Boyden

Executive Monitor

Chief Digital Officer

Executive Summary

The most successful companies are those that leverage modern innovations in technology toward their business strategy, regardless of their industry or specialty. This correlation is not incidental. Big data, mobile technology, and other physical and non-physical advancements in technology are changing the way companies operate internally and interact with partners and consumers – within and outside of the tech industry proper.

"At the organisational level, digital transformation enables reinvention of internal processes, business models and corporate interaction with customers and partners. The impact on senior executives is huge. The use of analytics, mobility, social media and smart embedded devices challenges them to analyse and merge new forms of data, capture valuable insights and turn these into real-time action."

Pierre Fouques Duparc, Leader of Boyden's Global Technology Practice and Managing Partner, Boyden France

New technology points to an urgent need for businesses to seriously consider how they can remain competitive among their peers by reducing operating costs, maximising efficiency, and investing in R&D to improve consumer experiences. Recent tech trends, including the use of big data analysis, socially enabled business processes, and physical technologies like drones and fitness wearables can have a transformative impact on the way companies do business.

Companies that have prioritized bringing their operations into the modern age are hiring Chief Digital Officers (CDOs) for their executive suite to oversee the implementation of digitally enabled strategies in all business areas. Among the challenges facing CDOs are enforcing robust cybersecurity tactics to protect increasingly valuable data, integrating business-wide digital infrastructures that are compatible with the organisation's existing processes, and educating other leaders about the tremendous gains to be realized from these critical modernizing strategies.

Chief Digital Officer

Role

The Chief Digital Officer (CDO) is rapidly cropping up in executive teams across industries, charged with managing a company's digital projects and implementing its "digital vision." [1] This vague job description manifests itself in different ways, depending on the company, its position within the industry, the existing executive team, its products or deliverables, and myriad other factors. CDOs are meant to bridge the gap between Chief Information Officers and Chief Marketing Officers, using knowledge and insights from both realms to craft an end consumer experience that is contemporary, exciting and efficient by virtue of being digitally enabled. The CDO therefore brings insights about brand awareness and consumer experience to the CIO, and insights about interactive branding and messaging to the CMO. In addition to close engagement with the CIO and CMO, however, CDOs must be involved in all areas of the company due to their mission to understand how all segments can activate digital strategies. [2]

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[1] *http://www.mckinsey.com/insights/business_technology/bullish_on_digital_mckinsey_global_survey_results*
[2] *http://www.deloittedigital.ca/chief-digital-officer*

"Clients are engaging us in more and more Chief Digital Officer roles, which are often better driven by the CIO rather than the CMO. CIOs understand the business model, big program delivery and big transformation, which includes data and cybersecurity. Thus, if you're among the top five percent of CIOs, you're among the best candidates for CDO positions."

Vicky Maxwell Davies, Partner, Boyden UK

According to *CIO Magazine,* there are six distinct priorities that must be addressed by successful CDOs. These include:

• Earning company-wide commitment to implementing digital strategy
• Developing a digital strategy mission statement
• Informing the strategy with data-based experimentation
• Creating a strong network of business and IT innovators
• Speaking multiple business "languages" to communicate clearly with all segments
• Striving to achieve tangible digitization goals [3]

"The Chief Digital Officer plays in the place where enterprise meets the customer, where the revenue is generated and the mission accomplished. They're in charge of the digital business strategy." [4]
– David Willis, VP and analyst at Gartner

The CDO is widely becoming an indispensable role within the C-Suite, but there are still those who are reluctant to make a permanent space at the executive level for someone devoted to digital strategy. As the CDO is meant to facilitate the transition from analogue to digital across all business segments, analysts and executives have argued that the position is only useful in the short term and becomes obsolete as the digitization process winds down. While the move to digital platforms is undeniably a challenging one for many companies, other analysts argue that the CDO position is ultimately detrimental to the process and could drive a wedge between front- and back-end operations, because it separates the inherently intertwined work of the CIO and the CDO.[5]

"If I'm successful], my role should not exist in three to four years' time because digital will cut across the whole organization and we will be a fully digitally embraced organization."
– Sean Cornwell, CDO of Travelex [6]

As many companies continue choosing not to place a CDO in the C-Suite, other executives must be particularly careful to integrate digital strategies into their work, while integrating their separate initiatives to maintain cohesiveness and security. Most importantly, the chief executive must "[monitor] the company's digital service landscape to ensure that leadership exists within the current organisational structure to exploit digital strategies as they arise."[7]

Expected CDO Trends

Companies that want to be a digitization bellwether in their industry, expect digital products and services to make up a significant portion of their revenue growth, or face particular difficulties in executing digitization initiatives across organisational boundaries, which could lead to misaligned or duplicated investments or inordinately long implementation times, can benefit tangibly from appointing a Chief Digital Officer, according to analysts at Strategy&.[8]

[4] http://www.gartner.com/newsroom/id/2208015
[5] http://www.informationweek.com/strategic-cio/digital-business/cdos-replace-cios-im-not-buying-it/a/d-id/1317196
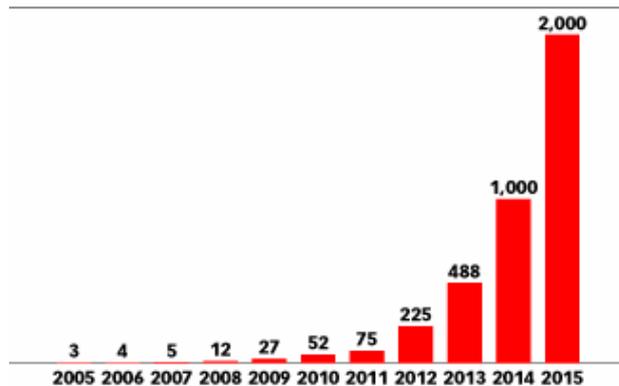[6] http://www.computing.co.uk/ctg/opinion/2408644/why-the-role-of-the-chief-digital-officer-shouldn-t-exist-in-10-years-time
[7] http://www.strategyand.pwc.com/media/file/FT_Digitising-the-industrial-company.pdf
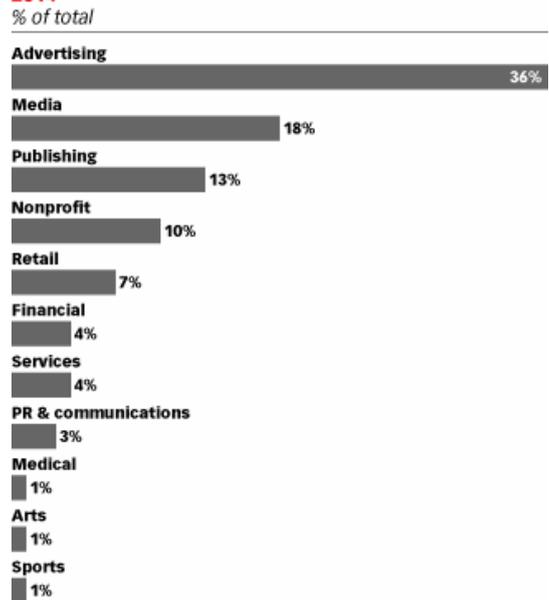[8] http://www.ft.com/intl/cms/s/0/b05082ea-e7e3-11e2-babb-00144feabdc0.html#axzz3e19iqgRl

As companies that have already adopted Chief Digital Officers (comprising approximately 25% of businesses in 2015) realize the gains from adding a CDO to their executive suite, other companies, especially in the technology, media, and government/non-profit industries will follow suit. According to e-Marketer, CDO positions will double globally in one year, increasing from 1,000 to 2,000. This is almost 800% more than the 225 CDO posts held in 2012.[9] Though more common in technology and various advertising and media sectors, this global phenomenon is projected to span a range of industries.

