Grande Ecole Majeure Finance – Master in International Finance

Master's Thesis

Acquiring technology companies: Are Google, Amazon, Facebook, Apple and Microsoft (GAFAM) more successful than non-tech bidders?

Authors:
Giacomo Genzini
Simona Kepalaitė

Supervisor:
Prof. Aram Attar

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ABSTRACT

In this paper, we compare the relative success of *Google, Amazon, Facebook, Apple and Microsoft* (GAFAM) on one hand, and a range of non-technology companies on the other hand, when acquiring technology targets. We develop a comprehensive definition of technology companies as well as a measure of success for this specific type of acquisition and provide both qualitative and quantitative analyses on a proprietary database covering over 700 deals. We find that – in principle – GAFAM enjoy a small relative advantage, but that its role in predicting success is limited . Instead, we identify four specific factors on which successful technology firm acquisitions depend – regardless of the nature of the acquirer – and we discuss how each may favour GAFAM or traditional buyers. Additional research would be necessary to establish whether these factors also apply to situations in which technology companies acquire non-technology targets.

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INTRODUCTION

Technology is the engine of economic growth. By increasing total factor productivity, it allows companies to increase the quantity, quality and value of their outputs, enabling them to create better products and expand into more sophisticated industries that account for a growing share of the economy and lead its development (Persson, 2010).

A lot has been written on the role of technology in driving productivity, with research focusing on both internal technology development and external acquisition. In the latter area, the role of Intellectual Property (IP) transfers - i.e. the way patents are filed for and traded – has been analysed extensively (Abernathy & Townsend, 1975; Agrawal, 2001; Cassiman & Veugelers, 2006; Gradstrand & Sjölander, 1990; Granstrand, Bohlin, Oskarsson & Sjöberg, 1992; Tsai & Wang, 2005; Stiroh, 2001).

Our goal is to shed some light on another aspect of external technology acquisition, focusing on the acquisition of entire technology companies, as opposed to the mere purchase of their IP. Others have already addressed the topic from different angles, mainly focusing on the different ways in which knowledge is extracted and integrated. Building knowledge through acquisitions is especially important because companies may not be able to internally develop the competences required to stay leaders in industries shaped by rapid innovation and technological complexity (Ranft & Lord 2002).

Our research question is whether companies whose businesses are entirely based on technology – "Tech" companies – are more successful at acquiring their peers than companies operating in more traditional sectors – "Non-Tech" companies. Most Non-Tech firms may have been in business for decades, but – with few exceptions – they have only recently begun to engage in technology M&A activities. This is most likely a response to the rapid changes that technology – digital in particular – has brought to their industries.

In order to answer our question, we are going to focus on five companies – *Google, Amazon, Facebook, Apple and Microsoft* (henceforth referred to as GAFAM) – that in the last few years have been frequently covered together by financial analysts and the media alike. While markedly different, these five companies share a few basic traits which make them similar in the eye of the public: they are all innovative technology firms, they are all American-based and, as we write, they are the five most valuable public companies in the world.

Table 1. Top 10 Public Companies by Market Capitalization (YCHARTS, June 19th 2018)

#	*COMPANY*	*MARKET CAP ($ BILLION)*	*#*	*COMPANY*	*MARKET CAP ($ BILLION)*
1	Apple	915.20	***6***	Alibaba	522.30
2	Amazon.com	827.75	***7***	Tencent Holdings	490.46
3	Alphabet	805.76	***8***	Berkshire Hathaway	473.13
4	Microsoft	764.17	***9***	JPMorgan Chase	364.75
5	Facebook	568.24	***10***	Johnson & Johnson	322.39

They also share a number of key characteristics which make them a suitable proxy for the technology industry as a whole. Most importantly, each of them has invested significantly in non-organic growth, producing vast amounts of data from which we can extract valuable insights.

To set the basis for our analysis, the first section of this paper lays down a few operative definitions and provides an overview of the M&A strategies of each of the GAFAM companies.

Building on that, Section 2 provides a selection of qualitative case studies which – we believe – highlight the key themes emerging from our analysis of GAFAM acquisitions.

In Sections 3 and 4 we replicate the same process but focus on Non-Tech bidders. We present a comparable set of deals involving non-technology players acquiring technology companies, discuss the motives behind these acquisitions and explore the similarities and differences with our first sample through more qualitative case studies.

In order to make our analysis as rigorous as possible, we have reviewed and classified every acquisition made by the five GAFAM companies from their incorporation until the end of 2017, gathering and coding both quantitative and qualitative data points. The same has been done for the sample of non-technology buyers presented in Section 3. Section 5 therefore describes the resulting databases and provides a data-driven, quantitative analysis of the two groups of acquisitions in order to make our answer to the research question as objective as possible. We provide a wide range of statistical outputs and our own interpretation of the results, discussing the merits and limitations of this type of analysis.

Section 6 brings together the results of the previous sections and combines both qualitative and quantitative outputs to provide a final answer to our research question.

Section 7 concludes this paper with a summary of our key findings and a few suggestions on further topics of research.

		BIDDER	
		Tech	Non-Tech
TARGET	Tech	*Sections 1-2-5*	*Sections 3-4-5*
	Non-Tech	*(Not covered)*	*(Not covered)*

SECTION 1 – THE STARTING POINT

Technology's central role in driving economic growth is undisputed. Economic history clearly identifies the Industrial Revolution as the pivotal moment that separates the last two and a half centuries of fast economic development from millennia of essentially flat GDP levels across the world (Cameron & Neal, 2003).

At the macro-level, economists have addressed the subject from multiple angles. The most widely recognized theory is the one formulated by Robert Solow (1956), whose eponymous growth model incorporates productivity improvement stemming from technological progress as one of three sources of economic growth – capital accumulation and labour intensity being the other two.

At the micro-level, research has focused on internal technology generation and external acquisition. The first body of studies focuses on the capitalization of R&D expenditures as a way to quantify the potential for internal technology generation and value creation within firms. While researchers are not unanimous, their general conclusion is that returns on R&D investments are far more uncertain than the ones on PP&E (Kothari, Laguerre & Leone, 2002), and that markets tend to discount R&D-intensive companies to compensate for this extra risk (Lev & Sougiannis, 1996; Cazavan-Jeni & Jeanjean, 2007).

The second branch looks at the challenges that arise when acquiring technology from external sources, either through the purchase of IP in the form of patents or indirectly through acqui-hires (Coyle & Polsky, 2013; Makinen, Haber & Raymundo, 2012).

Our goal is to add more detail to the third path, namely inorganic (or semi-organic) growth through the acquisition of technology companies, be them promising start-ups or more mature businesses. Since we are interested in comparing the relative performance of technology and non-technology companies (from here on simply referred to as “Tech” and “Non-Tech” companies) when acquiring smaller Tech companies, the definition of what constitutes a “Tech company” is of paramount importance.

Definitions – What makes a Tech company

A relatively small number of remarkable discoveries and inventions made the rapid change from secular stagnation to fast economic growth possible, and a few companies were able to capitalize on them. First in Europe and the USA and later in Asia and Latin America, these companies were able to introduce new products and jobs that allowed people to improve their lifestyles and economic conditions and to escape the Malthusian trap (Galor & Weil, 2000; Persson, 2010).

The steam engine, the internal combustion engine, electricity, vaccines, nuclear power and radio signals are only some of the inventions that have contributed to the development of human society in the last few centuries. Each can be traced back to one or more core technologies that multiple firms were able to master and spread over time.

Industrial firms, chemical firms, consumer good firms and even media companies are all reflections of their underlying technologies, and a case could be made that they all fit the definition of a “Tech company”. At some point in time, each of them embodied the latest technical developments and was perceived as the pinnacle of innovation.

Industrial conglomerates that struggle today were once the torchbearers of progress and technological advancement.

As interesting and fundamental as it is, virtually no formal academic research covers the topic. The issue of defining Tech companies has been tackled by many authors over the last 30 years and beyond, but always as a preliminary question rather than as a stand-alone matter. Since we are in the same position, we limit ourselves to a brief overview of their definitions and provide our own version for the purpose of this research.

Literature Review

Scholars inevitably run across the issue of defining Tech companies when they study Venture Capital and innovation financing. For example, Bachher and Guild (1996) define "technology based companies" as "those companies intending to commercialize a technology for the first time and thereby expecting to derive a significant source of competitive advantage from the technology".

Bauer, Dehning and Stratopoulos (2012) expand the analysis to encompass the financial performance of global Information and Communication Technology Companies at large. They base their samples on BusinessWeek's InfoTech100 (2007) and on the Global Industry Classification Codes (GICS) 45 and 50, corresponding to "Information Technology" and "Telecommunication Services" firms respectively. In turn, BusinessWeek's classification is based on S&P Compustat data and considers a sample of firms hand-picked from 8 industry categories.

Fernàndez, Callén and Laìnez Gadea (2009) look at European Technology companies and the impact of non-financial news on their stock price. Their sample is based on the "Sectorial e-business Watch", an initiative of the DG Enterprise and Industry of the European Union which monitored the penetration of "ICT and e-businesses" in 15 selected industrial sectors.

Bernal, de Nieves and Briones (2016) encounter the issue when studying CSR strategy within Spanish technology companies and identify them based on their affiliation to one of the country's Scientific and Technological Parks, building on research of Vásquez-Urriago, Barge-Gil and Rico (2012).

Overall, these classifications all suggest innovation and ICT (Information and Telecommunications Technology) capabilities as the two main criteria to identify Tech companies. However, the final sample composition appears to be affected by arbitrary choices regarding the industries in which innovation takes place.

Given the intrinsic ambiguity of this type of definition, it is interesting to take into account the perspective of VC investors who interact with Tech companies on a daily basis as part of their vocation. Marli Guzzetta – Research Director at Inc. Magazine – gathered the views of some of them in 2016.

Upfront Ventures partner Greg Bettinelli defines Tech companies as firms that "use technology to create an unfair advantage in terms of product uniqueness or scale or improved margins". In case of a doubt, he suggests considering whether a given company could exist without technology: if the answer is "no", then that company must be a Tech company.

Hayley Barna of First Round Capital also stresses the role of technology in giving some companies an edge over industry incumbents and theorizes the existence of a middle ground between Tech and Non-Tech firms, suggesting that a full spectrum exists.

Alex Payne, technologist and co-founder of Simple Finance Technology corp. stresses the need for a Tech company's *product* to consist of "applied scientific knowledge that solves concrete problems and enables other endeavours".

As vague and inconclusive as they may sound, these definitions clearly show that Tech companies operate across sectors and that no such thing exists as a secluded "Tech industry". They also suggest that companies enjoy some leeway in the way they market themselves. On one hand, firms that succeed in presenting themselves as Tech companies tend to be more appealing to investors and talents, resulting in cheaper capital, higher valuations and a more motivated workforce; on the other hand, expectations are higher for Tech companies, and so is the pressure on management.

The clearest example of this definition-arbitrage is *Juicero*, a company that raised $120 million in venture capital to produce a connected juice machine that retailed for $400+. Despite the "Tech-valuation", the product itself was rather low-tech and overly complicated, leading to a public scandal for misleading claims and eventually forcing the company to file for bankruptcy in 2017.

A similar effect was extensively documented in the aftermath of the dot-com bubble, when several traditional companies rebranded to include ".com" in their name and reaped short-term benefits on the market (Rau, Patel, Osobov, Khorana & Cooper, 2002). More recently, similar "cosmetic effects" have been sought through the inclusion of blockchain or AI features in otherwise ordinary firms. One prominent example is the *Long Island Juice Company* that, after announcing that it would change its name to *Long Blockchain Corp.*, saw its shares increase by 500% (Johnson, Samson & Megaw, 2017).

The allure of tech positioning can be tempting for traditional companies as well: both *Goldman Sachs* and *JPMorgan* recently claimed their status as "Tech companies". While these claims can be backed by the sheer size of the engineering workforce companies employ, we resist the temptation to classify them as "Tech companies" and recognize that nowadays technology plays a crucial role in virtually every industry.

Defining "Tech"

Taking a cue from the elements discussed above, we elaborated our definition of a "Tech company" based on the following criteria:

- The company develops its own core technology internally rather than purchasing it from third parties, with limited exceptions. This technology may or may not be sold to clients, but it constitutes a competitive advantage.
- The core business of the company could not exist without this proprietary technology. This excludes basic technologies such as electricity but encompasses more specific inventions such as sensors or patented software.
- The core technology on which the company's success is based on is innovative: it did not exist 10 years ago and it will probably be obsolete in another decade.

In other terms, Tech companies either exist for the purpose of supplying innovative technology to others, or they could not exist if they did not produce their own technology.

These three tenets allow for a certain degree of flexibility but set a limit to it. For example, the definition excludes traditional retail banks because their business could certainly exist without modern technologies (in fact, it did), and the infrastructure on which they operate is not itself a source of competitive advantage.

Over the last 20 years, many technological products have been enabled by a combination of internet and software. These circumstances might suggest a fourth tenet to be included in our definition, namely near-zero marginal costs and high scalability. While certainly interesting, however, this property seems more typical of the current phase of innovation rather than of technology in more

general terms. Most manufacturers of consumer electronics hardware face significant marginal costs, but no one questions their “Tech” status.

The list of contemporary Tech companies looks very different from the list that would have been written just 30 years ago, but this is consistent with the very definition of a Tech company that we propose: the definition of a company as “technological” depends on its ability to constantly innovate and add value to a given industry. As the potential for innovation decreases in a given industry as a whole – and new industries develop in which this potential is higher – old Tech companies find that their success rests increasingly less on technological advancements and increasingly more on operational efficiency.

We should stress that even accounting for this flexibility some corner cases exist that are hard to classify. For example, *Tesla Motors* is broadly regarded as a Tech company – a fact that is strongly reflected by its financial valuation. However, the cars it sells are not fundamentally different from some of the electric models that traditional manufacturers, such as *Toyota* or *Nissan*, have been producing for years. A similar argument could be made for some traditional players in the finance industry, which have an analogical legacy but have been quick to transform into digital players. While we have adopted a conservative view throughout our research, one should be open to reclassifying traditional players as “Tech companies”, should they radically change their DNA in response to competitive pressure from more technological competitors. We will return to this point in sections 3 and 4.

