY SERVICES</p> <p>Strategic advisor to the buyer</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>  <p>NPM CAPITAL</p>  <p>Inspecta</p> <p>Strategic advisor to the buyer</p> <p>\$218 million</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>  <p>MANN+HUMMEL</p>  <p>AFFINIA</p> <p>Strategic advisor to the buyer</p> <p>\$513 million</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>  <p>Willis</p>  <p>GRAS NAVOVI</p> <p>Strategic advisor to the buyer</p> <p>\$547 million</p> <p>BCG The Boston Consulting Group</p>

2015




Strategic advisor to the buyer
\$2.3 billion
BCG
The Boston Consulting Group

2015

Strategic advisor to the buyer
\$131 million
BCG
The Boston Consulting Group

2015



Pharma CMO business of


Strategic advisor to the buyer
€270 million
BCG
The Boston Consulting Group

2015






Strategic advisor to the buyer
\$599 million
BCG
The Boston Consulting Group

2015




Strategic advisor to the buyer
Value not disclosed
BCG
The Boston Consulting Group

2015



Strategic advisor to the buyer
Value not disclosed
BCG
The Boston Consulting Group

2015




Strategic advisor to the buyer
\$8.1 billion
BCG
The Boston Consulting Group

2015




Strategic advisor to the buyer
\$142 million
BCG
The Boston Consulting Group

2015





Strategic advisor to the buyer
\$19.1 billion
BCG
The Boston Consulting Group

2015






Strategic advisor to the buyer
Value not disclosed
BCG
The Boston Consulting Group

2015




GRUPO



Strategic advisor to the seller
\$280 million
BCG
The Boston Consulting Group

2015




Strategic advisor to the seller
Value not disclosed
BCG
The Boston Consulting Group



Private Equity Transactions

2017






Strategic advisor to the buyer
Value not disclosed
BCG
The Boston Consulting Group

2017

Strategic advisor to the buyer
Value not disclosed
BCG
The Boston Consulting Group

2017

Strategic advisor to the buyer
\$579 million
BCG
The Boston Consulting Group

2017




Strategic advisor to the seller
€462 million
BCG
The Boston Consulting Group





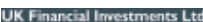
































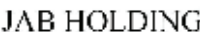









2016




Strategic advisor to the buyer
Value not disclosed
BCG
The Boston Consulting Group

Private Equity Transactions

(continued)

<p>2016</p>   <p>Strategic advisor to the buyer</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the seller</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the seller</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the buyer</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the buyer</p> <p>€18 million</p> <p>BCG The Boston Consulting Group</p>
<p>2016</p>   <p>Strategic advisor to the seller</p> <p>\$664 million</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the buyer</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the buyer</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the buyer</p> <p>€388 million</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>  <p>Strategic advisor to the seller</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>
<p>2016</p>   <p>Strategic advisor to the buyer</p> <p>\$344 million</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the buyer</p> <p>\$360 million</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the buyer</p> <p>\$124 million</p> <p>BCG The Boston Consulting Group</p>	<p>2016</p>   <p>Strategic advisor to the seller</p> <p>\$3.7 billion</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>   <p>Strategic advisor to the buyer</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>
<p>2015</p>   <p>Strategic advisor to the seller</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>   <p>Strategic advisor to the seller</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>   <p>Strategic advisor to the seller</p> <p>€24 million</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>   <p>Strategic advisor to the seller</p> <p>€714 million</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>   <p>Strategic advisor to the buyer</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>
<p>2015</p>   <p>Strategic advisor to the buyer</p> <p>\$258 million</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>   <p>Strategic advisor to the buyer</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>   <p>Strategic advisor to the buyer</p> <p>\$98 million</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>   <p>Strategic advisor to the buyer</p> <p>Value not disclosed</p> <p>BCG The Boston Consulting Group</p>	<p>2015</p>   <p>Strategic advisor to the buyer</p> <p>\$800 million</p> <p>BCG The Boston Consulting Group</p>

2015

THE CARLYLE GROUP

M.M. WARBURG & CO

CGS

 Strategic advisor to the buyer
 Value not disclosed
BCG
The Boston Consulting Group

2015

GENSTAR

AWC

 Strategic advisor to the buyer
 Value not disclosed
BCG
The Boston Consulting Group

2015

veritas Shareholders

veritas

 Strategic advisor to the seller
 Value not disclosed
BCG
The Boston Consulting Group

2015

sentica

PUUULO

 Strategic advisor to the buyer
 Value not disclosed
BCG
The Boston Consulting Group

2015

BC Partners

synlab

 Labordienstleistungen
 Strategic advisor to the seller
\$1.9 billion
BCG
The Boston Consulting Group

2015

HELLMAN & FRIEDMAN

TeamSystem

 Strategic advisor to the buyer
 Value not disclosed
BCG
The Boston Consulting Group

2015

JAB HOLDING

barezzo

 Strategic advisor to the buyer
 Value not disclosed
BCG
The Boston Consulting Group

2015

Bridgepoint

NORDIC CINEMA GROUP

 Strategic advisor to the buyer
\$543 million
BCG
The Boston Consulting Group

2015

Herkules Capital

Olivia

 Strategic advisor to the buyer
\$28 million
BCG
The Boston Consulting Group

2015

Bridgepoint

PONANI

 Strategic advisor to the seller
\$154 million
BCG
The Boston Consulting Group

2015

YF CAPITAL

ReLIA

 Strategic advisor to the buyer
 Value not disclosed
BCG
The Boston Consulting Group

2015

THL THOMAS H. LEE FINANCIAL

Gülden Sürkes

GCA SERVICES GROUP

 Strategic advisor to the buyer
\$950 million
BCG
The Boston Consulting Group

2015

Apax PARTNERS

azelis

 Strategic advisor to the buyer
 Value not disclosed
BCG
The Boston Consulting Group

2015

VITRUVIAN PARTNERS

CRF HEALTH

 Commercial due diligence provider
 Value not disclosed
BCG
The Boston Consulting Group

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A report by The Boston Consulting Group, July 2015

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This report is a product of BCG's Corporate Development practice, which works with its clients to deliver solutions to the challenges addressed in this report. If you would like to discuss the insights drawn from this report or learn more about the firm's capabilities in M&A, please contact one of the authors.

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