Number of Chief Digital Officers (CDOs) Worldwide, 2005-2015

Year	Number
2005	3
2006	4
2007	5
2008	12
2009	27
2010	52
2011	75
2012	225
2013	488
2014	1,000
2015	2,000

Source: The CDO Club, "Hall of Fame: CDOs Who Have Become CEO & Board Directors," May 7, 2015

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www.eMarketer.com

Chief Digital Officers (CDOs) Worldwide, by Industry, 2014
% of total

Industry	%
Advertising	36%
Media	18%
Publishing	13%
Nonprofit	10%
Retail	7%
Financial	4%
Services	4%
PR & communications	3%
Medical	1%
Arts	1%
Sports	1%

Note: numbers may not add up to 100% due to rounding
Source: The CDO Club, "Hall of Fame: CDOs Who Have Become CEO & Board Directors," May 7, 2015

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www.eMarketer.com

Source: http://www.emarketer.com/Article/Chief-Digital-Officers-Continue-Global-Explosion/1012489

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> **"In healthcare and life sciences, digital management is playing an important role in company organisation, task allocation and consumer marketing. And the product of this effort is more than digital itself, which is further transforming functions such as the CFO, R&D and operations."**
>
> *Sabine Brunthaler, Partner, Boyden Switzerland*

Additionally, companies outside the tech industry spearheading the CDO movement, some of which are highlighted in the following section, will encourage similar companies to take full advantage of their own digital capacities through this executive appointment.

CDOs Beyond Silicon Valley

Outside of tech, the earliest companies to adopt CDOs into their executive suites have been in the media industry: Agencies, publishers and broadcasters, including Forbes Media Group, Doe-Anderson and HarperCollins, have perceived the potential growth that a CDO can bring about in a climate of steep competition. These companies easily lend themselves to digitization due to the nature of their products and services, and so have seamlessly incorporated CDOs into their executive suites and initiated digitization strategies in hopes of improving efficiency and reducing costs.

An unexpected area of growth for CDO positions has been in public sector and government organizations. As digitization has become more challenging because of institutional and organizational

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[9] *http://www.emarketer.com/Article/Chief-Digital-Officers-Continue-Global-Explosion/1012489*

barriers, there has risen a more urgent need for CDOs devoted to the challenging task of bringing what are often highly bureaucratic and conservative organizations into the modern era with as little internal friction as possible. In these organizations, where budgets are often tight, the utility of a CDO is particularly evident, as the savings this executive can bring about through digitization will allow them to allocate funds elsewhere in the organization. Chief Digital Officers in government agencies especially are tasked with the singularly important task of protecting infrastructure and sensitive information at the critical nexus of data security and national security.[10]

Noteworthy CDOs

Though CDO is a relatively new position in the C-Suite, the appointment of CDOs at several major brands in the recent past illustrates the growing awareness of the need for quick transformation via an effective digital strategy. Large global organizations that have appointed a CDO reside in all sectors and regions, and include blue-chip brands:[11]

Chief Digital Officer Appointments			
Company	Sector	Name	Date
Aetna	Healthcare	Michael Palmer	Feb. 2014
Aviva	Insurance	Andrew Brem	Aug. 2014
BET Networks	Entertainment	Kay Madati	Sept. 2014
CVS	Retail	Brian Tilzer	Feb. 2013
Eastern Bank	Financial Services	Dan O'Malley	Apr. 2014
Haggar Clothing	Apparel	Eve Richey	Sept. 2014
Konecranes	Manufacturing	Juha Pankakoski	Sept. 2014
L'Oreal	Cosmetics	Lubomira Rochet	Mar. 2014
Maxus (WPP)	Advertising	Jonathan Adams	Sept. 2014
McDonald's	Restaurant	Atif Rafiq	Oct. 2013
McGraw-Hill	Publishing	Stephen Laster	Sept. 2012
Meredith	Publishing	Andy Wilson	Aug. 2013
Starbucks	Restaurant	Adam Brotman	Apr. 2009
VICE Media	Entertainment	Mike Germano	Dec. 2013

Source: http://www.chiefdigitalofficer.net/the-market-for-chief-digital-officers-heats-up

Starbucks

Starbucks was a relatively early adopter of the Chief Digital Officer role, installing Adam Brotman, a former employee of the company's digital ventures group, in the trending position in 2012. Brotman's digital vision for the coffee giant involved using digital strategies and technologies to revolutionize the Starbucks customer experience. Brotman's most successful projects include launching the Starbucks Digital Network, a native homepage that serves as the home screen when customers connect to in-store Wi-Fi; and building a vastly successful in-house e-commerce platform, a new social media engagement strategy, and mobile applications. Through this aggressive change in digital strategy, Brotman has been able to craft a unique experience for Starbucks customers that allows them to engage with the company, its baristas, and their local community to a far greater degree than ever before.

[10] *http://www.mckinsey.com/insights/business_technology/public_sector_digitization_the_trillion_dollar_challenge*
[11] *http://www.chiefdigitalofficer.net/the-market-for-chief-digital-officers-heats-up/*

"It's about creating relevant, meaningful relationships with our customers, both in our stores and online." – Adam Brotman, CDO of Starbucks

CVS

Brian Tilzer joined CVS as Chief Digital Officer after working as the head of e-commerce at Staples. Tilzer worked to establish the CVS Health Digital Innovation Lab, a large project that aims to improve customer experiences at CVS stores through digital strategy.[13] Tilzer has used the freedom and creativity that comes with his position to experiment with different ways of communicating with CVS customers to make shopping easier and faster – for example, he has headed projects aiming to enable customers to videoconference with doctors at CVS clinics, and communicate about prescriptions via text.

"One big goal… is to connect with start-ups that are developing new healthcare products and services." – Brian Tilzer, CDO of CVS

The overall expansion of mobile and digital offerings in conjunction with the so-called "digital enablement of healthcare" is expected to propel CVS to the innovative forefront of pharmacy retailers.

"Mobile remains an important part of our digital strategy and we will continue to focus heavily on retail and pharmacy abilities as well as integration across the enterprise, making it easier for our customers to engage with us at any moment." [14] – Brian Tilzer, CDO of CVS

Renault

Patrick Hoffstetter, recently appointed CDO of global luxury carmaker Renault, came from a position at Yahoo! with the goal of bringing Renault up to speed on the most recent trends in the digital universe and, more specifically, building an internal business structure dedicated to the invention and implementation of digital strategy. Hoffstetter is calling this ambitious coalition of digital strategy initiatives Renault's Digital Factory. As the name implies, the Factory sees digital initiatives through from concept to execution, with its team working toward the goal of using data and analysis to improve the end consumer experience.

"Very often, the CDO is in charge of strategy and benchmarking and KPI and dashboard, but it's very rare when he has got his hands on the operation. At Renault, the CDO has an actual digital factory and digital team to manage strategy, all the way from strategy to implementation. I cover the whole digital spectrum from platform to content. We're not only doing the brain, but the hands and feet. At Renault, the CDO role and the role of the digital factory are quite unique." – Patrick Hoffstetter, CDO of Renault

While coming into the CDO position with a background in technology has certainly afforded Hoffstetter many advantages, such as a fresh set of eyes from which to evaluate Renault's existing digital capacities, he has also faced unique challenges as head of the Renault Digital Factory. Renault's global scale means that there is a strong imperative to keep its digital content and capabilities consistent with its sales strategies, which differ significantly from region to region. While businesses with less international presence do not need to consider the impact of their global digital forums in a region-specific industry, Renault needs to consider how its digital content will interact with its sales strategies in Italy as well as China.

13 http://www.betaboston.com/news/2014/11/17/pharmacy-giant-cvs-health-will-open-digital-innovation-lab-in-boston
14 http://www.retailingtoday.com/article/cvs%E2%80%99s-digital-strategy-pays

"By essence, digital is global. You can't do something on YouTube or Facebook in France without any potential impact on Brazil or India." – Patrick Hoffstetter, CDO of Renault

Hoffstetter also works to keep his Digital Factory team as well as the executive team up to speed on the digital climate as it pertains to the business of car manufacturing. The car industry is, according to Hoffstetter, a particularly challenging area for CDOs to operate in, due to the very traditional mind-sets of its businesses' leadership teams. While CEOs may be willing to integrate a new social media campaign where there was none before, Hoffstetter has found it much more difficult to sell a CEO on the opportunities that big data and digital strategy present for enhancing existing business processes. For this reason, Hoffstetter spends much of his time identifying individuals whose tasks are impacted by Digital Factory initiatives, and providing them with the appropriate training and information to equip them with the necessary skills to optimize digital strategy.