M&A Profiles of GAFAM

Over the last few years, *Google, Amazon, Facebook, Apple* and *Microsoft* have often been collectively referred to as GAFAM by the press and by some financial analysts (*Google* has since been reorganized as *Alphabet*, but the "G" survives in the acronym and is used throughout our paper). While markedly different in many ways, these firms are often addressed together because of their innovative nature, proven success and scale. As of June 2018, they were the five largest publicly traded companies in the world with an aggregate market capitalization above £3.8 billion (see Table 1), and the first trillion-dollar company is likely to be one of them.

They are all American (originated and based), but together they employ over 900,000 people around the world, and their products and services are available in most countries. Alibaba and Tencent are the largest non-GAFAM Tech-companies by market capitalization. They dominate China but not even their near duopoly – coupled with Chinese censorship and non-tariff barriers that hinder GAFAM expansion in favour of local champions – has been able to prevent *Apple, Amazon* and *Microsoft* from having a role in China. *Google* famously abandoned China in 2010 under regulatory pressure from the Chinese government, and *Facebook* was blocked the year before. However, the two companies have not given up on China, and are both working on ways to access its huge market.

Conversely, *Alibaba* and *Tencent* have been expanding freely in Western countries, only to find that GAFAM companies are much stronger competitors there. While Chinese Tech companies deserve close attention and are only going to grow, their tight relationship with the government and their almost exclusive reliance on the home market – however large – make them fundamentally different from GAFAM, prompting us to exclude them from our current research.

More recently, some financial commentators (starting with *CNBC*'s Jim Cramer) have been substituting *Netflix* for *Microsoft* because of the two companies' relative financial performance and future prospects, giving rise to FAANG. However, *Microsoft* bears many more similarities with the rest of the group than *Netflix*.

Most significantly, our focus on GAFAM is justified by the fact that these five firms are among the most acquisitive Tech companies in the world: together they have acquired more than 500 companies to date (in contrast, *Netflix* made its very first acquisition only in 2017). This makes them ideal candidates for our research on the relative success of Tech and Non-Tech acquirers.

Scott Galloway – NYU Stern professor and author of *The Four* – also places *Microsoft* in a different category, arguing that its influence on society is in decline and its market power has peaked. In *Microsoft's* defence, we notice that its market capitalization has been steadily rising in the last few years and, as discussed below, the last change of leadership may have infused new life and a new vision in the company.

Other firms such as *Twitter* and *Snapchat* – but also *Intel*, *Cisco* and *IBM* – have also contributed significantly to technological innovation in the last decade. However, these companies are smaller, tend to have a narrower focus on a single core business and – crucially for our research – have not been as active in M&A as the five companies we analyse in this paper.

At this point, it is important to specify that our research excludes those early-stage investments for partial ownership that most GAFAM companies make through separate Corporate Venture Capital branches. We focus on companies on which GAFAM have full control.

What follows is a brief overview of the acquisition strategies of each of the GAFAM. While sections 2 and 5 stress their similarities, it is worth taking the time now to outline their main differences, as well as the assumptions and strategic choices behind them.

M&A Profile – Google

Google's (currently *Alphabet*) acquisition strategy is difficult to define due to the sheer quantity of deals made (approx. 220 companies acquired[1] to date) and also due to their broad scope – *Google's* acquisitions are not focused in a particular field. However, the strategy has been globally described as taking on a semi-organic growth approach (Geis, 2015) and is an obvious source of innovation and growth for the company – some of its core and most famous products are direct and indirect results of these acquisitions.

Taking a closer look, the strategy could be broken into two broad and interconnected streams: strategic core business developments (improvements and expansions through differentiation) and bets on the future of technology (moonshots and independent ventures).

These deals originate from various sources but two principal ones stand-out: need and network. Target companies are either sought out to fix a particular internal problem, or an interesting company is introduced to *Google* through its vast network, especially through start-up founders who had previously joined through acquisitions.

When evaluating a potential acquisition, two core criteria are used at *Google*:

- **The Toothbrush Test** – is the product something to be used daily and would it make the user's life better?
- **The Team** – is the founding/managing team a good fit for *Google*?

Whereas the toothbrush test is enough to attract *Google's* interest in a company – no matter if it relates to its areas of activity – the team fit is thoroughly vetted as well – founding members meet the CEO Larry Page and VP Sundar Pichai before any decision is taken. Only if the company matches both criteria, *Google* is interested in pursuing the acquisition.

The success of the deal is internally assessed based on the integration of acquired companies and their employees and is closely monitored. *Google* makes sure to deliver the promises made to the founders of acquired companies and also runs 90-day follow-ups on all of the deals executed, even to the disbelief of the start-up founders, according to Don Harrison – VP of Corporate Development (as reported by D'Onfro, 2015). Based on the internal measures, back in 2012, *Google* estimated that two thirds of their acquisitions had been successful (Ludwig, 2012).

The level of integration itself is also varied: either companies and their employees are absorbed into existing or forming structures (e.g. *ASI*) or they maintain their autonomy with some or no integration with *Google's* other products (e.g. *Nest*, *YouTube* and moonshots).

The promise of freedom, coupled with access to *Google's* vast resources is a common attraction point, especially for the teams of start-ups that are already operating successfully on their own. By joining *Google*, the team can then concentrate completely on their principal goals.

It has also been speculated by a few sources (for example Yarow, 2010) that acquisitions have become a way for *Google* to hire employees when competition for talent is at an all-time high in Silicon Valley. Indeed, from our research we can see that a significant number of founders have joined Google after the acquisition, with some even staying on for long periods of time – something unusual in Silicon Valley but not as much for *Google* (Luckerson, 2015).

[1] For the scope of this research, we only consider deals made by *Google's* (and later *Alphabet's*) core M&A team (sometimes referred to as Google Business Development) and not Google Ventures or Google Capital.

M&A Profile – Amazon

Amazon has relied extensively on M&A to drive its expansion, both geographically and across businesses. The company started out as a US-only online bookstore in 1994, and its first acquisitions targeted competitors in other countries (*bookpages.co.uk* and *telebuch.de*) which soon became local versions (marketplaces) of the *Amazon* platform. The same method was applied to enter the first product categories outside books, with the acquisition of vertical e-commerce websites specialized in the sale of music CDs (*CDnow*), power tools (*Tool Crib of the North*), toys (*Back to Basics*) and apparel (*Zappos*, *BuyVip*).

Each of *Amazon's* acquisitions has been driven by one of three factors:

- geographic/channel expansion
- product category addition
- technology acquisition

Regardless of the factor, a clear picture emerges from the analysis of 20 years of deals: *Amazon* relied on acquisitions to expand its geographic reach, product catalogue and technical capabilities at first, but its real strength is the way in which it has been able to systematically integrate its targets into a single ecosystem and to learn from the process.

Having bought local players in Germany and the UK, *Amazon* learnt how to open its own marketplaces in countries like France, Spain, Italy and Australia starting from scratch. In much the same way, it did not need to purchase a vertical specialist when it started selling gardening tools, for example. And while many key pieces of technology were obtained through acquisitions (the *Kiva* robots that now power many of the firm's fulfilment centres are probably the best example), *Amazon* has become a leader in cloud computing and software engineering mainly through in-house development.

While not all acquisitions have been widely publicized, *Amazon* has always been quite explicit about its M&A strategy, acquiring companies in adjacent fields with clear integration goals. Very few firms have remained independent for long (*Zappos* and *Twitch* are remarkable exceptions): the majority of *Amazon's* targets have been integrated into the bigger ecosystem within just a few years.

The picture that emerges from the 86 deals we covered is that of a company which has been able to refine and master its internal integration processes, with scalability and repeatability in mind. The acquisition of talent has been secondary with respect to that of capabilities: less than half of the CEOs of the companies *Amazon* bought were still working at the firm 3 years after the deal was done, but the capabilities of these companies have always been integrated.

While we did see a gradual shift from inorganic to organic growth in the three dimensions above, we should note that *Amazon* has not stopped making acquisitions for any of the three points mentioned above: while it opened its Australian marketplace from scratch, it did enter the Middle East with the purchase of a local platform (*Souq*). And despite its experiments with brick-and-mortar retail, it has entered physical groceries through the acquisition of *Whole Foods*, its largest acquisition to date[2]. It has also been investing heavily in cyber security and gaming software.

[2] Since *Whole Foods* is not a technology company, we did not include it into our analysis. However, we do recognize its effectiveness in expanding *Amazon's* business through a new, physical channel.

M&A Profile – Facebook

Facebook's acquisition strategy has evolved as the company grew over time, but it retains a very targeted approach with an almost exclusive concentration on software companies (with the notable exception of *Oculus Rift* and a few smaller companies). Acquisitions are a key aspect of the company's growth and maintained leadership position – 4 out of 6 *Facebook's* standalone brands were acquired (*Instagram*, *Whatsapp*, *Oculus*, *tbh*) and most of the other companies were acquired to bring improvements to the company's core activities.

Facebook's acquisition strategy started out very gradually as the company made only two deals before 2010 – in contrast, since then the company made between 7 and 10 deals every year, slowing down again in 2017. The acquisitions were also almost exclusively in the form of acquihires up until the purchase of *Instagram* in 2012. This specific acquisition thesis was described by founder M. Zuckerberg in 2010: *"We have not once bought a company for the company. We buy companies to get excellent people."* And even if the strategy has broadened in the years since, it is still heavily concentrated on the quality of the people onboarded through the acquisition.

Facebook has been acquiring companies that allow it to maintain its established leadership position by keeping up with the fleeting crowds – the purchase of *Instagram* brought a younger user base and so did the acquisition of *tbh*, while *WhatsApp* gave *Facebook* access to a more international user base. Moving forward, it is safe to assume that *Facebook* will try to concentrate even more on its monetization efforts – it has been involved in bidding wars on advertising companies[3] with *Google* on a few occasions already.

In 2017, M. Zuckerberg explained the four main acquisition strategies employed at *Facebook*, in all of which he himself seems to be heavily involved (Heath, 2017):

1. **Building relationships first** – in line with long-term vision, M. Zuckerberg establishes friendships with company founders that he is interested in long before *Facebook* makes inquiries about a potential acquisition.
2. **Having a shared vision** – M. Zuckerberg makes sure that both companies are equally excited to be working together and that they both see the benefit of a mutual effort.
3. **Sometimes using scare tactics** – M. Zuckerberg has admitted to occasionally using scare tactics on small businesses, emphasising how difficult it would be to try to run their business alone, but maintained that it is not the preferred modus operandi.
4. **Moving fast and buying things** – by playing the long game since the very beginning (establishing a relationship long before a company is ready to be acquired), Facebook can close deals quickly once the time is right and does not have to waste time on due diligence at a crucial moment.

All in all, these steps help to ensure that *Facebook* not only chooses their targets right, but also that it is more likely to place the winning bid – even if on some occasions it is below the target's expectations or other competing bids. Looking forward, it is very likely that *Facebook's* acquisition strategy will deviate from its focus on purely software targets, especially as in 2016 it established its own consumer hardware lab called Building 8.

[3] We discuss the importance of advertising to *Facebook* in the case study: *Advertisers first? – How GAFAM make money*

M&A Profile – Apple

"Apple buys smaller technology companies from time to time, and we generally do not discuss our purpose or plans."

While the deals of other GAFAM companies are usually quite straightforward to interpret, *Apple's* acquisitions are much more cryptic. The reason is twofold: not only does *Apple* talk much less about its purchases (the quote above is the traditional reply the company has been offering to journalists inquiring about acquisitions for the past twenty years), it also tends to make acquisitions in the very early stages of development, years before their capabilities find commercial application in one of *Apple's* products.

While we can only speculate whether *Apple's* development cycles are longer than those of its peers – and whether other firms are faster at integrating acquisitions – we do observe that the purpose of many of *Apple's* acquisitions is not clear until many years after they are made.

This is consistent with *Apple's* general preference for product-quality over speed to market, but it does make the analysis of its acquisition strategy more challenging than for some of its peers. It is also consistent with *Apple's* reliance on hardware as a sales driver: while other GAFAM companies make most of their money selling services or advertising, *Apple* provides most software as a free complement to its hardware, for which it charges customers. It could be argued that hardware acquisitions (be them about finished products, simple components or production technology) take longer – on average – to make an impact, simply because physical products are not as quickly scalable as software.

As an example, *Apple* acquired *LuxVue Technology* – a company that produces MicroLED displays in 2014. And rumours are only now beginning to surface that the technology acquired might be employed in the next generation of *Apple Watches*, which could be launched in late 2018.

Another characteristic of *Apple* is its long-term investment in a full ecosystem – as opposed to a portfolio of hardware and software products. This element certainly plays in favour of customers, but it can make it harder to identify where exactly the firm's acquisitions come into play. The acquisitions of *Lattice Data* (an Artificial Intelligence start-up), *Turi* (a slightly more mature company working on Machine Learning) and *Shazam* (a music recognition mobile application, EU approval pending) amount to over $800 million, but the way in which they fit *Apple's* plans remains uncertain today.

Remarkable exceptions to this secrecy exist: *Beats Electronics* was explicitly bought for its *Beats Music* streaming service, which served as foundation for *Apple Music*. Similarly, it was clear that *Apple* was designing its own mapping service as soon as it purchased *Placebase* in 2009. Still, it took the company another four years of work to debut the service, and ten more mapping companies have been acquired since then.

Most of *Apple's* acquisitions centre around technology and people: the companies behind them are usually terminated, their websites shut down and their products either rebranded or incorporated into a broader ecosystem. The *Beats* brand is one of very few exceptions.

M&A Profile – Microsoft

Microsoft's vast acquisition record (approx. 175 companies acquired[4]) comes from its long history and can be globally described as a strategy to strengthen the company's position in the markets where it already exists – overall, the company has focused on core product development and improvements. The majority of its acquisition deals have come from a bottom-up approach – when a product team has a need that could be fulfilled by an acquisition – and have been focused on smaller companies.

Microsoft's propensity to sometimes purchase Tech companies after establishing a partnership could be viewed as a differentiating factor from other GAFAM companies' strategies. Moreover, the acquisition activity profile and strategy can be clearly divided into three distinctive periods, based on the tenures of its three CEOs. The difference in strategies is especially stark between the previous CEO Steve Ballmer, who resigned in 2014, and the current CEO Satya Nadella, who succeeded him.