With an eye on global synchronization, and attention to increasing leadership exposure to the possibilities of digital strategies, the Digital Factory has played a transformative role in the way Renault does business in the car manufacturing world.[15]

Marks & Spencer

A Boyden placement, Carl Dawson was hired to Marks & Spencer as Chief Information Officer in 2014, but the holistic and transformative changes he has made to the business closely align with the initiatives headed by Chief Digital Officers in peer companies. In Marks & Spencer's pre-Dawson era, the large UK retailer struggled to turn a profit from its online store; Marks & Spencer's e-commerce division was underperforming, resulting in consecutive quarterly sales declines.[16] In cooperation with Laura Wade-Gery, Marks & Spencer's head of e-commerce, Dawson combined marketing acumen with digital and big data strategy to reinvent the way customers interact with Marks & Spencer in the digital space, eventually recovering sales and accelerating growth.

Most notably, Dawson helped Marks & Spencer understand how its customers want to shop. Previously, the business struggled to increase the percentage of conversions from the online store, which hovered at 16% of the company's total sales despite millions of website visits per day. Dawson used big data analytics to help the sales team understand that customers tend to use the website to "window shop", then pick up their selections from brick-and-mortar locations.

In order to cater to the window shopper demographic, Dawson has made dramatic improvements to the Marks & Spencer mobile app, and worked to enhance the customer shopping experience through editorial content and web features, even when the customer is not in the physical store. The "click-and-collect" model of retailing, which is exceedingly common throughout Europe, proved to be highly appealing to Marks & Spencer customers, and Dawson's eye to digital transformation helped the business realize these trends and preferences. In this way, Dawson has facilitated Marks and Spencer's digital transformation into a "truly international, multichannel retailer".[17]

"Retailers talk about how they cannot have one strategy for stores and another for online, and they must instead work seamlessly together." – Laura Wade-Gery, Head of E-Commerce at Marks & Spencer

Dawson has also used the better understanding of customer behaviour afforded by data analysis to optimize the digital training offered to sales associates, who must interact with technologically engaged customers, as well as Marks & Spencer executives who can use data to solve problems in other areas of the business, such as inefficient distribution channels and outdated merchandise replenishment systems. In this way, Dawson echoes the common CDO mentality that digital strategy

[15] http://sloanreview.mit.edu/article/inside-renaults-digital-factory/

[16] http://www.marketingweek.com/2015/01/08/ms-ceo-bolland-marketing-initiatives-are-boosting-brand-love-if-not-sales-yet/

[17] https://econsultancy.com/blog/65780-marks-and-spencer-s-three-steps-to-digital-transformation

is applicable to all areas of a business and all employee levels, from customer-facing sales associates to company executives who are often reluctant to adopt the cutting-edge technologies necessary to stay competitive.[18]

"I have a particular focus on making sure we've got a high level of technical capability in my team. I think technology is so important to a number of different parts of our business now, so we need to be expert at that. We're investing in more development and architecture people, and that's something that will continue for certainly the next three years." – Carl Dawson, CIO of Marks & Spencer[19]

The White House

Jason Goldman was a product leader at Twitter and a member of Twitter's board of directors before becoming the White House's first CDO in March 2015. He is expected to take the helm of the White House's digital communications.[20] In an interview, Goldman said his main goal is to facilitate conversations through digital platforms – "less being talked to, and more being talked with."[21] Goldman's expertise from Twitter has served the White House digitization strategy well, as he has worked with the existing digital media team to "spread Obama's message across the ever-expanding number of digital platforms." Goldman is a prime example of the value that a CDO can add to a government organization that aims to improve its relationship with its stakeholders and cope with the higher level of scrutiny that comes with its central position in the public eye. By crafting a digital strategy that focuses on the end readers, Goldman works to manage and direct the White House's relationship with the public as well as protect the president's reputation.

"The mission of our team is to connect people with purpose." – Jason Goldman, CDO of the White House

The CDO is also quickly becoming one of Asia's most sought-after senior technology positions.

Google China

"As data and its use in marketing become more and more relevant for a business's long term success, the challenge in a market like China is finding seasoned indigenous talent."

Jed Van Voorhis, Managing Partner, Boyden Greater China

Google China recently hired Tony Chen, an expert and prolific speaker on the topic of digital marketing in China. As Chief Digital Evangelist, his efforts will focus on digital transformation for Chinese advertisers through the application of Google's latest data/technology-driven solutions. Chen has also served as CDO of GroupM China, where he set digital agendas that integrated solutions in the areas of search, OTV, mobile, ecommerce and social, and was part of the leadership team that tripled the organization's digital business in a three-year period.[22]

Executive Hiring

Expected Trends

Job growth is expected to expand as the economy recovers. While firms experienced reductions in staffing in the aftermath of the global financial crisis, companies will enact more aggressive recruitment practices in the short term. The market will compete for high calibre talent at all levels, with an eye towards securing the best candidates for top-level positions. In order to remain competitive, firms of all sizes and in all locations will hone their recruiting strategies to target leadership that understands the changing global landscape and can successfully navigate the requirements of an increasingly diverse, data- and digital-driven world economy.

[18] http://www.retail-week.com/analysis-ms-new-it-director-carl-dawsons-to-do-list/5062616.article
[19] http://www.retail-week.com/technology/interview-how-ms-pushed-the-reset-button-on-its-technology-strategy/5075635.article
[20] http://fortune.com/2015/03/24/obama-chief-digital-officer/
[21] https://www.whitehouse.gov/blog/2015/04/13/qa-first-ever-white-house-chief-digital-officer-people-purpose-puff-daddy-and-hulk
[22] http://www.campaignasia.com/Article/392602,Tony+Chen+resurfaces+at+Google+China.aspx

Demand for executive and professional candidates is expected to rise in 2015 and beyond. The most sought-after positions at the senior level include a number of "Chiefs": Digital Officer, Cyber Security Officer, Innovation Officer, Revenue Officer and Sustainability Officer. These high level executives are particularly needed to address the trends surfacing for businesses around the globe. Companies aim to increase revenue, focus on privacy and security, engage with clients, and reform practices to meet the requirements of the changing healthcare space. The need for senior talent to fill the aforementioned posts will span most industries; however it is thought that the greatest proportion of recruitment will take place in healthcare, social media, and cybersecurity risk management.[23]

In a recent survey of recruiters, approximately 80% of respondents expected to see a significant rise in the number of executive-level positions: "The economic conditions have improved significantly over 2014. Economic growth and expansion will force businesses to enhance their (executive) presence." The greatest job growth is expected to be seen in the US, China, India, ASEAN and Africa.[24] While there will be an increase in senior-level hiring, organizations will also focus on obtaining the right combination of individuals: "As the economy strengthened in 2014, businesses focused on allocating greater resources to manage their workforces. While rebuilding and expanding is on the corporate agenda, organizations are increasingly focused on the quality of hires over quantity."[25] The CDO will be an individual with a vision and the comprehensive understanding of a broad set of technologies to lead digital transformation.

Firms will also reward quality and performance, as evidenced by the rise in executive compensation. Self-reported data show that total pay (salary and bonus) increased by close to half for CEOs and approximately two thirds for others in the C-Suite.[26]
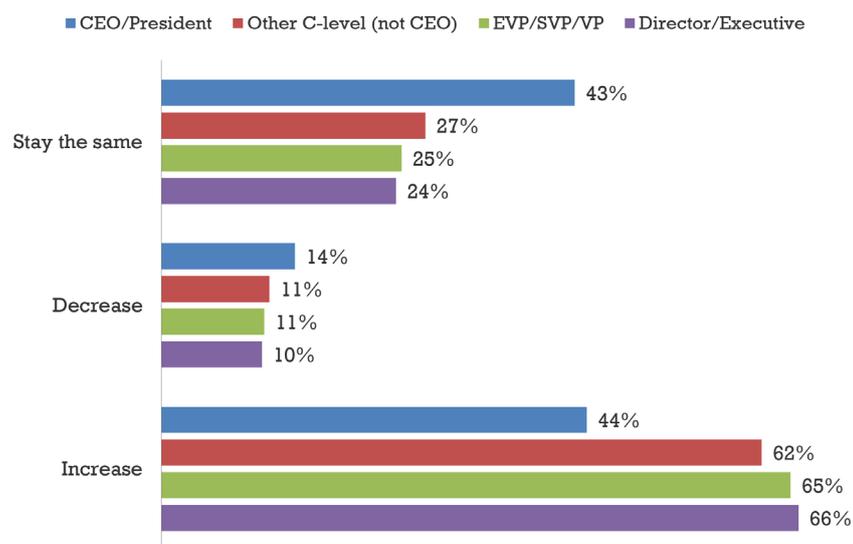
"The best Chief Digital Officers are curious, flexible, adaptable, have a view into the future, and are at ease in a change environment. For many companies, CDOs are also effectively taking on the role of Chief Transformation Officer, with the goal of challenging the status quo and taking the business to the next level. Our clients want CDOs who bring fresh insight and know what needs to be done, even if they have never done it before."

Roger T. Duguay, Managing Partner, Boyden Montreal

Fluctuation in Total Compensation

Did your total compensation increase, decrease, or stay the same in the last fiscal year?*

*Total percentage separated by career level.

Legend: ■ CEO/President ■ Other C-level (not CEO) ■ EVP/SVP/VP ■ Director/Executive

Category	CEO/President	Other C-level (not CEO)	EVP/SVP/VP	Director/Executive
Stay the same	43%	27%	25%	24%
Decrease	14%	11%	11%	10%
Increase	44%	62%	65%	66%

Source: http://members.aesc.org/iweb/upload/2014-AESC-BlueSteps-Executive-Compensation-Report-Final2.pdf

[23] http://www.recruitingtrends.com/industry-data/656-executive-and-professional-jobs-demand-to-rise-in-2015
[24] https://www.bluesteps.com/blog/executive-job-outlook-2015
[25] http://www.hrtalentmanagement.com/2015/01/28/what-we-can-expect-from-the-recruitment-industry-in-2015/
[26] http://members.aesc.org/iweb/upload/2014-AESC-BlueSteps-Executive-Compensation-Report-Final2.pdf

It is also interesting to note that executive job candidates and recruiters alike will begin to rely increasingly on social media, with the former networking and researching opportunities and the latter scoping out and vetting potential hires.[27]
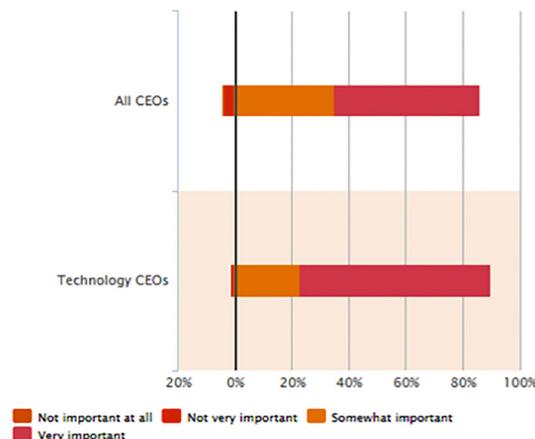
C-Suite Sentiment

CEOs and other executives recognize the urgent need to stay competitive in their industries through technological advancement and innovative use of increasingly available digital resources. The annual PwC executive survey report reveals that respondents aim to maintain or grow their technological capabilities via numerous avenues, including targeted hiring, training, and investment in lucrative new technologies. 46% of CEOs reported concern that changes in core technologies would disrupt their business to some degree between 2015 and 2020. 75% of surveyed CEOs said "having specific hiring and training strategies to integrate digital technologies throughout the enterprise" is either somewhat or very important in "helping [their] organisations get the most out of their digital investments." Almost 90% of respondents also placed specific emphasis on the pivotal role that the CEO plays in activating digital investments. It is clear that CEOs believe they are responsible for spearheading digital initiatives within their company and facilitating a culture of innovation.

How important is 'having specific hiring and training strategies to integrate digital technologies throughout the enterprise', in helping CEOs' organisations get the most out of their digital investments?

Source: http://www.pwc.com/gx/en/ceo-survey/2015/explore-the-data.jhtml
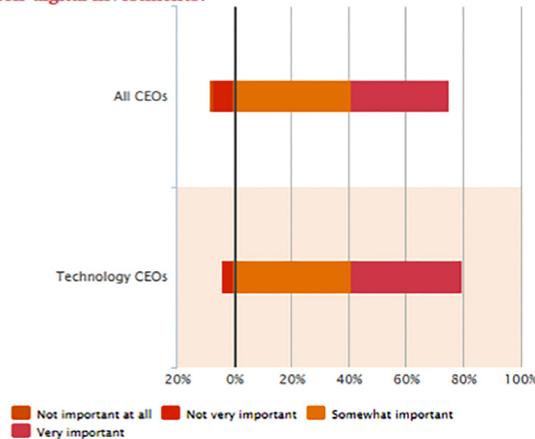
How important is 'having a CEO who champions the use of digital technologies', in helping CEOs' organisations get the most out of their digital investments?

Source: http://www.pwc.com/gx/en/ceo-survey/2015/explore-the-data.jhtml

[27] https://agenda.weforum.org/2015/05/why-tomorrows-c-suite-should-be-built-today

CEOs in the technology industry reported that they face similar struggles and anxieties to CEOs in other industries, with the primary outlier being concern over government regulation and development. While CEOs outside the tech industry prioritized other concerns over government regulation, tech CEOs placed an extremely high premium on government investment in digital infrastructures and an "innovation ecosystem" conducive to the development of better technologies.

Despite the comparatively robust growth that many companies have enjoyed as the economy continues its recovery from the 2008 financial crisis, CEOs remain insecure about the stability of the economy, and are wary of their businesses' sensitivity to lagging market conditions. A Reuters study showed that American CEOs are pessimistic about the economy for the second half of 2015, which translates to deflated expected earnings, reduced or stagnating investment, and decelerated recruiting.[28] A KPMG study that surveyed 100 tech industry leaders in the United States unveiled similar results and concerns among C-Suite executives, adding that research and development would slow significantly, with tech companies instead looking to add technological capability, customers, and employee expertise through merger and acquisition activity. As tech companies struggle to maintain their competitive edge due to constant inflows of new businesses and disruptive technologies, executives in the industry should remain especially watchful for advantageous M&A opportunities.

Adding assets, blocking competitors

Q: Which of the following will be among the most important drivers of mergers and acquisitions in your company?

Access to new technology and products	65%
Access to new customers/users	49%
Access to engineering and other talent	31%
Control over strategic assets to defend against competition	28%

Source: http://www.kpmg-institutes.com/content/dam/kpmg/globalenterpriseinstitute/pdf/2014/2014-technology-industry-outlook.pdf
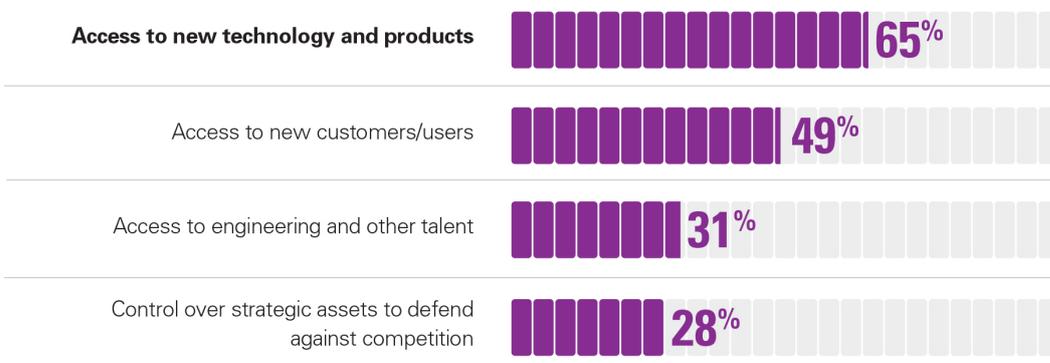
Industry Trends

Big Data, Cloud, Mobile & the Internet of Things

"Big data" has become one of the most common buzz phrases in the technology sector over the past few years. The topic also tops industry trend lists and is expected to continue to play a role throughout 2015 and beyond. Big data, the cloud, mobile technology, and the Internet of Things are evolving together to render the world more interconnected than ever before, which makes the various devices they network and influence more powerful.