During Steve Ballmer's tenure (2000 – 2014), *Microsoft* seems to have lacked clear strategic vision in both corporate and M&A terms. This prevented it from making some important strategic moves, making it miss attractive opportunities and eventually lag behind its competitors. In addition, during this period *Microsoft* made some very big – albeit incoherent – deals that did not work out for the firm, earning it the reputation of a company that never does well with large acquisitions. One well-known example of this was Ballmer's decision to purchase *Nokia's* mobile phone business in 2013 for over $7.4 billion, even as other key people at *Microsoft* expressed their concern and disapproval of the deal. It is now widely accepted that this deal was a failure, as *Microsoft* did not make use of the acquisition, wrote-off an extensive part of it and finally divested. Another example is the $6.3 billion acquisition of *aQuantive* in 2007, amid an online advertising acquisition spree intended to allow *Microsoft* to catch-up with *Google*. This particular deal led to write-offs of $6.2 billion in 2012, as the growth acceleration expected from the acquisition failed to materialize.

Under the new CEO Satya Nadella, *Microsoft's* M&A activity has increased significantly and has become much more focused as he turns around and centres the firm's overall strategy around the cloud rather than the Windows product. Not only has Nadella put the focus on particular industries of interest, he has also led acquisition efforts in a more disciplined and centralized manner – M&A activities have been consolidated and some interesting but unclear opportunities foregone (e.g. the purchase of *Slack* that *Microsoft* walked away from) – showing more restraint than his predecessor.

In this new era, *Microsoft* seems to be following a new type of M&A philosophy –the company now practices what the *Financial Times* (2018) has called a "network approach", where *Microsoft* ventures to purchase companies that are more online communities and networks than anything else, with overlapping mutual interests. The challenge comes later: how to exploit the areas of common ground without destroying the independent value of those communities and networks.

The latest big acquisitions of *Majong*, *LinkedIn* and *GitHub* (announced in June 2018) fit this pattern rather well. The three companies represent *Microsoft's* interest in game developer, business professional and software developer communities with the intent of reinforcing the company's image as a professionals' tool provider that was somewhat diminished over the recent years. However, as these acquisitions are fairly recent it is still too early to say whether this strategy will be fruitful.

[4] *Microsoft* makes deals in three forms – partnerships, acquisitions and investments. Once again, it should be noted that for the scope of this research we only consider fully acquired companies.

Defining success

Given the nature of technology acquisitions made by technology companies – which as the profiles above outline often aim at building more sophisticated products rather than simply extracting synergies or exploiting scale – defining success is not easy. Existing literature in the field does not help much, in that it lacks a consistent methodology and assesses M&A outcomes on a diverse range of factors, including financial, operational and behavioural (Marks & Mirvis, 2001).

In most cases, M&A targets are completely absorbed by acquirers to the point that they cease to exist as separate distinguishable entities, which makes it virtually impossible to measure the added value generated through their acquisition: even as their websites are shut down and their brands dissolved, the technologies and know-how of the target companies live on and ideally contribute to the success of the acquirer as a whole. When this does not happen, it sends a very strong signal that the deal destroyed value.

The most traditional approach to assess the success of an acquisition revolves around the "make or buy dilemma", first formalized by Coase (1937) and revisited by several authors since then (cfr Williamson 1975; Anderson 1986). It could be argued that where the cost of buying a technology through an acquisition is lower than the cost of internal development, the buy option should prevail and acquisitions should be successful. As market friction increases, so does the appeal of internal development.

While intuitively correct, this approach oversimplifies the decision to be evaluated, because the alternative cost of internal development is supposed to include many elements which are impossible to quantify. More recently, Slack (2007) and others have highlighted that the long-term implications of the make-buy decision are far more significant than the short term economic consequences. Factors such as exclusivity and secrecy are difficult to incorporate in a purely economic computation of the costs and benefits of an acquisition, but often determine the difference between success or failure of a deal.

A large userbase is another asset that can be hard to price as establishing the cost of recreating it from scratch (i.e. estimating the business' Customer Acquisition Cost) involves assumptions about the product being offered, marketing activities, their conversion rates and the natural churn of the business, all factors which vary enormously on a case by case basis and are often impossible to estimate independently and from the outside.

A second school of thought concentrates on post-merger integration, focusing mainly on capability and knowledge sharing and integration. Whereas some sources have strongly argued that knowledge integration is essential for one to claim a value-creating acquisition (Larsson & Finkelstein, 1999; Ranft & Lord, 2002), subsequent research has highlighted the integration-autonomy dilemma (Datta & Grant, 1990; Duncan & Mtar, 2006; Puranam & Srikanth, 2007; Puranam, Singh & Chaudhuri, 2009 and others). And while successful integration is not necessarily easier to define than successful acquisition, a few sources mention the retention of the target's key human capital as an indicator or precedent of successful post-merger performance (Aghasi, Colombo & Rossi-Lamastra, 2017; Chaudhuri & Tabrizi, 1999; Graebner 2004).

Given the potentially infinite list of "things that could go wrong", a conservative approach could simply define as successful those acquisitions that do not dilute the value of the company being acquired in terms of technology and user base (where applicable). It is tempting to include the target's team among the assets that should not be destroyed, but we recognize that many acquirers are able to preserve the value of their targets even when their founding members leave. This approach is a first approximation, but it ignores the cost of acquisition.

A third, specular approach involves an analysis of those deals that were clearly unsuccessful and a definition of success that is "reverse-engineered" based on the opposite criteria. Companies that were sold for less than they were acquired for, or which were shut down or written-off without their technologies or products being integrated clearly qualify as unsuccessful. Conversely, survival and evolution of the acquired technology within the acquirer's organization therefore appears to be a crucial factor in achieving a successful deal.

A fourth approach consists of assessing the threat to the acquirer's business represented by the target before its acquisition and comparing the cost of the acquisition to the decline in sales and profits that would have resulted from a loss in market share, had the target remained independent: buying fast-growing competitors and shutting them down can save incumbents a lot of money, i.e. the opportunity cost of not buying them is high (Marks & Mirvis, 2001).

Regardless of the starting point, the single most important factor that predicts and signals the success of an acquisition is the fit of the target with the company integrating it. In our analysis, we focus on business fit, limiting considerations about culture which can make or break very large deals but are very hard to track and are less likely to influence the integration of smaller, younger firms.

Our definition of success therefore considers the following elements:

- Whether the company acquired was divested/written-off/spun-off or not.
- Whether the company was well integrated or not. For this second point we look at several indicators, including:
    - Whether the target company formed a new division in the one acquiring it, and whether its products were kept unchanged. When this was the case, we look at whether this situation was stable or momentary.
    - Whether the target was used to expand into a new channel or market.
    - Whether it clearly became part of a new or existing product.
    - Whether the technology of the target was used to improve the internal efficiency of the acquirer's operations.

Recognizing the complexity and uniqueness of each deal, we also collected additional variables (as explained in Section 5) and evaluated every transaction to our best judgement, considering the context in which it happened and looking for additional data where needed.

SECTION 2 – GAFAM M&A: QUALITATIVE CASE STUDIES

While the quantitative analysis of our dataset in Section 5 highlights interesting insights and trends, it can fall short when it comes to providing a clear-cut judgement on the success of some acquisitions. This should be expected, considering the infinite range of variables that could be explored, their availability across deals and the sheer definition of success itself.

In this more qualitative section, we look at some of the more complex deals strategic drive whose may not transpire from a merely numerical analysis. Our main goal for this section is to provide a broader context for the analysis of such acquisitions, looking at business models, industry trends and competitive dynamics in more detail. By showing how many acquisitions are actually intertwined and contribute to the long-term objectives of the five GAFAM, we hope to shed more light on the rationale behind these deals and to complement and support our quantitative Section 5. We provide examples of both success and failure, and focus on their underlying causes.

The case studies that follow are just some of the most significant examples we identified: we first present a few cases of "classic" business expansion and then move on to more complex examples of competitive interaction resulting in M&A.

Entering new geographies – Amazon's Marketplaces

Amazon relied on acquisitions to enter its first foreign markets: until 1998, the e-commerce platform operated exclusively in the US, where it sold books. In the spring of 1998, however, the company disclosed the acquisition of *Bookpages.co.uk* and *Telebuch.de*, two smaller firms operating very similar businesses in the UK and Germany. The two websites became *Amazon.uk* and *Amazon.de*, which launched in the same year.

The strategy was clear: *Amazon* had no knowledge of the English and German markets, but it knew how to sell books online, so acquiring a local competitor and turning it into a foreign version of its American platform was a sensible business decision.

What is more interesting is the fact that the same strategy was not adopted for the rest of Europe. Once the firm learnt enough about the European market, it was able to launch its French, Italian and Spanish marketplaces organically without acquiring any local players. This was not because of a lack of potential local targets. Rather, as the company scaled up and understood how to expand across product categories and regions within a given country, cross border expansion became more of a matter of translation and local compliance. Products could be shipped from the closest fulfilment centre, regardless of its nationality, and building state-of-the-art infrastructure from scratch probably became more convenient than converting existing facilities.

In China, the same playbook was used. The company had no presence in the region and was entering a competitive market dominated by *Alibaba*, *JD.com* and a few relatively smaller players. Facing a huge market with strong incumbents, *Amazon* once again opted for an acquisition and, in 2004, decided to purchase and rebrand *Joyo.com* – a local player. At the time, *Joyo* was the largest e-commerce platform for books, which made its acquisition extremely consistent with *Amazon's* initial moves in Europe.

However, things were markedly different this time: *Amazon* was already selling multiple product categories in other countries, and local competitors were much bigger than any company *Amazon* had ever faced. They had deep market knowledge and sold virtually everything. For these reasons,

the launch of *Amazon.cn* was not successful and the company has been struggling in China ever since.

The mistake it made was not the acquisition of a local player, but rather investing too little to expand quickly. Recognizing its own mistakes, *Amazon* entered India in 2013 determined to spend as much as needed and to pursue a more aggressive expansion. Indian laws prevent foreign businesses from selling goods directly to Indians, so *Amazon.in* had to be founded as a marketplace with no inventory, connecting buyers and sellers, and handling logistics and purchase experience (something akin to the "*Fulfilled by Amazon*" program that exists alongside the direct sale method in other countries).

This made the local acquisition route impractical, but it did not prevent *Amazon* from acquiring Indian expertise in other ways: back in 1998, *Amazon* had acquired *Junglee.com*, a generalist e-commerce platform founded and run by Indian graduates in the US that aggregated offers from online and offline retailers. The website – which covered the US market only, at first – was launched in India in 2012 and served as a testbed for *Amazon.in*, into which it was integrated in 2016.

The latest episode in *Amazon's* expansion saga was the acquisition of *Souq.com*, an e-commerce platform operating in the Middle East (UAE, Saudi Arabia, Egypt, Bahrain, Oman and Qatar). The purchase allowed *Amazon* to enter the region as a market leader, integrating *Souq.com* while preserving its interface. Future plans have not been disclosed: today *Souq.com* operates as an independent website (its logo has been updated to include the line "an amazon company") but *Amazon's* track record suggests that the platform could be fully rebranded and eventually folded into local versions of amazon.com.

An important trend emerges from the analysis of *Amazon's* geographical expansion strategy: acquisitions were successful as long as they were sustained with adequate investments. This was the case in Europe, but not in China. It is too early to say whether *Amazon's* investments in India will be enough to make it a local leader – especially considering *Walmart's* majority-investment in a local e-commerce *Flipkart* – but the fact that *Amazon's* leadership was quick to admit it had underinvested in China leaves us confident that things will be different here.

Another key takeaway that emerges from this analysis but can be generalized is that *Amazon* became a better acquirer of foreign marketplaces as time went by. Its European attempts succeeded because they were extremely focused and happened at a relative early stage in the development of the ecommerce industry. Acquisitions failed in China, where the company apparently underestimated the power of local competitors. In India and the Middle East, Amazon seems to have learnt its lesson and became more cautious.

Time will tell to what extent this experience is applicable to new acquisitions, but the point seems to hold for other companies making multiple acquisitions in the same domain (e.g. *Apple* acquiring more mapping companies).

The mobile opportunity – How did GAFAM approach it?

The world was different before 2007. Smartphones as we know them did not exist and "mobile" did not have the meaning it has today. The digital world was accessed exclusively through computers, and laptops represented the most extreme form of portable productivity – with only *BlackBerry* existing as a niche product for managers. *Microsoft* and *Apple* contributed to the development of Desktop computing, while *Google*, *Amazon* and *Facebook* were born in this environment. Mobile phones were just phones, and there was essentially no overlap between the companies

manufacturing them and the ones making computers. *Nokia* was the market leader, followed by *Motorola*, *Samsung* and *Sony*.

On January 9th 2007, everything changed. *Apple* announced the *iPhone*, a touchscreen-based mobile phone running an adapted version of the company's powerful desktop operating system which – in the words of Steve Jobs – was 5 years ahead of anything the competition could produce. Whereas software capabilities were developed in-house and came from the company's experience with the Mac, the most innovative piece of hardware technology – the touchscreen – was developed by *FingerWorks*, a small company *Apple* purchased in 2005.

Indeed, the *iPhone* was a revolutionary product, but while many focus on the technical aspect of this revolution – which is undeniable, considering the acceleration in mobile hardware and software development it initiated – its impact on business models was equally profound.

Two models prevailed in the desktop era: on one side was the fully integrated scheme championed by *Apple*, which developed both its hardware and software; on the other side was the predominant model imposed by *Microsoft*, which developed the *Windows* operating system and licensed it out to hardware manufacturers for a fee. A third model existed whereby users would purchase a PC and independently install a free open-source operating system – usually a version of *Linux* – but it only catered to a niche of expert users.

When it came to addressing mobile as a platform, *Apple's* approach – writing *iOS* software and designing the *iPhone*, outsourcing only its final assembly – was perfectly consistent with what it had been doing with the *Mac*.

Microsoft, on the other side, faced a dilemma: the mobile opportunity was compelling – in fact, a *Windows Mobile OS* had existed since 1996 – but the technology in the *iPhone* was much more advanced than anything seen until then. Over the next few years, *Microsoft* actually managed to create an OS powerful and elegant enough that some thought it would actually be a worthy competitor to *Apple* and *Android*. The modern *Windows Mobile OS* was launched in 2010 and in the next couple years received great reviews for being something different – at a time when *Apple* had been recreating the same phone over and over again – and functional – *Windows Mobile* was much faster than *Android* was then.