[28] *http://www.reuters.com/article/2015/06/08/us-usa-economy-ceo-survey-idUSKBN0OO24I20150608*

> **"Chief Digital Officers must integrate their understanding of content along with their understanding of technology, data and analytics to offer a unique digital perspective that other C-level executives cannot provide."**
>
> *Don Leon, Partner, Boyden New York*

Big data has evolved in the recent past and will continue to make its mark on the technology sector, moving data and information "from obscurity to centrality and relevance". With big data, certain information, traditionally reserved for specialists and experts, is now accessible for the general population. This includes social media data, sensor data, and unstructured data, among others.[29] Big data has begun to permeate and drive the growth of the cloud as well.[30] In the future, it is not precisely clear how big data will impact the way we operate as individuals and as businesses, but it is clear that an influential tool has been created.[31]

Mobile technology has existed for some time, but the extent to which we rely on it has vastly increased and will continue to do so. Smart devices have opened up a world of opportunities for both businesses and consumers, offering more ways to engage, interact, educate, and make purchases. It is projected that by 2020, there will be 50 billion connected devices.[32] In addition, Gartner has predicted "an increased emphasis on serving the needs of the mobile user in diverse contexts and environments, as opposed to focusing on devices alone."[33]

"Increasingly, it's the overall environment that will need to adapt to the requirements of the mobile user. This will continue to raise significant management challenges for IT organizations as they lose control of user endpoint devices. It will also require increased attention to user experience design." – David Cearley, VP and Gartner Fellow[34]

Cloud technology will continue to converge with mobile to produce a more thoroughly interconnected environment. It makes mobile and smart devices more powerful by synchronizing content and applications, and addressing application portability across devices.[35] Analysts expect that over time, a unified model could emerge in which one "cloud" can be used by all as needed. Enterprises should consider cloud service providers now for their data management needs, and work to establish the necessary infrastructure and integration for the future. They should also design applications with a cloud model in mind to ensure that eventual transitions are as seamless as possible.

The cloud has many benefits. Among them are reduction of the overall cost of data management and providing "greater agility and reduced complexity." However, while the advantages are clear, there are also a number of challenges that businesses should consider and plan for – namely security, concerns about performance, and integration, among others.[36]

"Cloud is the new style of elastically scalable, self-service computing, and both internal applications and external applications will be built on this new style." – David Cearley, Vice President and Gartner Fellow

The Internet of Things (IoT) has emerged as the "third wave in the development of the Internet."[37] The IoT makes it possible to connect anything and everything to the Internet, giving "things" the ability to produce real-time information. "Essentially, things become agents for themselves, for people and for businesses." Businesses are beginning to use algorithms and automated judgement for decision-making, and this will continue to be prominent in the coming months and years. Big data has, in fact, enabled IoT, equipping organizations with the tools to extract information from considerably

[29] http://blogs.wsj.com/cio/2014/12/02/looking-beyond-big-data-in-2015/
[30] http://www.tableau.com/learn/whitepapers/top-7-trends-big-data-2015
[31] http://blogs.wsj.com/cio/2014/12/02/looking-beyond-big-data-in-2015/
[32] http://mashable.com/2015/01/02/mobile-trends-2015/
[33] http://www.information-management.com/gallery/gartners-top-10-strategic-tech-trends-for-2015-10026168-1.html
[34] http://www.information-management.com/gallery/gartners-top-10-strategic-tech-trends-for-2015-10026168-1.html
[35] http://www.information-management.com/gallery/gartners-top-10-strategic-tech-trends-for-2015-10026168-1.html
[36] http://www.itbusinessedge.com/slideshows/show.aspx?c=95261&slide=2
[37] http://www.goldmansachs.com/our-thinking/pages/internet-of-things/iot-report.pdf

> **"In the automotive and consumer sectors, first and foremost, before a company invests in digital to stay competitive in a world of digital disruption, it's important that the organisation securing the new strategy takes the roots of its brand into account. The company also must listen to customer needs in a never-ending customer orientation approach throughout the entire organisation. In addition, the company must secure integrated branding at each and every point of contact with consumers."**
>
> *Richard Fudickar, Managing Partner, Boyden Germany*

> **"The focus on CDOs reflects the business model of the future and the role digitalization will play. It's all about change management and the success of the role requires strong charisma and boardroom acumen. Far more than 'digital natives', CDOs should be experienced professionals from the technology sector with an outspoken, entrepreneurial mind-set who can integrate a digital culture throughout the company."**
>
> *Francis Vaningelgem, Managing Partner, Boyden Belgium and Luxembourg*

larger data sets with greater cost effectiveness than traditional technology. As the amount of data collected by connected devices swells, we expect increased investment in analytical platforms and visualization technologies that will allow business managers to make sense of the information and react to it.[38]

A related trend expected to impact recruitment and employee engagement, made possible by big data, the cloud and IoT, is HR analytics, including optimizing workflow and tracking overall employee happiness and satisfaction. The C-Suite has begun to rely on these processes to gauge the organization's environment. Companies that have already adopted this as part of their business strategy will see the benefits, and those that have not will need to catch up or be left behind.[39] HR analytics could be a very powerful tool for executives across industries, and one of the important ways that big data can permeate companies and add value to their bottom line.

Socially Enabled Business Processes

As businesses fight to remain relevant and profitable by creating products that consumers can integrate into their digital life, socially enabled business processes are allowing companies to carry this same intuition into the workplace, revolutionizing the way employees communicate with end consumers and one another.

With respect to business-to-consumer communications, more businesses are growing their social media presence and interacting with consumers in a personalized manner. Domino's Pizza allows customers to place an order by sending a tweet to their designated "Tweet-A-Pizza" account. Facebook has rolled out a "messenger for business" platform that allows businesses to use Facebook Messenger to field customer concerns. The emphasis is on making social commerce seamlessly integrated, while remaining unobtrusive and preserving individual privacy. Industry leaders are now looking for ways to eliminate the leap from the company's social media pages to its website to create a positive shopper experience that accommodates rapidly shrinking consumer attention spans.

"What if the actual purchase could take place within the social network, and the shopper didn't have to have the jarring experience of being directed to another site? By enabling social experiences with payments capabilities, businesses will reduce the friction of online shopping even further."[40]
– Tomás Campos of Blackhawk Network

Executives are also introducing internal social media platforms to their employees, thereby reducing operating costs and connecting employees more efficiently. Employees can collaborate, track each other's progress, and gain a better understanding of wider company projects more efficiently through social media than through traditional office communications like email. In addition to improving productivity through the de-compartmentalization of labour, introducing internal socially enabled business processes can help employers shape company culture and connect with employees on more personal terms.

Social networks will continue to facilitate trust and interconnectivity within the office and in the greater sphere of e-commerce, and effective executives will carefully consider how they can best apply these digital strategies to their own businesses. Additionally, while these technologies and social media capabilities are highly useful when used correctly, they can also be easily abused and exploited. Company leadership must therefore pair socially enabled business process initiatives with appropriate regulation and policies dictating appropriate use of digital channels of communication. Messaging with customers through Twitter, for example, must agree with the company's established brand, while employee social media platforms should be clearly defined as an extension of the workplace.

[38] http://www.forbes.com/sites/gartnergroup/2015/02/12/gartner-predicts-three-big-data-trends-for-business-intelligence/
[39] https://channels.theinnovationenterprise.com/articles/big-data-top-trends-in-2015
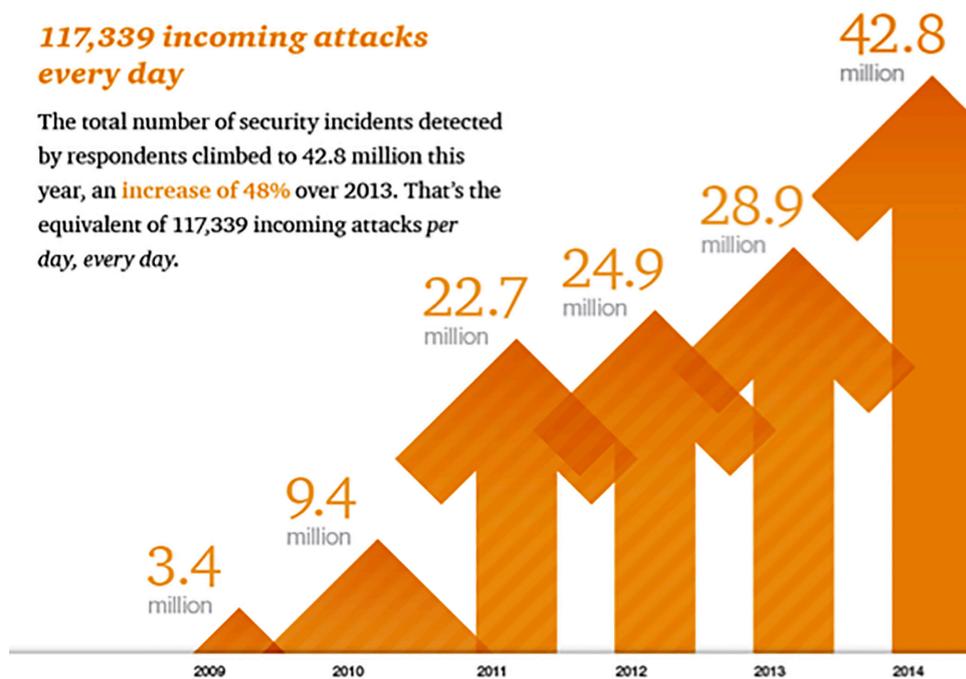[40] http://www.pymnts.com/news/2015/social-commerce/#.VYLZaPlVikp

Security and Privacy

With businesses increasingly depending on big data, business analytics, and socially enabled business processes for daily operations, cybersecurity has become a top priority for executives who wish to keep abreast of the massive data breaches littering newspaper headlines with increasingly frequency. Cybersecurity presents a particular challenge as dependence on big data and analytics grows without a clear understanding of who owns the data and who is responsible for managing and protecting it.[41]

According to a PwC study conducted at the end of 2014, there were an estimated 42.8 million security incidents detected by respondents, resulting in the theft or corruption of billions of records and a 48% increase over 2013, as indicated by the chart below. This higher incidence of data hacking led to greater investment in companies dedicated to providing cybersecurity to businesses. The issue of cybersecurity is so pressing that 30 of the most prominent publicly traded cybersecurity companies have grown at a rate 19% faster than the S&P 500 in the past year.[42]

117,339 incoming attacks every day

The total number of security incidents detected by respondents climbed to 42.8 million this year, an increase of 48% over 2013. That's the equivalent of 117,339 incoming attacks *per day, every day.*

Source: http://www.pwc.com/gx/en/consulting-services/information-security-survey/key-findings.jhtml#finding1

Cybersecurity will continue to present a significant challenge to both government entities and private companies, due to the increasing sophistication of cybercrime. Information technology has responded to this higher degree of sophistication with a new focus on rapid detection and attack of security breaches, rather than the construction of virtual protective walls around company networks.

[41] *http://www.federaltimes.com/story/government/it/blog/2015/06/15/chief-data-officers-improve-agency-decisions/71244984/*
[42] *http://www.businessinsider.in/Cyberattacks-are-exploding-and-investors-are-cashing-in/articleshow/47679060.cms*

> **"Investment in digital functions is growing as companies realize the rapid ROI. Talent for CDOs and digital managers is scarce, and thus we're seeing a trend to attract managers with strong media and online experience. Companies are also working to develop talent from within marketing or other connected areas of the organisation."**
>
> *Pedro de Valle, Managing Partner, Boyden Argentina*

Executives should consider cybercrimes and those who commit them to be a real threat. Cybercrime operations are increasingly organized, technologically complex and business-like. Executives must respond to threats swiftly, and in their cybersecurity strategies, assume that they have already experienced a data breach that requires immediate detection and elimination.[43] Chief information security officers and their IT teams must play prominent roles in the development of digital projects throughout the company to ensure that they do not present unnecessary threats to cybersecurity.[44]
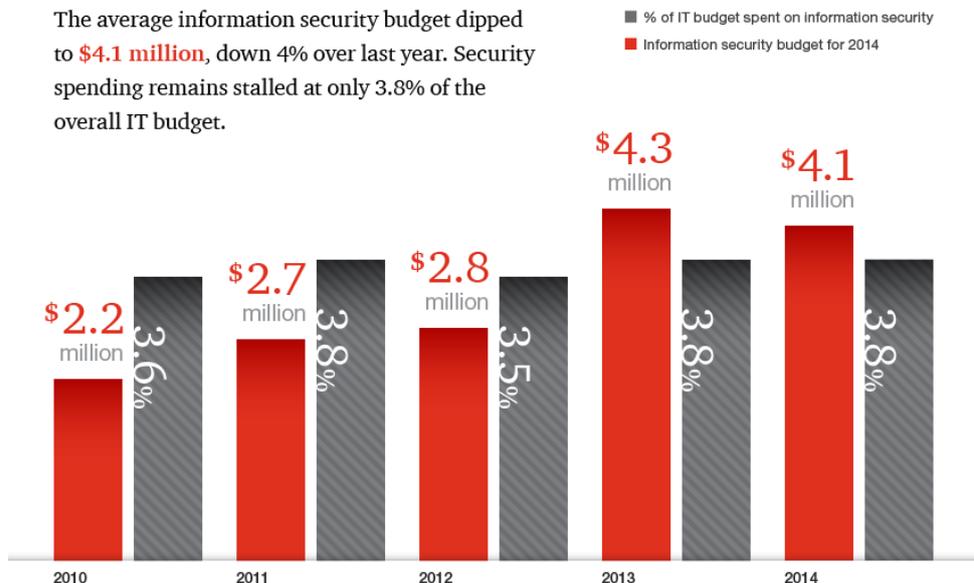
A highly connected and integrated network can also strengthen a company's security in three prominent ways which are now being employed by companies aiming to protect themselves against cyber threats: Networks can be used as sensors to detect weaknesses in cybersecurity, including the time and point at which data is breached.[45] IT departments are strategically segmenting their networks to contain security threats and prevent them from spreading throughout the network and causing more extensive damage. And, automated cross-network threat mitigation is being used to further minimize business disruption due to cyber threats.

Executives across industries must emphasize the importance of IT and cybersecurity in order to effectively combat the cyber threats that will continue to inundate their companies. In spite of the clear trend of the rising incidence of data breaches, however, spending on cybersecurity declined by 4% in 2014. There are many compelling initiatives and technologies that savvy IT departments can pursue to grow their business, but cybersecurity must be kept a top priority for IT and executives alike.

"It is no longer realistic to think that a strong perimeter defence will top attacks. Instead of focusing on how to keep attackers out, enterprises should be asking what is the quickest way to identify ongoing attacks and mitigate their damage."[46] – Andrew Wild, Chief Information Security Officer of Lancope

Reversing a three-year trend

The average information security budget dipped to **$4.1 million**, down 4% over last year. Security spending remains stalled at only 3.8% of the overall IT budget.