Partnerships with key mobile phone manufacturers – *Nokia* adopted *Window Mobile OS* over *Symbian* and *Meego*, *HTC* and *Samsung* were early adopters as well – helped propel *Windows* phones to hardware competitiveness as well – *Nokia Lumia 1020* with *Windows Mobile OS* was one of the first modern camera-phones.

In 2013, *Microsoft* decided to follow *Apple's* model and increase its exposure to hardware, acquiring *Nokia's* mobile phone unit for $7.2 billion. However, *Windows* phone's every chance of success was scrapped by the almost non-existence of third-party developer applications for *Windows Mobile*.

Not only did the *Windows Mobile OS* meet its demise (it was officially discontinued in 2017), *Microsoft* also brought down *Nokia* with it: the business was shut down in 2015 after a $7.6 billion write-off related to the deal. Once a promising contender, *Microsoft* eventually gave way to the two mobile behemoths we have today.

Even though the *iPhone* caught the mobile industry by surprise, *Apple* and *Microsoft's* interest in the field was to be expected considering the similarities between desktop computers and mobile phones. After all, both were powered by microchips, connected to the internet, accepted inputs through keyboards and had screens. What was more difficult to predict was *Google's* interest in mobile operating systems. The company had the early intuition that mobile web traffic would soon explode, and did its best to position itself accordingly.

Google quietly acquired *Android* for an estimated $50 million in 2005, after *Android's* first unsuccessful pitch to *Samsung*. At the time it was an interesting experiment as no one expected *Google* to break into an already well-established market. Surprisingly, *Google* took a complete different route than anyone else, especially *Microsoft*: *Android* was developed based on a *Linux* kernel and created as an open-source operating system that was welcoming to third-party developers and was ultimately intended to be free for anyone to use. After *Google* offered sizeable rewards to developers to create the best *Android*-based application in 2007, it became clear that *Google* is not going to compete with the *iPhone* straight on but will rather foster the development of an OS that is independent from any hardware. Not only did *Google* open-source *Android* software from version 1.1 – released in 2008 – it also open-sourced its mascot and logo, truly embracing this model.

Eventually, the free "*Linux* model" prevailed. Looking at the bigger picture, this was consistent with the broader trend of the freemium model taking off, with users trading their personal data in exchange for "free" services. *Google* overtook *Microsoft* in disrupting the scene and became *Apple's* main competitor on the OS front – by 2015, 96.8% of all mobile phones sold were either *iOS* or *Android* powered (Savov, 2015).

It is worth mentioning that *Google* did venture into mobile hardware as well. *Google's* most expensive ever acquisition was that of *Motorola Mobility* in 2011. *Google* paid a total of $12.5 billion for the mobile hardware manufacturer and subsequently sold it for $10 billion less to *Lenovo* in 2014. The outcome of this acquisition is debatable – *Google* kept the patents it took over through the acquisition and, possibly, used the acquisition both to scare *Samsung* into obeying *Google's* wishes of not tampering too much with *Android* (the two companies signed a global patent deal days before the divestiture) and to experiment with hardware making. On the other hand, *Google* has also been involved in the *Nexus* phone line since 2010 (made by various contract manufacturers), which has been succeeded by the *Pixel* line in 2016 (made with *HTC* as contract manufacturer). In 2017, *Google* has ventured forward by acquihiring a massive portion of *HTC's* mobile division team.

While *Google*, *Apple* and *Microsoft* have all been tightly involved with the progress of the mobile industry as a whole, *Amazon* and *Facebook* were not immune to its charm.

Amazon has had a hardware division since 2004. Called *Lab126*, it was launched to develop the *Kindle – Amazon's* first e-reader – and grew both organically and through acquisitions. In particular, *Amazon's* hardware acquisition strategy has focused on touchscreen technology – with *Touchco* in 2010 and *Liquavista* in 2013 – and microchip design – with the acquisition of Israeli *Annapurna Labs* in 2015.

The company began developing its *Fire Phone* in 2010 and announced it in 2014. The project was ambitious and introduced several innovative technologies such as a holographic 3D screen and a system that recognized objects, text and even sound, and suggested related purchases through amazon.com. The hardware was developed entirely in-house, while the operating system was a customized version of *Android*.

The phone was probably a way to both showcase the company's own innovative technologies and enrich *Amazon's* ecosystem with a product that could bring *Amazon's* marketplace and additional services into its customers' pocket. Whatever the original ambition, the *Fire Phone* was discontinued one year after it was first announced and is considered to be one of the Tech industry's most notable flops.

Mobile also tested *Facebook's* ability to respond to changes in technology platforms and standards. The company famously botched its first attempt to adapt its product for mobile, realized its mistakes early on and made it a strategic imperative to become a mobile-first company. However, *Facebook's* mobile efforts focused predominantly on its own third-party apps for *Android* and *iOS*, only making inexpensive experiments with *Android* skins and customized versions: in 2013, it partnered with *HTC* and *AT&T* to bring a *Facebook*-centred phone to the market. After poor reception, *Facebook* scrapped the *Facebook Home* initiative and instead decided to focus on the stand-alone application approach that it still uses today.

For both *Amazon* and *Facebook*, failed approaches to mobile were not attributable to bad acquisitions, but rather to unclear strategies. In their defence, it must be noted that both failed fast and were quick to address their mistakes.

Advertisers first? – How GAFAM make money

All of the five biggest technology companies in the world are or have at some point been involved in the online advertising business. In particular, advertising is a necessity for *Google* and *Facebook* – which offer their services for free to users – while it is an opportunity for *Apple*, *Amazon* and *Microsoft*. *Google* pioneered the business model in which the user – indirectly through its browsing data – is the product being sold to advertisers. Advertising-supported TV channels had existed for decades, but they could only sell their viewers' attention "in bulk", with ad targeting based exclusively on the type of content being broadcast. By keeping track of its users' searches and by collecting ever more data about them, *Google* is able to sell much more valuable information to advertisers, delivering more effective, personalized ads to each user. *Facebook* took this model and brought it to a whole new level, dramatically increasing the quality and granularity of its profiling data which is often provided directly and explicitly by users. In 2017, 87% of *Google's* and 98% of *Facebook's* total revenues came from advertising (Alba, 2017).

It is no surprise then that that these two companies are also the world's largest online advertisers – it is estimated that together they account for approximately 60% of all online advertising – *Facebook* 20% and *Google* 40% – and for approximately 25% of total media advertising revenues – *Facebook* 7% and *Google* 18% (Statista 2017).

The two companies also account for approximately 83% of digital advertising revenue growth (D'Onfro, 2017). With online advertising revenues steadily increasing over time – it is estimated that by 2020 online advertising revenues will equal offline advertising ones (Handley 2017) – the power of these two companies is becoming increasingly important. Whereas the opportunities in this field are attracting the attention of other players (namely *Amazon* and *Microsoft*), for the moment *Facebook* and *Google* are absolute leaders, forming an online advertising duopoly.

Facebook and *Google's* advertising business models still differ somewhat in what types of advertisements each specializes in, even as recent years have seen the rise of the online video advertising channel for both – on *YouTube* for *Google* and *Facebook Videos* and *IGTV* for *Facebook*.

Next to conventional banner ads, Facebook also delivers ads tailored to some of its platforms – *Facebook, Messenger* and *Instagram*. For example, through the *Facebook NewsFeed*, clients are able to deliver sponsored posts, visual/text ads or include ads in videos shared on the platform. Advertising through *Messenger* gives option for ad placements in between user's message lists and chatbots (available in *Discover* section). On *Instagram*, ads are visible either in the user's feed or among other users' *Stories*.

Generally, *Facebook* has been more competent in targeted ads, which is part of the reason why it has been in the eye of US senate investigations over the Russian meddling in the 2016 Presidential election using targeted ads more than other companies (*Google* and *Twitter* advertising platforms have been found to have been used for the same purpose as well). Recently, *Facebook* has encountered a new issue: its growth rate has been slowing as its *NewsFeed* has become saturated with ads. *Facebook's* increased focus on video ads and on its other platforms can therefore be read as an attempt to identify new advertising space.

Google, on the other hand, has always been the leader in search advertising, selling the premium top search result spots for certain keywords at the highest price. However, this revenue channel has not been immune to shifts in consumer behaviour. As users tend to favour mobile search channels more and more, online mobile traffic as a whole has increased. Increasing traffic on its own would be very good news but mobile advertising is in general cheaper than standard web advertising, a factor that explains why *Google* has experienced a 23% drop in its cost-per-click (CPC) metric. While this does not seem to have affected *Google's* overall advertising revenues (they grew by $15 billion in 2017), it may signal need for innovation in the future.

The two companies have also developed their advertising competence in slightly different manners. *Facebook's* reliance on M&A has been limited, with only around ten advertising and analytics-related acquisitions throughout its history, and only three notable mentions: *FriendFeed* in 2009, *Atlas* and *Onavo* in 2013.

Even though *FriendFeed* is not categorized as either AdTech or analytics company, this acquisition brought notable talent to *Facebook*: former *Google* employees who had been involved, among other things, in the development of *Google's* advertising platform *AdSense*. It is quite possible that this talent worked on *Facebook's* advertising solutions internally after coming onboard.

In 2013, *Facebook* purchased *Atlas* from *Microsoft* for $100 million. The *Atlas* advertiser suite uses ad personam techniques and focused ad campaigning capabilities and had been used by *Facebook* prior to the acquisition through a partnership with *Microsoft*. This purchase helped strengthen *Facebook's* advertising competence and propel it to the advertising leadership position it occupies today.

In addition, in the same year *Facebook* acquired Israel-based *Onavo* for estimated $150-200 million. *Onavo* was acquired for its suite of mobile analytics, allowing *Facebook* to have the full analytics and advertising package on top of an operational division in tech-savvy Israel.

Google, in contrast, built up its advertising business through many acquisitions: it has acquired at least 25 companies in the AdTech or analytics sectors and many other acquisitions have indirectly helped it bring in advertising revenues. Notably, among the all-time top 12 *Google* M&A deals identified by *CB Insights*, three are directly related to this business stream: *Applied Semantics* in 2003, *DoubleClick* in 2007 and *Urchin* in 2005. Other notable acquisitions include *AdMob* in 2009, *Adscape* in 2007, and *Wildfire Interactive* in 2012. Its famous and highly successful acquisitions of *Android* in 2005, *YouTube* in 2006 and *Waze* in 2013 have without a doubt played an important role in growing the advertising revenue streams by expanding *Google's* advertising foothold into mobile, video and geo-targeted channels.

Google started its advertising initiatives back in 2000, when it launched *AdWords* with only 350 advertisers on board. The search engine included CPC pricing through a major overhaul in 2002 and in the same year opened *AdWords*-dedicated offices outside of the US.

One of its earliest acquisitions – *Applied Semantics (ASI)* in 2003 for approximately $102 million in stock and cash – not only set a precedent for the acquihire-type of acquisitions and for *Google's*

semi-organic growth strategy, but also provided the base for its advertising business. Both companies had been developing semantic search models and *ASI* had shifted gears towards creating a concept-based advertising system (in place of a keyword-based one) after concluding that users preferred to carry out their searches on *Google*. On the way to creating *AdSense* – a pay-per-click system for sense-based ad placement – *ASI* secured a few important patents. These patents at least partially blocked *Google's* initiative to develop a similar system (internally called *Phil*) on its own, making the search engine interested in acquiring *ASI*. In what was at the time its most expensive deal ever, *Google* acquired the necessary IP, talent and technology that allowed it to build the advertising platform it wanted. The internal developments were merged with *ASI's* product and *AdSense* was launched later in 2003.

Early in 2005, *Google* acquired *Urchin*, an analytics software company. *Urchin* quickly grew under *Google's* wings and in late 2005 *Google Analytics* was launched. Even though the company is not directly related to advertising itself and has been heralded as shaping the world of online publishing, its features of website traffic analytics – including where it comes from – have definitely allowed *Google* to strengthen both its search and advertising services.

In 2007 *Google* ventured into new advertising channels through two acquisitions – *DoubleClick* and *Adscape*. A bidding war with *Microsoft* lead to an unprecedented price tag of $3.1 billion for *DoubleClick*. *DoubleClick* was worth the price, as it allowed *Google* to enter the display advertising industry and to also open the *DoubleClick Ad Exchange* in 2009 – a real-time exchange marketplace for buying and selling advertising – securing *Google* a strong position in the advertising ecosystem, which the company filled via numerous subsequent acquisitions (such as *Spider.io* in 2014 or *Admeld* in 2011). *Adscape*, on the other hand, allowed *Google* to place ads inside video games, opening a new advertising channel. According to Geis (2015) this acquisition was a response to *Microsoft* buying *Massive* – an in-game advertising company as well – in 2006.

Even though *Google* had launched *AdSense Mobile* in 2007, in 2009 the company also purchased *AdMob* – an emerging mobile advertising company. Since the company was a pioneer in displaying ads on websites optimized for smartphones – and for the *iPhone* in particular – this deal was also sought after by *Apple*. However, *Google* won the acquisition through a higher bid – $681 million in both stock and cash – and *AdMob* has contributed to the critical push towards increasing *Google's* mobile advertising revenues.

Another important channel improvement came through *Google's* acquisition of *Wildfire Interactive* (at estimated $350 million) in 2012. *Wildfire Interactive's* functionalities of serving ads throughout an array of social media platforms (including *Facebook* and *YouTube*) were slowly integrated into *Google's* advertising suites (for example, *DoubleClick*).

It is important to take into account that not all of *Google's* ventures into different advertising channels have been successful. In 2006 *Google* purchased *dMarc Broadcasting*, a company aimed at radio advertising. *dMarc's* founders left *Google* shortly after – in 2007 – following management disagreements, and *Google* shut down its radio advertising efforts completely in 2009, divesting all related assets.

Considering how much of *Facebook* and *Google's* businesses revolve around and depend on advertising (at least financially), it is sometimes tempting to call the two firms not technology but advertising companies, especially after such remarks as the following exchange in the 2018 US Congressional hearing of Mark Zuckerberg:

"How do you sustain a business model in which users don't pay for your service?"

– senator Orrin Hatch

"Senator, we run ads."

– Mark Zuckerberg

Whereas *Facebook* and *Google* have definitely become the leaders in online advertising, other GAFAM members have also been involved in this business over the years.