Legend:
- ■ % of IT budget spent on information security
- ■ Information security budget for 2014

Year	Information security budget	% of IT budget
2010	$2.2 million	3.6%
2011	$2.7 million	3.8%
2012	$2.8 million	3.5%
2013	$4.3 million	3.8%
2014	$4.1 million	3.8%

Source: http://www.pwc.com/gx/en/consulting-services/information-security-survey/key-findings.jhtml#finding1

[43] http://www.cisco.com/c/dam/en/us/solutions/enterprise-networks/enterprise-network-security/en-security-wp.pdf
[44] http://www.networkworld.com/article/2897296/cisco-subnet/information-security-the-most-important-it-initiative-in-2015.html
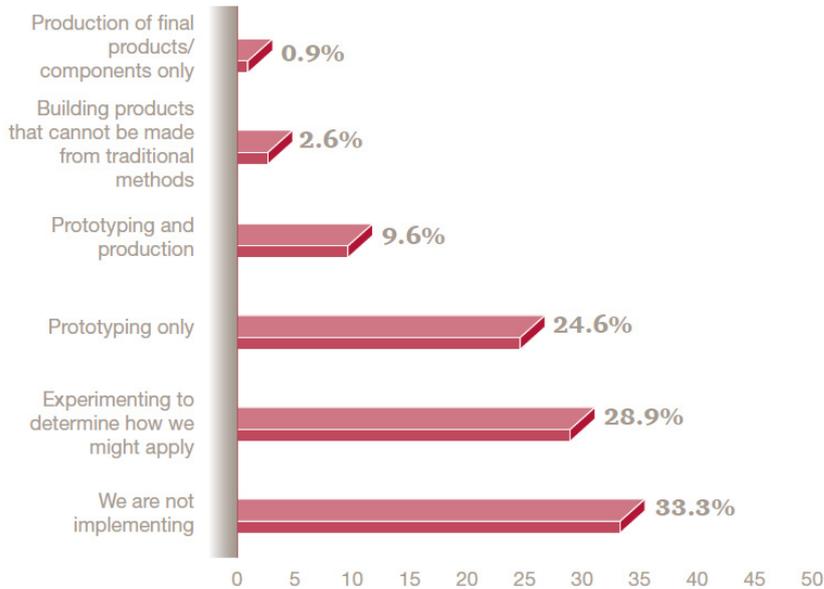[45] http://cloudtweaks.com/2015/06/networks-can-be-used-asprof-sensors-to-enforce-security/
[46] http://cloudtweaks.com/2015/06/networks-can-be-used-as-sensors-to-enforce-security/

3D Printing

Three-dimensional printing or "additive manufacturing" has emerged as a genuine disruptor in traditional production processes globally and across industries. Companies whose production processes are restricted by inflexible and item-specific machinery can now manufacture parts and entire products based on digitally rendered prototypes. This presents opportunities for companies to produce goods cheaply and quickly, especially impacting costs associated with inventory and customization. While adoption of 3D printing among smaller or low-volume manufacturers is limited due to high entry costs, continued research and development as well as the evolution of new "inks" – materials compatible with additive manufacturing – will quicken the pace of adoption in coming years. [47]

3DP chiefly used for prototyping by industrial manufacturers

Q. How is your company currently using 3DP technology?

Category	Percentage
Production of final products/components only	0.9%
Building products that cannot be made from traditional methods	2.6%
Prototyping and production	9.6%
Prototyping only	24.6%
Experimenting to determine how we might apply	28.9%
We are not implementing	33.3%

Number of respondents: 114
Source: PwC and Zpryme survey and analysis, "2014 Disruptive Manufacturing Innovations Survey," conducted in February 2014.

Source: https://www.pwc.se/sv_SE/se/verkstad/assets/3d-printing-and-the-new-shape-of-industrial-manufacturing.pdf

Companies in the manufacturing sector have been the primary users of additive manufacturing, employing 3D printers to create prototypes, experiment with different production materials, and "mate" traditional machining with additive manufacturing, as indicated by the chart above. However, according to a PwC study that surveyed over 100 industrial manufacturers, 3D printing will soon be used to create final products and after-market parts on an as-needed basis, eliminating unnecessary inventory and delivery costs.[48] Additionally, a survey of more than 1,000 industry leaders across the globe reported that 68% of respondents plan to increase their company's spending on additive manufacturing in 2015.[49] These respondents expressed confidence that additive manufacturing is

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[47] https://www.pwc.se/sv_SE/se/verkstad/assets/3d-printing-and-the-new-shape-of-industrial-manufacturing.pdf

[48] https://www.pwc.se/sv_SE/se/verkstad/assets/3d-printing-and-the-new-shape-of-industrial-manufacturing.pdf

capable of accelerating product development and allowing for the release of customized or limited-release products, with almost 20% stating that buying a 3D printer by the year 2020 is a priority for their company. Executives in the manufacturing and technology industries (as well as those outside them) should consider the positive impact that 3D printing can have on their businesses' value and bottom line.

Advancements in additive manufacturing increase the modernizing capabilities of industries from pharmaceuticals to aerospace technology. With recently discovered filament technology, 3D printing of medications will begin to revolutionize the healthcare sector, enabling pharmaceutical companies to customize the dosage of medicine and the speed at which it is released in a patient's body. Pills can be produced in different shapes, including pyramids, cylinders, spheres and donuts, allowing for variation in the surface-area-to-volume ratio, thereby accommodating a diverse range of patient needs.

"A pyramid and standard cylinder are not created equal – with the pyramid able to deliver the drug more expediently based on kinetic studies. The take-away point is that the one-size-fits-all approach is not optimal for patients who require continuous adjustments to their dosage." [50] – Robert Glatter MD, Forbes Magazine

Additive manufacturing has also contributed significant cost reductions to companies looking to launch satellites into space, an endeavour that can run up to $50 million per launch. This high price tag is due to the expensive nature of the traditional production process for satellite engines and other parts. Thanks to innovative 3D printing work, however, satellites are now much cheaper to launch into orbit. All parts of the engine are entirely producible through additive manufacturing technology, and assembly takes only three days rather than the months required to build satellites using the traditional technology. According to a report by CNBC, scientists have developed "the first hydrocarbon engine to use 3D printing for all its primary components." Test flights will begin this year, with an eye to "weekly commercial operations" in the next year.[51] Industry giants like NASA and SpaceX are using these developments to build sturdier and cheaper engine parts.

"Through 3D printing, robust and high-performing engine parts can be created at a fraction of the cost and time of traditional manufacturing methods. SpaceX is pushing the boundaries of what additive manufacturing can do in the twenty-first century, ultimately making our vehicles more efficient, reliable, and robust than ever before." – Elon Musk, CEO of SpaceX

Fitness Wearables

Of the more than 300 wearable devices currently on the market, 141 are devoted to tracking and encouraging fitness in some capacity. Many also double as "lifestyle" wearables meant to be worn at all times. Fitness wearables are a recent trend in the technology sector that stems from the "Internet of Things", which refers to the digital connectivity of people to the objects around them. These fitness and lifestyle wearables, including the ubiquitous Fitbit and Nike FuelBand, aim to fill the demand for consumer goods that serve the "quantified self" by constantly aggregating biological data on the wearer's wellness as well as overall movement and activity.[52] The following chart, which displays information collected by PwC, reflects the continued projected prominence of fitness wearables – especially among millennials – in the coming year.
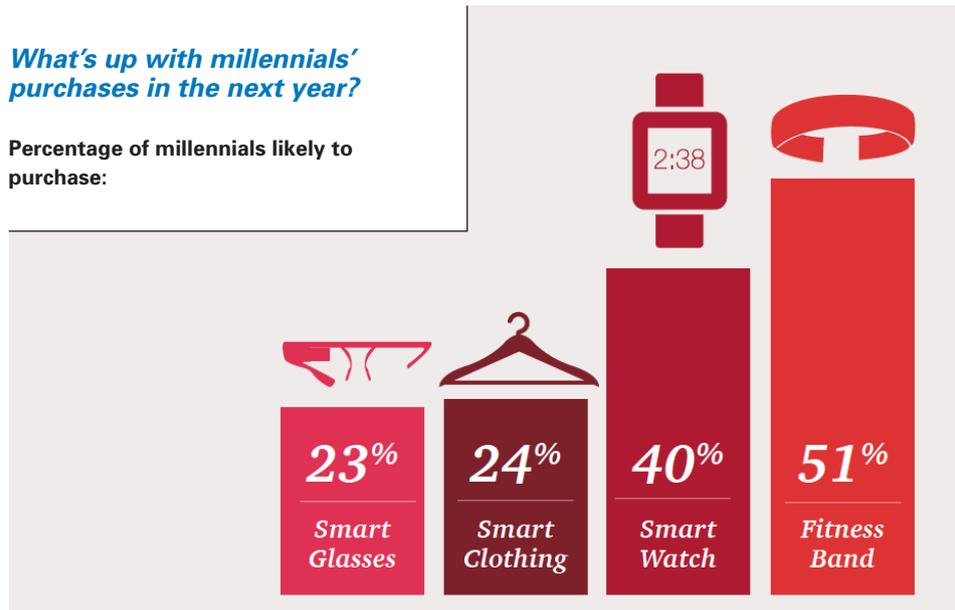
[50] *http://www.forbes.com/sites/robertglatter/2015/06/01/why-shape-matters-the-rise-of-3d-printing-in-pharma/*
[51] *http://www.cnbc.com/id/102681427*
[52] *http://vandrico.com/wearables*

What's up with millennials' purchases in the next year?