Microsoft has made slightly less than 20 AdTech and analytics related acquisitions throughout its long history and, as mentioned above, it has been involved in some bidding wars with other GAFAM companies. It lagged behind the competition for many years – e.g. *Bing* was the last of the three big search engines to introduce its own PPC system – and made some interesting M&A decisions in the past – such as purchasing *aQuantive*, the parent company of *Atlas*, writing-off $6.2 billion of its value and then selling *Atlas* to *Facebook*. This seeming lack of attention is explained by the fact that *Microsoft* has never had a pressing need for advertising revenues, as its business model has traditionally been based on direct monetization of its services and products.

However, with the increased usage of *Bing* in *Windows 10* and with more and more smart partnerships (e.g. with *Bing* powering both *Apple's Siri* and *Amazon's Alexa*), *Bing Ads* started bringing in sizeable revenues – approx. $7 billion in 2017, which is slightly higher than that of Instagram and double that of *Twitter* in the same year (Statista, 2018).

Apple's position on advertising has evolved over time. The company's original business model was entirely based on selling hardware at a premium and bundling it with free software, with only a few professional applications being sold separately. Things changed dramatically with the introduction of the *App Store* in 2008: as *Apple's* ecosystem expanded to include mobile, and as the *iPhone* platform was opened to developers, a natural opportunity arose to monetize it by selling advertising space within apps. While *Apple* could afford to provide software for free – over-compensating with hardware sales – third-party developers needed a sustainable model to distribute their applications. Subscription and freemium business models worked for some, but the opportunity to offer ad-supported apps for free was clear from day one. *Apple* immediately realized it could have a role similar to the one played by *Google* in this new economic space, taking a cut on advertising sales within its platform.

In January 2010, *Apple* made its only acquisition in this direction with the purchase of *Quattro Wireless* – a competitor of *AdMob*, which *Google* had acquired just a few months before – for $275 million. In April, it introduced *iAd*, a service that allowed developers to offer in-app interactive banners and keep 60% of the revenues. *Apple* would retain 40% - the industry standard according to Steve Jobs – which later was brought down to 30%. Although the strategic fit of the acquisition was clear, the deal was also a sign of the growing rivalry between *Apple* and *Google*. As the two companies entered each other's turf, it is no coincidence that the *Quattro Wireless* acquisition was announced on the day *Google* unveiled its first own smartphone – the *Nexus One*.

Over time, *Apple's* position on advertising changed, and in 2016 *iAd* was discontinued. While the rivalry with *Google* and in-app advertising are still there, *Apple* has become more and more conscious about user privacy, a stance that is in fact being leveraged to criticize companies – to some extent rivals – that trade their users' data for money. As *Apple* looks to increase its proportion of revenue coming from services – as opposed to hardware sales – advertising has not disappeared completely from *Apple's* plans. The firm is rumoured to be considering sponsored results in its *App Store* search, but it is very unlikely to make use of any of the user-profiling techniques adopted by

the likes of *Google* and *Facebook*, which *Apple* has been actively hampering in the last few years (e.g. blocking cookies, auto-play videos and ad-trackers in its *Safari* browser).

While *Google* is by far the leader in online search, *Amazon* represents a serious threat to its business, and the reason is straightforward: people make all sorts of researches online, but the ones that are the most profitable for search engines in general are the ones that signal some form of purchase intent, because virtually all advertisers are potential sellers. While most prospective buyers have historically started their purchase journey on *Google*, today they are more and more likely to do so on *Amazon* whenever physical products are involved. This constitutes a critical risk for *Google* – which has no access to *Amazon's* advertising – and a huge opportunity for *Amazon* – which has a monopoly on its online space.

Amazon has not made any acquisition specifically aimed at building an advertising platform, but the reason is that it probably does not need to: it knows its customers better than any other company, and it has been experimenting with ads for years. In fact, *Amazon's* online advertising business has been growing faster than that of *Google* and *Facebook*, even as it represented only $1.32 billion in 2017, and is estimated to surge even higher – *Morgan Stanley* believes that it could pull in $8 billion in ad revenue by 2019. For the moment, *Amazon's* efforts have focused on trade promotion – such as in-store promotions and coupons – so the expansion of its advertising platform might in theory end up increasing the overall online advertising market without hurting the business of search engines, but there is no reason to believe that the fastest-growing of GAFAMs would shy away for such an opportunity within reach.

The only reason why *Amazon* might be willing to forego selling advertising space to merchants or manufacturers selling through its platform is to compete directly with them, with its private labels. The e-commerce giant has already been nudging online shoppers towards its products in some ways – as an example, instructing *Amazon's* vocal assistant to purchase batteries will result in *Alexa* adding *AmazonBasics* batteries to the user's kart in the US – but it should have no problem allowing others to advertise in all product categories in which it decides not to compete directly.

As we can see, advertising constitutes a revenue stream for all GAFAM, although its importance within their relative strategies differs. Advertising represents the core business of *Google* and *Facebook*, while it is a welcome addition to the businesses of *Apple*, *Amazon* and *Microsoft*, always in a quest to diversify their base of monetizable assets. Each of the companies has pursued a somewhat different strategy in building up advertising competencies – with *Google* leading the way in successful M&A acquisitions in this field – each has access to different types of monetizable data and each holds particular strengths in different areas of advertising.

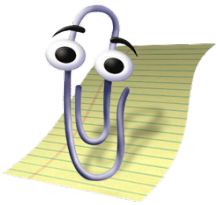
The evolution of the digital advertising space highlights two main trends. First of all, GAFAM companies are constantly looking for ways to diversify their sources of revenue. This is especially true of *Apple* – whose revenues largely depend on *iPhone* sales – but also of *Amazon*. As companies manage to create "walled-garden" platforms and retain users, they quickly realize they have a monopoly on advertising there. It is then up to the company to decide whether to monetize it or to provide a premium, ad-free experience to its customers.

Secondly, in expanding into advertising GAFAM inevitably find themselves competing with each other in one more dimension.

GAFAM raising their Voice – The origins of Alexa, Cortana, Siri and Google Assistant

Virtual assistants are an interesting topic for our research: *Google*, *Apple*, *Amazon* and *Microsoft* each have one, and they are all the product of one or more acquisitions.

The idea of a virtual personal assistant interacting with users through voice is not particularly recent. *IBM* started exploring the field of speech recognition in 1961 with its *ShoeBox* product, companies like *Nuance Communications* have been licensing this type of technology to large businesses for decades, and concept videos of *Apple's Knowledge Navigator* – an elegant personal assistant with human semblance, which was never commercialized – were released as early as in 1987.



Microsoft was the first company to introduce some form of consumer-friendly assistant with the release of *Microsoft Office 97*, which featured an on-screen virtual character – *Clippit* – that could provide recommendations based on user behaviour. However, the assistant had no voice and – more critically – its scope was limited to a few basic functions within *Microsoft's* productivity suite.

IBM's technology – which evolved into *Watson Artificial Intelligence* – was much more advanced, but it targeted B2B applications only.

The first mass-market personal assistant was *Siri*. Initially developed at Stanford, it was spun off as an independent entity and debuted on the *App Store* in 2010 as a third-party application, after two years of development. *Apple* quickly took notice, and in April of the same year purchased the company for $200 million. In just one year, it incorporated *Siri* into its mobile operating software, and made it the "killer feature" of the *iPhone 4s*, which launched in late 2011.

Siri was free and aligned with *Apple's* strategy of offering high-quality, user-friendly software at no cost while charging premium prices for its hardware. With its acquisition, *Apple* acquired both AI and Speech Recognition capabilities, although the latter were largely licensed from *Nuance*. However, the acquired organization was significantly sub-scale – the original team consisted of less than 30 people – compared to the needs of a product suddenly available to millions of users, and it struggled to keep *Siri* running well in the early days at *Apple*. While the technical integration of the product within *iOS* was smooth, integrating and growing the team was reportedly a real challenge. Due to diverging views with *Apple's* management on the future of the product and on the way the team should be run, both co-founders soon left and began working on *Viv*, a technically more advanced artificial intelligence assistant that was sold to *Samsung* in 2016 and incorporated into the company's most recent products.

Since then, *Apple* has acquired five companies working on Artificial Intelligence and Voice platforms (*Novauris Technologies*, *Cue*, *VocalIQ*, *Init.ai* and *Shazam*), building on *Siri*'s original concept and growing the team behind it. At the same time, it has probably been leveraging acquisitions in contiguous domains as well, especially in the fields of machine learning and AI.

While *Apple* was first to market – something unusual for the company – competitors soon responded with alternatives that were often more advanced in at least some domains, including following up on queries and handling more complex tasks.

Google Voice – a simple way to use *Google* search through voice – had been around since 2002 and was developed internally by the search giant. Following *Apple's* acquisition of *Siri*, it was enhanced with predictive capabilities and grew into *Google Now*. Voice was also the main input for *Google Glass*, and while the output information was only projected on the lens, much of the AI technology behind this product was likely ported over to future voice-based products.

Meanwhile, between 2010 and 2016 the company acquired 4 companies in the field (*Phonetic Arts, SayNow, Wavii* and *Dialogflow*). Their combined product was the *Google Assistant*, which was exclusively available on *Pixel* phones at first and was later included in other *Android* devices. Today, the *Assistant* also powers *Google Home* – a line of smart speakers.

Microsoft had been working on virtual assistants for decades – as demonstrated by *Clippit* – and since 2009 it had a Speech products team in which the teams of *Entropic* and *Colloquis* – two companies applying AI to semantics and voice recognition acquired between 1999 and 2006 – most likely converged. Development of its *Siri*-competitor *Cortana* began in 2009, but the product was only announced to the public in 2013. Since then, it has been integrated in *Windows* operating system – both desktop and mobile – as well as in the *XBox One* and a few third-party devices.

Since the introduction of *Cortana*, *Microsoft* has acquired three more companies operating in the same domain, in an effort to catch up with earlier players and help popularize its assistant. In fact, the virtual surrender of *Microsoft* in the mobile OS space inevitably has repercussions on consumers' first choice when it comes to virtual assistants, since most people only interact with them on their mobile devices.

While the three assistants presented above were all natural product extensions for the companies that created them, *Amazon's* introduction of *Alexa* was perhaps harder to anticipate. And yet, the signs of a possible expansion in this direction were there years before its launch. Days before the launch of *Apple's Siri*, *Amazon* purchased *Yap*, a voice-to-text software company. In 2013, it doubled down with the purchase of a text-to-voice company – *Ivona Software* – which had provided technology to *Amazon* in the past.

In June 2014, *Amazon* unveiled its *Fire Phone*. While the handset did not do well on the market and was ultimately discontinued, its introduction gave at least two messages. On one side, it signalled that *Amazon* aimed at expanding its ecosystem of complementary services built around e-commerce well beyond the perks offered exclusively to *Prime* members. On the other side, the release of the *Fire Phone* marked a shift into more advanced consumer technologies.

Until then, *Amazon's* hardware (the *Kindle* e-reader and the *Fire Tablets*) had been marketed as practical and cheap. In contrast, with the introduction of the *Fire Phone* first, and of *Alexa* and the first *Echo* speaker in late 2014, *Amazon* repositioned as a more innovative Consumer Tech company. While the features that initially made it popular were its ability to answer simple questions and play music based on voice commands, *Amazon's* goal was actually to gain a foothold in its customers' houses in order to eventually grow its e-commerce business.

Ever since the beginning, *Amazon* promoted an open development model for *Alexa*, inviting third parties to integrate their services by developing new *Alexa* skills that are made available to all *Alexa* users. This approach is very similar to the one adopted by *Google* with *Android*, and it has allowed *Alexa* to grow quickly and to win market share.

As far as *Facebook* is concerned, the company has been running internal experiments with AI, and in 2015 it debuted its digital assistant *M*, which combined artificial and human intelligence to interact with users in *Messenger*. The product was only made available as a beta to a small number of users, and this particular form was discontinued in early 2018. In *Facebook's* words, it was a first experiment to *"learn what people needed and expected of an assistant".* The learnings live on in such initiatives as *M Translations* – a *Messenger* and *Marketplace* translator. And in spring of 2018, discovered patents have boosted rumours that *Facebook* will soon roll out its own line of smart speakers – a direct response to *Google Home* and *Amazon Echo* – powered by a version of *M* as a smart assistant. Even as it has been speculated that the company will launch the speakers

internationally, due to privacy concerns in the US, as of now no concrete plans have been unveiled. On top of that, *Facebook* has also brought speech recognition and basic assistance (only available in English) into *Oculus*. These features were developed by the Applied Machine Learning group that started its work with help from one of *Facebook's* acquisitions – *Jibbigo* – in 2013. It was later on boosted with acquisitions of *Wit.ai* in 2015 and *Ozlo* in 2017.

The stories of these five projects tell us a lot about the way GAFAM develop and compete through acquisitions. First of all, each of the five companies was able to master at least one key technology and to turn it into a profitable business. This allowed them to develop the technical, managerial and financial capabilities to purchase and absorb more innovative technologies in adjacent domains, integrating them into their core businesses and turning them into products that billions of people will use. Traditional Non-Tech companies may have plenty of resources but are unlikely to operate in this way for at least two reasons: on one side, their general lack of technical expertise makes it harder for them to identify promising early-stage technologies and to envision their future applications; on the other side, even when ideal innovative targets are identified, this lack of expertise makes it more difficult for them to integrate new technologies in their existing organizations. In other terms, absorptive capacity is likely to be rather limited (Cohen & Levinthal, 1990). *Apple* initially struggled with *Siri*, but it was able to address its shortcomings in a way that would have been impossible for most Non-Tech actors.

A second key takeaway is that while the original success of GAFAM may be due to their expertise in a given domain, the way these companies evolve is deeply influenced by the evolution of the technology industry at large. *Microsoft* had been exploring speech technologies for years, and so had *Apple* – at least in theory – but the fact that these technologies first gradually, then suddenly came of age around 2010 was something they had no control of. The CALO project – "Cognitive Assistant that Learns and Organizes" – was funded by the DARPA and developed at SRI International – a non-profit research centre at Stanford – between 2003 and 2008. Thanks to this investment in AI and Machine Learning research – and to plenty of parallel and independent contributions around the world – over time speech-recognition technologies became accurate enough to be incorporated into consumer products. Around 2010, the first consumer application demos were available, and in a matter of months all big Tech players were suddenly competing to acquire a new technology for which – until recently – they had no clear roadmap.

The third lesson is that their leadership role in Technology puts GAFAM in the best position to sense external innovations and to identify potential winners when they are still relatively young. Excluding *Shazam* – which *Apple* acquired at the end of 2017 – none of the target companies above had raised more than $15 million, and their average age was just five years.

The fourth takeaway is that these dynamics make the relationship between large Tech companies unpredictable. Before 2014, few would have predicted that *Amazon* and *Google* would one day be competing in the living room. The same happened between *Apple* and *Google* when *Apple* launched its *Mapping* service and is likely to happen again in the near future.

Not the first but the best – Google Maps

The story of *Google Maps* is one of a product with a life-long commitment to continuous improvement. And it started with an acquisition. Or rather three.

The first distant notions of *Google's* future strength in Geo services came in 2003, when the *Google* Labs team started building a *Search by Location* feature. The idea was that one could make geo-specific *Google* search queries. But it quickly flopped, even after being enhanced with information

licensed from *Yellow Pages*. Despite the fact that it was a failure, *Google* was making its first steps toward Geo services.

However, it was slower than its competitors: in 2004 *Yahoo* had just launched their mapping services and the digital mapping industry was already dominated by *MapQuest*. This all changed after *Google* made three acquisitions in that same year – *Where2*, *ZipDash* and *Keyhole* – that would be the base for *Google's* three Geo-services – *Google Maps, Google Maps mobile* and *Google Earth*.

Where2 was originally designed as an application competing with *MapQuest*, but after Larry Page's expressed preference for a web-based solution the start-up redesigned its offer in three weeks and was acquired by *Google*. The team would be in charge of developing the main *Google Maps* solution based on this product, and had it built by 2005. Some of the original features – most notably, the pin – live on to this day, even after many updates and improvements.

ZipDash's key competence was in mobile traffic and the company had developed a mobile application similar to *Waze* – a later acquisition of *Google*. Even though *ZipDash* was by far the smallest start-up of the three – boasting a tiny team of only three people – they went on to build the *Google Maps* application that is, arguably, the most popular of *Google's* Geo services.

Keyhole astonished *Google* with its novel feature of using satellite imaging data to zoom into specific locations. Contrary to the other two, *Keyhole* was already an established company with three years of history and a finished product. The owners decided to join *Google* after considering the impact they could make on the world by offering high-quality imaging data for free. And *Google* astonished *Keyhole* soon into *Google Earth's* development by committing to spend millions of dollars on high-resolution satellite imaging data.

By 2005, the *Google Maps* product was ready to launch. It initially received a lot of popularity and praise for novelty: among other things, *Google Maps* used a novel AJAX web technology that allowed it to fetch mapping data in the background and eliminated the need to refresh the website. After the initial hype, however, traffic was not growing as steadily as *Google* had hoped.

The popularity of *Google Maps* improved because of internal and external collaboration. Firstly, *Google Maps* incorporated *Keyhole*'s satellite data, which allowed people to view their homes from space and it attracted attention. Secondly, *Google* released developer tools that allowed others to build their own applications on top of *Google Maps*. After that, *Google Maps* boomed. By the end of 2006 it became the largest maps provider in the world and *Google's* second most trafficked site, only second to *google.com* itself.

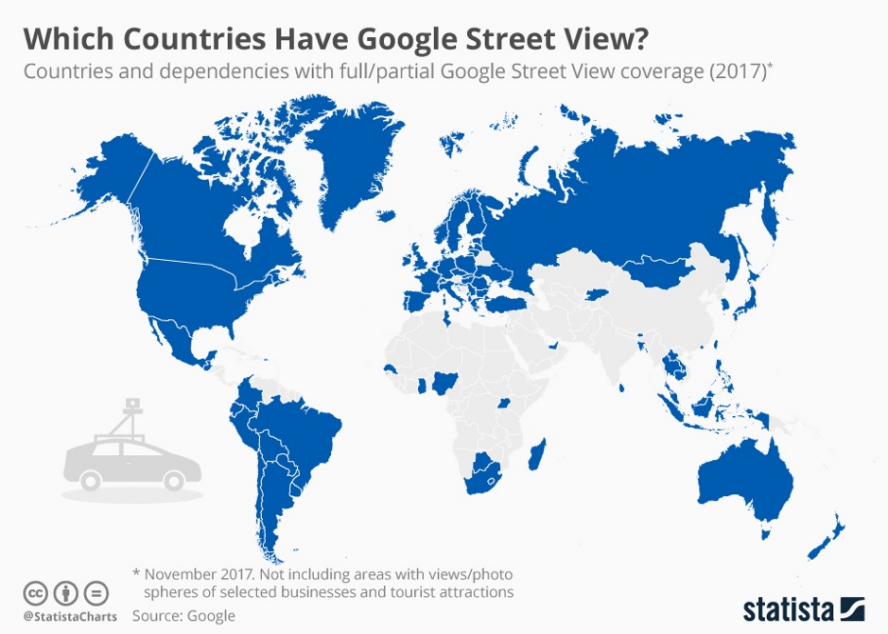
Similarly, *Google Maps mobile* was not seeing too much popularity in the very beginning, but two distinct events gave it the push it needed to become today's most popular mobile maps provider. Firstly, it gained some awareness when *BlackBerry* support was added. Secondly, it established its name when it was featured as a native application on the very first *iPhone*. By the time *Apple* replaced *Google Maps* with its own *Mapping* app in 2012 (catching *Google* somewhat by surprise, since the company needed three months to bring out its standalone application), *Google* had already earned its following and reputation. More on this in the next case study.

What made the *Google Maps* service maintain its leadership was *Google's* commitment to improving it over the years, even after becoming one of the most popular mapping providers.

Developed under collaboration with Stanford, *Google* co-founders Larry Page and Sergey Brin's idea of *Street View* was launched in 2007 and became one of *Google Map's* most distinct features. Even though some aspects of collecting the data needed to make *Street View* have caused controversy and even attracted international fine citations – raising lasting privacy concerns – the project remains one of *Google's* most visible commitments. It entails driving every road possible globally

with specially fitted cars, and keeping the information up-to-date. This effort does not only capture the *Street View* imagery but also helps validate the underlying *Google Maps* data. For example, with machine learning and computer vision *Google* can now use those captured images to incorporate road signage data into *Google Maps*. By 2018, the initiative has grown past its initial purposes: imagery is now captured by an array of vehicles and *Google* trekkers; they also collect different types of data such as pollution, for example. In Figure 1, one can see *Street View* coverage globally.

Figure 1. Google Map's Street View Global Coverage (Statista, 2017)



Also in 2007, *Google* started a project that was not widely known at the time – and neither is now – called *Ground Truth*. In a response to some unfavourable changes in the mapping competition – *TomTom* acquiring *Tele Atlas* and *Nokia* acquiring *Navteq* – *Google* set out to collect its own data to create the most accurate and reliable maps with the freedom to add novel features. This is also another example of *Google's* long-term commitment to its Geo services improvement, as illustrated in the words of Megan Quinn, who led the data acquisition project and, later, *Ground Truth* itself: *"The challenge of deciding you're going to map the world is that you can't ever stop"* (as cited by Gannes, 2015).

In the years later, *Google* continued adding features to *Google Maps* and continued improving its services. Some of these came through other acquisitions, for example: after acquiring *Zagat* in 2011, *Google Maps* started featuring reviews and ratings from 2012 onwards; and in 2014 *Google* acquired *Skybox Imaging*, a satellite imaging company (even though the company was sold to *Planet Labs* in 2017, the two companies have entered a multi-year agreement for purchasing *SkySat* imaging data).

One of the most expensive acquisitions in *Google's* history was also related to *Google Maps* service. In 2013, *Google* paid $1 billion for Israeli-based *Waze*. While the application itself has remained an independent service, its social traffic data has made *Google Maps'* own traffic data and navigation suggestions more accurate. And that is on top of *Waze* being a new – geo-targeted – advertising channel for *Google's* online advertising business.

Google Maps is a great example of a situation where a company does not necessarily need to be the first-comer to become the most popular service provider. By now *Google Maps* can count more than 1 billion active monthly users, including some big companies (*Uber*, for example, uses *Waze*

and *Google Maps*). This case also illustrates the fact that long-term commitment is one of the main drivers behind a platform's popularity: even as the online mapping space sees many newcomers, *Google Maps* remains the most accurate and informative out of all the service providers. So much so that Justin O'Bierne, a cartographer who contributed to *Apple Maps*, says that *Google* has created an "information moat" making it impossible for any competitor to possibly ever catch up (Hawkins, 2017; O'Bierne, 2017).

Catching up in the mapping space – Apple Maps

The story behind *Apple Maps* is one worth telling, because it incorporates several elements that are key to our research: it shows how the acquisition of smaller technology companies can be central to the development of a bigger company's strategy, how the decision to buy can be dictated by changing dynamics of power and increasing friction within a given industry, and how the success or failure of a Tech acquisition can only be measured after the target company has been integrated into the buyer's systems.

As mentioned above, when the *iPhone* launched in 2007 its mapping system was powered by *Google*. At the time, the app store did not exist and all applications running on the first version of the phone were designed by *Apple*, with one exception. *Google* was the only external partner to be granted a place on the original iPhone's home screen with two applications: *YouTube* and *Maps*.

Back in 2007, *Google* had already acquired *Android*, but it operated the company in stealth mode and its mobile plans were not clear to the public. *Google's* CEO – Eric Schmidt – sat on *Apple's* board of directors, and despite some competition in web browsing (between *Apple's Safari* and *Google's Chrome*) the two companies had a "friendly" relationship.

Things changed dramatically as soon as it became clear that *Google* was going to launch its own mobile operating system – *Android* – that would power essentially all devices competing with the *iPhone*. Recognizing that the two companies would be competing head-to-head, Schmidt agreed to resign from the board of *Apple* in 2009.

In the same year, *Apple* began making plans to make itself independent from *Google*. Removing *YouTube's* native app would be straightforward, but *Google Maps* was the single most popular app on the smartphone and providing a valid alternative would be necessary.

Apple quietly bought an independent online mapping service – *Placebase* – and began developing its own mapping app. Over the next two years it acquired *Poly9* – a Canadian online mapping service focusing on location-based problem solving – and *C3 Technologies* – a Swedish start-up developing 3D models of cities. The teams of the three companies were integrated with *Apple* employees to form a new mapping division and, three years after Schmidt's departure, *Apple* ditched *Google Maps* and introduced its own *Mapping* service.

At launch, *Apple Maps* stood out for two features that *Google* did not have: turn-by-turn navigation (something satellite navigators like *TomTom* had it, but smartphones lacked at the time) and a "*flyover mode"* that allowed users to browse accurate 3D models of the main US cities.

While the latter was clearly the result of *C3 Technologies'* acquisition, it is interesting to notice that *TomTom* (which provides both global mapping coverage and real-time navigation) was not acquired and simply licensed its maps to *Apple*. It is possible that *Apple* considered the company as too old and low-tech to be valuable, thinking it would be able to develop its own maps internally more efficiently than *TomTom*. *TomTom* was founded in 1991 and went public in 2005, so it is possible that *Apple* considered it as "too mature to be assimilated".

Despite these two innovative features, *Apple Maps* immediately proved to be an inferior product when compared to *Google Maps*. Imprecise directions, inaccurate data, missing coverage and unstable technology made the early user experience so frustrating that *Apple's* CEO had to pen a public apology which appeared on the company's homepage and went so far as to encourage users to consider alternative apps. *Google* debuted its new, independent *iOS* mapping app just three months after *Apple Maps* and immediately re-claimed its spot as the most-used navigation service.

It would be tempting to mark the three acquisitions themselves as unsuccessful, but this would technically be incorrect: after all, the technology of the three targets was successfully acquired and leveraged on a global scale; their teams were integrated and contributed to the development of a product that was delivered to customers.

What made *Apple's* foray into mapping disappointing was the fact that the company – by its own admission – had severely underestimated the complexity of the project. It had been overoptimistic about the scalability potential of its technologies (and the ones it acquired) when applied to a business it was not familiar with, and it had not taken measures to control the negative feedback it should have expected.

At the same time, dismissing the decision to enter the mapping space as a strategic mistake – on the grounds that the company had no expertise in mapping and did not expect to derive a profit from the service – could also be a mistake, because it would disregard the power dynamics that made this move inevitable in the eyes of *Apple*.

Instead of giving up and closing its mapping division, *Apple* decided to double down. Between 2012 and 2017 it acquired seven more digital mapping companies focusing on various aspects of the business: it worked on fixing the bugs and limitations of its software but at the same time kept investing in a long-term roadmap. For example, it acquired *WifiSlam,* which developed an indoor mapping technology. The acquisition happened in 2013, but its first tangible application was only presented in 2017 (it involves the internal mapping of airports).

Less than six years after its public release, *Apple Maps* has been ported to *Macs* as well, and it could play a role in *Apple's* plan to develop a self-driving car.

Considering that the decision to enter the digital mapping space came as a reaction to a change in the strategy of one of *Apple's* main business partners, acquiring external technologies was the most sensible choice. It could be argued that its implementation was rushed to make iOS independent from *Google* as soon as possible (had *Apple* faced no competition, it would have probably postponed the launch), but nine years after the first acquisition it is safe to say that the outcome was successful.

What remains questionable was the decision to enter the mapping business in the first place. After all, *Google* was allowed to distribute its own applications on the *App Store*, no alternative to *YouTube* was developed and its search engine is the default option on all *Apple* devices (a $3bn license), although *Siri* is powered by *Microsoft's Bing*.

With hindsight, the decision to enter mapping may be criticized from a strategic point of view, because the independence it granted *Apple* has been more formal than substantial, with millions of *Apple* users preferring *Google* services over *Apple's*. *Apple Maps* is part of the suite of software that *Apple* gives out for free to its users. While it arguably adds value to their experience, it is not directly monetized, making *Apple Maps* unit a pure cost centre. Whether or not the strategy was successful remains to be seen; given *Apple's* decision to develop a mapping application, however, we conclude that the series of acquisitions that contributed to its production was successful.

Stuck somewhere in between – Microsoft and Yammer

"Yammer is our big bet for enterprise social, and we're committed to making it the underlying social layer for all of our products."