Percentage of millennials likely to purchase:

23% Smart Glasses

24% Smart Clothing

40% Smart Watch

51% Fitness Band

Source: https://www.pwc.se/sv_SE/se/verkstad/assets/3d-printing-and-the-new-shape-of-industrial-manufacturing.pdf

While personal use of wearables has climbed in recent years, employee wellness programs have also embraced the potential utility of the quantified self by introducing wearables to their employees and using them to motivate healthy eating and frequent exercise. Employers have begun harnessing the power of fitness wearables by purchasing them for employees who elect to participate in wellness programmes, hoping these tech-enabled wellness programs can counteract age-related diseases and boost productivity.[53] In response to this rise in workplace use, companies that produce wearables are developing applications and capacities that tailor their products to employee wellness programs, such as special privacy policies that prevent plan administrators from seeing individual data, and group discounts that make wearables more affordable for businesses.[54]

Herein lies great potential benefit for executives, as healthier and happier employees can yield lower healthcare costs in the long term, and ultimately boost the business' bottom line. Appirio, a consulting company that builds cloud storage projects, distributed Fitbits to its employees in 2014 and subsequently cut its health insurance bill by 5%.[55]

"We're spending in the tens of thousands for something that will get us hundreds of thousands in savings. People want to do stuff together. As a virtual company, this is a way to do that while attacking wellness." – Chris Barbin, CEO of Appirio

Despite their growing prominence in the workplace and on the street, fitness wearables have experienced high abandonment rates alongside increasing adoption rates. Companies battle to maintain consumer interest, as owners of fitness wearables become frustrated with poor battery life, imprecise biometric readings and unattractive hardware, then transition to smart watches that boast more capabilities and better compatibility with other digital devices. Companies wishing to stay ahead of the curve, such as Nike, are abandoning production of fitness wearables and instead focusing on creating apps that are compatible with smart watches and phones.

[53] http://www.cio.com/article/2377723/it-strategy/pros-and-cons-of-using-fitness-trackers-for-employee-wellness.html
[54] http://endeavourpartners.net/assets/Endeavour-Partners-Inside-Wearables-Part-2-July-2014.pdf
[55] http://www.citeworld.com/article/2450823/internet-of-things/appirio-fitbit-experiment.html

"As of May 2014, approximately a third of US consumers who own a modern activity tracker received it as a gift or from their employer."[56] – Inside Wearables Part 2, Endeavor Partners

"To succeed, the next generation of wearables needs to emerge as a purveyor of both functions – gathering our personal data, analysing it in comparison with other data sets, and then providing us with custom recommendations that take into account our personal context and situational data."[57]
– The Wearable Future, PwC

"Merely knowing how many steps you've taken each day is not all that compelling to a large mainstream audience."[58] – Erin Griffith, Fortune Magazine

Drones

As the US government relaxes regulation surrounding the commercial use of drones, or unmanned aerial vehicles (UAVs), companies in a variety of industries are beginning to consider the potential role this contentious technology could play in improving their productivity and putting them ahead of their industry peers. Media buzz on commercial drones has centred primarily on Amazon's proposition of using them to make deliveries in less than 30 minutes. This excited some and frightened others, who cited the privacy and safety hazards associated with the use of drones in neighbourhoods and near private homes.

Delivery, however, is not where the true commercial utility of drones lies. In fact, drones powerful enough to make these expedited deliveries would be too expensive to reduce the overall cost of delivery.[59] Rather, predicted growth in the commercial market for small UAVs, reaching more than $5.1 billion by 2019, will stem from the use of drones to support data and analysis.[60] Microsoft's Project Premonition plans to use drones to capture mosquitos in rural areas, analyse and study them, then use the resulting data to predict epidemic incidence and movement. This development project, which would have been prohibitively expensive and dangerous to conduct using conventional methods, is made possible by UAVs which can collect information rapidly and safely.[61] The Dallas Cowboys employ UAV technology to observe gameplay and practices from an overhead perspective, "including fine grain details like hand and foot placement"[62] that would otherwise have been difficult to capture. The Cowboys' coaches can then use this information to specialize training and expand upon the team's tactical repertoire.

Drones have made the greatest impact on the agriculture industry, as they collect and use big data to make farming more efficient. They can help farmers monitor their crops, and provide valuable information about the daily progress of remotely located properties. Based on the collected data, farmers can develop insights about soil quality and weather conditions, and adapt their crop rotation strategies accordingly.[63]

In spite of critics' insistence that drone technology as it exists today is too costly to bring about a return on investment in the long term, analysts predict (as shown in the following chart) that the overall economic impact of drones will climb at a steeper rate than direct spending on drones, especially in the three-year period from 2015 to 2017. By the year 2025, the economic impact will reach $10 billion due to research and development, and innovative investment in the use of drones across industries.

[56] http://endeavourpartners.net/assets/Endeavour-Partners-Inside-Wearables-Part-2-July-2014.pdf
[57] http://www.pwc.com/en_US/us/technology/publications/assets/pwc-wearable-tech-design-oct-8th.pdf
[58] http://fortune.com/2014/05/08/fitness-trackers-are-on-the-outs-but-wearables-are-not/
[59] http://www.cio.com/article/2910878/robotics/where-are-the-drones.html
[60] http://www.computerworld.com/article/2909747/drones-in-the-enterprise-the-future-of-data-collection.html
[61] http://blogs.microsoft.com/next/2015/06/10/project-premonition-mosquitoes-drones-cloud-computing/
[62] http://www.pcworld.com/article/2932365/the-dallas-cowboys-are-using-drones-and-virtual-reality-to-prep-for-the-2015-season.html
[63] http://fortune.com/2015/05/18/drone-agriculture/

Executives should consider the potential utility that drones could have on their business, and be prepared to invest in this technology within the coming five to 10 years. Drones will enter the mainstream when developers are able to extend battery life, lower the cost of production, and therefore reduce prices; business leadership should take full advantage of these improvements to develop robust big data analytics practices within their companies.

Figure 3: Total Spending and Economic Impact in the U.S. from 2015 - 2025
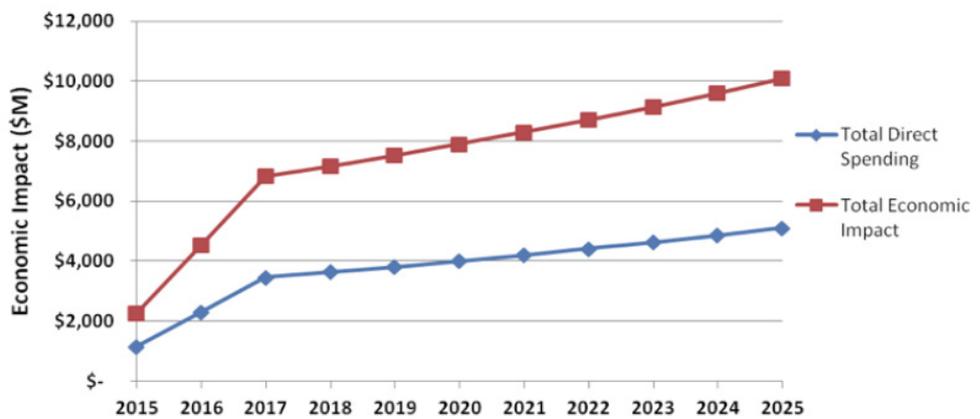
Source: https://higherlogicdownload.s3.amazonaws.com/AUVSI/958c920a-7f9b-4ad2-9807-f9a4e95d1ef1/UploadedImages/New_Economic%20Report%20 2013%20Full.pdf

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