The 'marriage' between *Microsoft* and *Yammer* that started out with this enthusiastic quote from *Microsoft Office Division* Senior Director Jared Spataro (2013 SharePoint conference), has become a perfect example of *Microsoft's* troubled acquisition history, especially when expensive targets are involved.

Microsoft acquired a freemium service *Yammer* for $1.2 billion in 2012 (making it one of *Microsoft's* most expensive deals to date), during the tenure of Steve Ballmer, when both corporate and M&A strategies within *Microsoft* where far from well-defined. In the long run, joining the Tech giant at a turbulent time was not easy for the *Yammer* team and product.

Despite *Microsoft's* own difficulties at the time, the acquisition of *Yammer* started out on a rather positive note – the start-up was enjoying rapid viral growth (55% user growth in the first year under *Microsoft*) and its Customer Success Managers were creating a seamless bridge between their customers and *Microsoft's* technical support teams. After all, the addition of a social enterprise tool made perfect sense for a company whose offerings and revenues are centred around enterprise productivity tools. It was also in line with what a lot of other companies in the enterprise software industry were pursuing at the time.

Microsoft was dedicated to making this acquisition work and kept investing into the improvement of *Yammer* at first. At the beginning, *Yammer* enjoyed relative independence (as part of *Microsoft's Office* division) with its previous corporate hierarchy intact, reporting to previous CEO and co-founder David Sacks.

However, two years after the acquisition, around the time when *Microsoft's* management and strategy changed – Satya Nadella became CEO in 2014 and started turning his company around – the warning signs about *Yammer's* uncertain faith became more apparent.

In mid-2014, *Yammer* was partially integrated into *Microsoft's Office 365*, raising questions from tech journalists about the state of *Yammer* and its absorption into *Microsoft's* general product offering. *Yammer's* development team was absorbed into *Office 365's* development team. David Sacks left *Microsoft* after working on his start-up for six years.

In early 2015, *Yammer* was further integrated in *Microsoft's Office 365* when its own customer network was shut down in favour of an *Office 365*-focused community.

In early 2016, *Microsoft* announced that it has laid-off a bulk of *Yammer's* Customer Success Managers, to the disappointment of *Yammer's* customers. This move was seen by the public as *Microsoft* killing off the social aspect that it had emphasized in the very beginning of this acquisition and coming back to its focus on profitability by cutting costs that are were now no longer deemed necessary.

In late 2016, *Microsoft* launched a new product – *Microsoft Teams* – that was similar enough to *Yammer* to create confusion among customers about which product was appropriate to use and when, raising questions about cannibalization.

In the years since, *Yammer* has been even more fully integrated within *Microsoft's Office 365* offering, with *Microsoft* educating its users about the appropriate uses (*Microsoft Teams* for inner loops and *Yammer* for outer loops).

All in all, this deal has attracted mixed, albeit mostly negative, commentary. Most of the product experts deem *Microsoft's* acquisition of *Yammer* to be a failure – it took the company around four years to decide what position *Yammer* should to take within *Microsoft's* offering; investment in *Yammer* had diminished in 2014 and crucial staff were let go. *Yammer's* acquisition is often used as one of the examples of *Microsoft's* inability to make its big deals a success.

On the other hand, there might still be a glimmer of hope for *Yammer*, even after it lost its core people and endured some years of neglect. While launching *Teams*, *Microsoft* reportedly turned more attention to *Yammer* and restarted investments necessary for its growth. Even though the two products are quite similar in their offerings, *Microsoft* is dedicated to educating its customers about appropriate uses and creating an eco-system where they both fit in. After all, *Microsoft* did not proceed with its bid to possibly purchase *Slack* in 2016, a direct competitor of *Yammer* (and *Teams* for that matter), hinting slightly (as there were other possible reasons for the withdrawal) at its confidence to further develop its own rival products internally.

If you cannot buy it, copy it – Facebook and Snapchat

A once overwhelmingly popular behemoth of social networks, *Facebook* has been battling for its user base in recent years. The reason for this is that the younger demographics – and especially the trend-setters and non-conformers – simply started viewing *Facebook* as… uncool. In their minds, *Facebook* became the platform of the parents, the teachers and other older groups.

It did not help that a once novel platform felt as if it had not kept up with consumer technology trends – as more and more users migrated to mobile device-centric platforms, *Facebook* had adapted but not innovated or astonished.

Add to this plight a newcomer that was niche enough to attract the people running away from the platform that everyone else was on. And one that was offering some different and innovative functionalities – in this case ephemeral photo messaging. *Snapchat* (originally *Picaboo*, currently under *Snap, Inc*. umbrella) was created in 2011 by a couple of Stanford students – Evan Spiegel and Bobby Murphy (with credits to Reggie Brown) – as a fun way to share moments of one's life without having to worry about them leaving a permanent mark online. Whether it was simply the novel features of the product that corresponded to the need for instant gratification of a younger generation, the sense of participation in something "new" while Snapchat maintained an "underdeveloped" look or something else, in a matter of months Snapchat became increasingly popular despite its initial reputation of a sexting application.

Throughout its life, *Facebook* has been in the habit of turning to M&A to catch up in the spaces where it was lagging behind, be it in terms of features or popularity with certain demographics. The most expensive and most famous of *Facebook's* acquisitions – Instagram for $1 billion in 2012 and *WhatsApp* for $19 billion in 2014 – are prime examples of this strategy. With the acquisition of *Instagram*, *Facebook* was making up for its under-development in the photo sharing universe, while the purchase of *WhatsApp* came with access to different user bases. Not surprisingly, *Facebook's* initial reaction to the rise of *Snapchat* was to act in the same manner in order to catch up in the ephemeral media sharing space. However, the traditional M&A efforts did not work out in this case and led to a years-long battle between the two companies which is not really over yet.

According to a few sources (Wagner, 2018; Mashable, 2014; Forbes, 2014; Yarrow, 2013) *Facebook* first approached *Snapchat's* founders with the interest of acquiring the young company for $1 billion right at the beginning, in 2012. This offer was declined by *Snapchat's* founders even after Zuckerberg threatened to launch a nearly identical application. This promise was fulfilled with the launch of the stand-alone application *Poke* that was reportedly developed in-house in just 12 days. Discontinued in 2014, *Poke* copied *Snapchat's* features almost identically. Evan Spiegel acknowledged the launch of the copy-cat rival with a quick comment: *"Welcome, Facebook. Seriously."* (a nod to a 1981 ad campaign by *Apple*). The launch of *Poke* was later on called *"the greatest Christmas present"* by Spiegel, as it helped the young company to validate its concept by proving the interest of a well-established social media player.

Then, in 2013, *Facebook* came back with a reported all-cash acquisition offer of $3 billion (Snapchat was valued at around $4 billion at the time) but the offer was again refused by *Snapchat's* founders.

At this point, *Facebook* gave up its direct acquisition efforts and adopted a widely different strategy (*Google* reportedly didn't, and in 2016 attempted to purchase *Snapchat* for $30 billion). The social media giant set out to bring *Snapchat*-like features to its platform and also to those of *Instagram*, *WhatsApp* and *Messenger*, through both in-house developments and acquisitions. Here is a quick summary of *Facebook's* main efforts, based on articles from *The Guardian, The Verge, Forbes* and others:

- In June 2014, *Facebook* launched the *Slingshot* application, that featured ephemeral messaging with a novel play-to-play feature, forcing users to send a message to view one. The application was shut down a year later.
- In July 2014, *Instagram* launched *Bolt* – a one-tap ephemeral photo messaging app – in select countries. The application was later shut down.
- In late 2014, *Facebook* experimented with disappearing posts, but the feature was not rolled out widely.
- In February 2015, *Facebook* launched *Paper*, a curated visual news reader for *iOS* which was shut down in 2016.
- In 2015, *Facebook* included ephemeral messaging into *Messenger* for some users.
- In 2016, *Facebook* rolled out ephemeral messaging in *Messenger* as part of its encrypted, secret conversation feature. Also, *Messenger* users were then able to connect through *Messenger codes* – a feature very similar to *Snapcodes*.
- In July 2016, *Facebook* tested and then scrapped a *Quick Updates* feature that allowed users to share updates on their *NewsFeed* only.
- In August 2016, *Instagram* rolled out a *Stories* feature that allows users to share videos or photos with a lifetime of 24 hours with their followers. *Stories* have since become one of *Instagram's* core features.
- In the same period, *Facebook* launched an app called *Lifestage* – aimed at people below 21 – that allowed users to share select aspects of their life (e.g. emotions, favourite song, etc.) with everyone (which raised privacy concerns). The application was shut down in 2017.
- In late 2016, following the acquisition of *MSQRD*, *Facebook* rolled out the *Camera* feature in its main app with various face filters. It also included these types of filters in *Facebook Live* videos.
- At the same time, *Facebook* rolled out the *Messenger Day* feature – offering the same features as *Instagram Stories* – in markets where *Snapchat* was not yet popular
- Also in 2016, *Facebook* reportedly and unsuccessfully tried to acquire *Snow*, an Asian version of *Snapchat*.

- In 2017, *Facebook* combined *Messenger Day* and *Stories* from its main application for easier use and cross-posting. It also allowed *Instagram Stories* to be cross-posted.
- In April 2017, *Facebook* rolled out a wide array of augmented reality and 3-D functionalities within its *Camera* feature. It also opened the doors for developers to create their own functionalities through *Frames* and *AR studios*. These features were hailed as much more functional that those of *Snapchat*.
- Also in 2017, *WhatsApp* rolled out a *Status* feature to all users, with the same functionalities as *Instagram Stories*.
- In August 2017, *Facebook* made *Stories* visible on desktop as well.
- In 2018, *Facebook* is rumoured to launch more *Snapchat*-like features across its platforms: disappearing messages, dedicated vertical long-form videos on *Instagram* (*IGTV* launched on June 21), new sharing options and more.

All in all, *Facebook* has made significant efforts to copy what it could not buy – *Snapchat*. The intensity with which it has challenged *Snapchat* has become a running gag in Silicon Valley, especially since most of the standalone applications and features it introduced had a very limited lifespan. However, the convergence of these efforts on the *Stories* format in 2016-2017 and its implementation throughout all of *Facebook's* platforms have shown that the investment was not unproductive: by the end of 2017, both *Instagram Stories* and *WhatsApp Status* had 300 million daily active users. For comparison, at the same time *Snapchat* only had 173 million daily active users (Constine, 2017). It also seems that *Facebook* has run out of features to copy from *Snapchat*, and has instead started bringing new ones – e.g. *Instagram Superzoom* that lets users add dramatic zoom to their videos – supporting the view that from now on it will likely be less about copying and more about innovating.

After all, *Apple* and *Microsoft* have been taking inspiration from each other's operating systems for years, and so have *Google* and *Apple* on mobile.

While some are predicting that *Snapchat* will follow the fate of *MySpace* – being pushed into oblivion by *Facebook* – others are hesitant to call it the end just yet, and some even speculate that *Snap* might be acquired by such company as *Apple*.

We cannot predict the fate of *Snapchat*, but we can see this years-long story as an example of *Facebook's* competitiveness and determination to maintain its position as the biggest social networking company. Even though the straightforward M&A option did not work out in *Facebook's* efforts to eliminate a potential rival, the company has spent considerable resources and time through in-house development and acquisitions (such as *MSQRD* in 2016) to build up the features that eventually let it take over *Snapchat* in popularity among its core demographics.

Spending $500 million to shut down a company – pre-emptive buying in the age of e-commerce

Strong competitors are a threat in every industry, and acquiring them before they reach critical scale is one way for market leaders to consolidate their position while protecting their margins. Up-and-coming challengers may employ similar technologies and offer similar products, but they might be able to position themselves in a way that attracts specific customer segments which larger players find hard to reach. Over time, success in a specific vertical or among a niche of enthusiastic customers may give these companies the resources and expertise to expand into larger markets and to challenge incumbents, mimicking their first steps.

The Tech industry is no exception. On the contrary, reinforcing these dynamics is the potential for small competitors to act as technological enablers for large players in traditional industries. By

opening the digital channel for them, small Tech players can put Non-Tech established players on the competitive map of digital native companies who might have liquidated their traditional business model as outdated.

Amazon's acquisition of *Quidsi* provides an illustration of both types of risk. Marc Lore and Vinit Bharara founded *Diapers.com* in 2005 to make it easy for young families in urban areas to keep diapers, baby wipes and related baby-care consumables in stock. Over the next few years, the two applied the same model to a number of similar verticals – launching websites such as *Soap.com*, *BeautyBar.com* and *Casa.com* – all catering to a similar customer base which was attracted by its bulk pricing and free-shipping practices. These websites operated under the Quidsi umbrella, and the company was run efficiently, with warehouses located strategically in areas close to target customers and largely automated through *Kiva* technology (later acquired by Amazon in 2012).

These features made Quidsi extremely attractive to other retailers: *Amazon* was a direct competitor and clearly saw a valuable asset in the company's user base, but traditional retailers were even more interested in *Quidsi's* technical capabilities. A bidding war ensued between *Amazon*, *Walmart* and *Walgreens*, and eventually *Amazon* prevailed with a $545 million offer – a 1.8x sales multiple.

In principle, *Amazon* could have afforded to lose out in a few verticals and invest the half billion dollars differently, although not reacting would have been a risky strategy given *Quidsi's* growing categories portfolio. What *Amazon* could not afford was seeing the e-commerce capabilities of an efficient competitor being acquired by a large traditional retailer, because this would have flooded the e-commerce channel with offline inventories across all product categories.

In this sense, the acquisition of *Quidsi* can be considered a case of pre-emptive buying, with *Amazon* preventing brick-and-mortar competitors from acquiring the capabilities to compete online.

Weeks before the acquisition, *Amazon* flexed its muscles by wilfully undercutting *Quidsi* on key products such as diapers and forcing it to face the dilemma of accepting negative margins or being outcompeted. This sent a clear message, and not just to *Quidsi's* management: whoever wanted to enter *Amazon's* turf should be prepared to sustain losses for as long as the e-commerce giant pleased (or had cash). *Amazon* even outbid *Quidsi* on *AdWords* in its own domains: users googling diapers.com in the weeks prior to the acquisition would see *Amazon* as the first result, with the original website coming second.

As illustrated in section 4, this was not enough to keep *Walmart* and other traditional retailers at bay, and merely postponed their entry by a few years. *Quidsi* was never integrated into *Amazon*, although orders were sometimes fulfilled through *Amazon's* network. Its websites were kept independent for almost seven years but they never reached profitability. Finally – in 2017 – they were shut down. Employees were fired and users redirected to *Amazon*. By the time, Lore was leading *Walmart's* online efforts. Based on our definition of success, the *Quidsi* deal was automatically marked as a failure in our database, and these arguments help us confirm the result.

SECTION 3 – WHY AND HOW DO NON-TECH COMPANIES ACQUIRE TECH COMPANIES?

The previous sections have described the different rationales behind technology company acquisitions from the point of view of other technology companies. As discussed above, technology companies do not constitute a self-standing industry: while some of them have defined industries that did and could not exist before a given technology was introduced (e.g. social networks and search engines), many others operate in industries that predate them. In most cases, the latter group competes with traditional companies with decades of experience in their industries but no native technology capabilities.

At the same time, while technology enables the rise of a new class of competitors, it also offers traditional companies the possibility to expand in new directions and improve their operations in order to offer better products that are more in line with the expectations of modern customers. Additionally, technology investments can also raise entry barriers for potential competitors (Chaudhuri & Tabrizi, 1999; Ledbetter & Sacks, 2017).

At least four factors encourage Non-Tech firms to acquire technology companies:

- The need to bridge the talent and technical gap with younger and more technologically advanced competitors
- The need to produce, collect and analyse business data
- The potential to connect and meet customer needs through new channels
- The potential to cultivate long-term, ongoing relationships with customers online or through more modern interfaces

Technology therefore presents both a threat and an opportunity to Non-Tech companies. In line of principle, in-house development of new technologies is always a possibility, but in practice very few mature companies have the structure, culture, time and resources necessary to experiment with new technical solutions and develop successful technologies from scratch. This is particularly true of such domains as online presence, digital production, AR/VR (and nowadays crypto) which are completely extraneous to their core skills. In this context, the "buy" option is likely to be more appealing than the "make" alternative.

In order to validate this hypothesis and study the behaviour of Non-Tech companies approaching technology company targets, we researched the sectors in which Tech and Non-Tech companies interacted the most in the last ten years. Data sources such as *PitchBook*, *CBInsights* and *Bloomberg* provided industry-level information about this kind of deal flow and allowed us to identify the industries that see the most interactions between Non-Tech and Tech companies in the US. We used this information coupled with deal size and strategic rationale as criteria to build a representative (albeit not exhaustive) database of Tech company acquisitions made by Non-Tech companies, and extended our sampling to non-US companies. The result is a database which includes 96 deals of this type.

The most active Tech investors were (in order) in the Financial, Media (content ownership and publication), Retail, HealthCare, Industrials and "Consumer" sectors. Included in the latter are a number of sectors that cater to mass consumers, such as automotive and apparel.

The first striking difference between Tech and Non-Tech companies relates to the different ways in which they approach technology targets. While Tech companies (as represented by GAFAM in our research) tend to most often proceed with straight acquisitions based on the potential of their targets' technologies, Non-Tech companies are more likely to make minority investments in early-

stage Tech firms with promising or at least interesting technologies, instead of purchasing them immediately.

The most straightforward explanation of this phenomenon is that Tech companies possess the necessary skills to better develop their targets' potential in-house, providing both technical support and business experience. On the contrary, the best asset Non-Tech companies with no technical expertise can provide to potential targets is cash: unable to predict whether a potential target will succeed in developing and scaling its technology, Non-Tech companies can only help make the environment as favourable as possible for Tech company targets (be them start-ups or more mature firms), postponing their integration into a more rigid corporate environment while providing financing. This also allows potential buyers to reduce risk by staging financing and postponing more binding resolutions such as a full acquisition.

This phenomenon has two significant consequences which we were able to observe through our quantitative research: the companies acquired by Non-Tech buyers tend to be older and to have raised more capital.

Several explanations can be put forward for these observations: technology companies have more technology skills and experience and may therefore be able to scout the firms with the highest potential well ahead of their Non-Tech competitors, managing to acquire them earlier and at a lower price. In other terms, less experienced Non-Tech firms would often be victims of the Winner's Curse (Thaler, 1998) when competing with Tech companies for a target. More on this and on other differences in Section 5.

In order to address this asymmetry, several traditional companies have been developing separate, semi-independent arms or divisions that focus exclusively on business development through acquisitions. *General Electric Digital* and *Walmart's Store No 8* are two such examples: the former constitutes the more modern, fully digital arm of *GE* which aggregates the firm's efforts and investments in the digital space within a consistent framework that is formally and structurally detached from the rest of the century-old company; the latter is an incubator for next-generation technologies that Walmart believes will change its customers' shopping experience in the years to come.

Such initiatives aim at reducing the cultural clash between Tech targets and legacy organizations, accommodating for flatter organizational structures, longer time horizons and more uncertainty.

It is important to stress that our findings depend heavily on the sample of deals that we included in our database. However, the size of the sample and the magnitude of the differences with our GAFAM set of acquisitions leave us confident of our results.

Overall, the picture emerging from our analysis is that of a catch-up phase in which traditional companies with abundant financial resources but limited technical expertise are investing in response to increased pressure from digital-native challengers. Within this panorama, a few traditional firms are finding space to expand their business leveraging technology to consolidate their industry leadership and gain an edge over historical competitors.

Section 4 describes the most salient examples that illustrate these dynamics, while Section 5 offers a quantitative analysis of the relative success of Tech and Non-Tech acquirers.

SECTION 4 – NON-TECH TECH CASE STUDIES

The Financial Sector

The financial sector is over two-millennia old, yet the biggest change to the way the industry operates only came with the introduction of the Automatic Telling Machine (ATM) in the late 1960s, which required the creation of interbank networks to manage and coordinate digital transactions. While the machines themselves have historically been produced by specialized technology companies like *IBM*, the underpinning networks were developed by incumbent banks through consortia or similar agreements ensuring the creation of common standards. This structure ensured that traditional banks kept the control of their business.

The first real threat to the dominance of traditional banks came with the diffusion of the internet and the possibility for ordinary people to make online transactions. The first generation of web-based platforms like *PayPal* was able to develop and thrive online by leveraging superior technical knowledge and understanding the economics of the web. The second generation of mobile-first applications like *Venmo* and *Stripe* – which build on first generation platforms and leverage increased smartphone adoption – is more insidious as it offers products that are increasingly seen as an alternative to what banks have to offer.

It is not only commercial banks that have been facing pressure from Tech companies: legacy trading platforms and insurance companies are facing the same threats.

The financial sector has been reacting in two ways: on one side, banks and finance platforms have been developing in-house capabilities to ensure they remain ahead of the curve and do not succumb to the rise of native digital players; on the other side, they have been acquiring smaller Tech companies to quickly build defences and acquire technical talent. In most cases, the two approaches have been complementary, with small acquisitions serving as the cornerstone for the development of entire engineering teams within established Non-Tech institutions.

The history of *Goldman Sachs* provides a few interesting examples to illustrate this strategy: in 1999, the company spent more than half a billion dollars to acquire the *Hull Group*, a private company specializing in electronic market making and in algorithmic trading. In 2015, it purchased *Pantor*, a smaller Swedish company specializing in trading efficiency. In between, *Goldman Sachs* invested heavily in technology, hiring thousands of engineers and rewriting its businesses to be competitive in the 21st century.

After 2010, the company decided to expand in the consumer retail banking business where it did not have a presence before the 2008 financial crisis. The company identified online personal loans and saving accounts as a strategic priority and opportunity and prepared the field with a few key acquisitions that set its *Marcus* retail product for success. In 2016, the company acquired *GE Capital Bank's* online deposits business, and later it acquired *Clarity Money* – a personal finance tracking app – and the team behind *Final* – a credit card technology company.

While it is still early days for *Goldman Sachs'* consumer platform, we can already venture to say that the bank's acquisitions have proven to be successful so far: they were each executed as a part of a consistent strategy; this strategy resulted in the integration of each target within the company's structure; and crucially, drastic changes to the internal capabilities and organization of the firm were implemented as part of the change required to ensure the overall strategy was executed effectively.

A similar argument can be made for companies like *American Express* and *MasterCard*: despite their differences, their acquisitions succeeded because they were all part of a coherent strategy that put

the acquirer's core business at the centre and looked for technologies capable of augmenting it. Having a clear goal likely made execution more effective.

Retail

Retail is among the sectors most severely hit by the diffusion of the internet. The rise of e-commerce has resulted in increasing downward pressure on prices and subsequent margin compression: customers are now able to instantly compare prices across multiple retailers at once – both online and offline – and logistics have evolved to make e-commerce increasingly more convenient.

While the development of e-commerce does not mean that brick-and-mortar shops are doomed, it does mark a shift towards an omni-channel model in which controlling physical or digital purchase experiences alone is not enough.

Facing mounting pressure from competitors, investors and media, large retailers have turned to M&A to quickly address their digital shortcomings and elaborate comprehensive omni-channel strategies.

Among these companies, *Walmart* has been the most active acquirer. At the heart of the behemoth's digital expansion strategy was the acquisition of e-commerce platform *Jet.com* in 2013, for $3 billion. A competitor of *Amazon*, *Jet.com* differentiates itself through a pricing mechanism that rewards buyers who optimize the size of their orders by filling their boxes optimally and by purchasing items that are stored in the same facilities. Despite its multi-billion price tag, the deal was first and foremost an acqui-hire aimed at bringing founder Marc Lore on board. Before founding *Jet.com*, Lore founded *Quidsi* (former *Diapers.com*) and sold it to *Amazon* for over $500 million, as discussed in Section 2. After the *Jet.com* acquisition, he was made CEO of *Walmart's* e-commerce division and given the resources to build a strong online commerce presence.

One of the first acts of Lore in his new positions was the creation of *Store No 8*, an incubator that *Walmart* is using to accelerate promising retail start-ups. At the same time, *Walmart* has kept buying e-commerce companies, adding *ModCloth*, *Shoebuy.com* and *Moosejaw* to its portfolio.

Two more acquisitions stand out in particular: *Bonobos* and *Spatialand*. The former is significant because it promotes a hybrid model that combines the possibilities of e-commerce with the advantages of in-store showrooming: customers can book private in-store try-on sessions with a personal stylist and shopper, but the purchases are made online and the physical products are delivered at home.

Spatialand designs virtual reality shopping experiences and is at an earlier stage of development. It is being incubated within *Store No 8* and is unlikely to produce any commercial result before long but could represent an interesting bet on the future.

The same elements of *Walmart's* acquisition strategy can be observed among most large retailers: brick-and-mortar retailers like *Target* have been acquiring start-ups and online businesses in an attempt to open new sales channels and keep up with customers' expectations. E-commerce and delivery platforms have been getting the most attention, with companies like *Plated*, *Shipt* and *Dermstore.com* being acquired.

It is too early to assess the success of these acquisitions, and preliminary indicators may be misleading, as the *Hudson's Bay - Gilt Europe* deal best showcases.

Established in Canada in 1670, the retailer is the oldest company in our database. In 2016 it acquired *Gilt Europe*, an e-commerce platform promoting flash-sales of designer clothes at a discount. The

company had raised approximately $300 million and had a valuation of $1 billion in 2011, but it sold to *Hudson's Bay* – which also owns *Saks Fifth Avenue* – for just $250 million. The decline in valuation and the fact that the company sold for less than it had raised should have spelt trouble, but for two years it seemed that the integration of one of the youngest e-commerce platforms into the oldest retail group would work. The indicators we were able to collect were promising, so much so that we classified the deal as successful in our database. Days after we ran our analysis, however, *Gilt* was sold for an undisclosed sum to a digital-native retail platform, *Rue La La*.

The *Gilt Europe* divestiture came after a partial write-off and a change of leadership, and serves as a cautionary tale for traditional retailers venturing into e-commerce M&A. Many of the targets have never been profitable and may never be, especially given the strong competition coming from *Amazon*. What will make a difference is the consistency of the different firms' broader strategies and their ability to execute. Companies venturing in technology M&A for the first time (like *Albertson*) will face higher hurdles and might be at a disadvantage against more experienced acquirers with a clearer vision and a proven track record. Financial resources will also play a key role.

Media and News

The media industry includes all companies whose core business involves the production and distribution of content. Firms such as the *Walt Disney Company*, the *New York Times*, the *CNN* and *Times Warner* all fall into this category.

These companies have historically enjoyed a close relationship with technology, because it is the technology prevailing at any given point in time that dictates the way content is distributed and broadcast to consumers. The printing press was the invention that made the media industry possible ("the press" as an industry took its name from it), and every new technology has transformed the way in which the industry operates. Cinema, television, radio, the internet and Virtual Reality each have had (or will have) a transformative influence on media.

However, media companies have historically been separated from technology companies. Some broadcasters had their production studios, but they never developed their own antennas or cables, relying on specialized technology companies for that purpose and limiting their business to the operation of these technologies.

Things may be different this time: with the advent of the internet, some companies have begun a process of vertical integration. For example, *ESPN* (*Walt Disney* group) purchased *Bamtech Media*, a Tech company that develops streaming solutions; *Netflix* has been able to develop both content and technological capabilities in-house, and *Apple* has begun producing its own shows to be broadcast to its customers.

This trend is very recent, and the examples above may well represent exceptions rather than the norm. In the past, media companies attempting to acquire Tech companies have often failed, sometimes spectacularly.

The merger between *AOL* (online service provider) and *Time Warner* (mass media conglomerate) in 2000 is often quoted as one of the worst M&A deals in history due to the poor fit between the two companies, and was completely undone in 2009. As we write, *Time Warner* is in the process of merging with *AT&T* (a telecommunication company), while *21st Century Fox* is being contended between *Walt Disney* and *Comcast* (a cable network companies). Neither deal has closed yet, but the synergies and strategic fit between buyers and sellers are much clearer this time, especially

since the merging entities are all part of a consolidated value chain that already creates and distributes content.

The *New York Times'* acquisition of *About.com* - a "content farm" which used technology to reverse engineer *Google's* algorithms and index web pages in order to attract traffic – is another example of failure. The *Times* purchased the company for over $400 million in 2005 but ended up selling it off for much less just a few years later. The purchase had been driven by the *Times'* need to build up a digital presence quickly, and it was informed by the flawed understanding that search engine optimization represented the essence of the internet.

The deals above focused on the role of technology in the distribution of content. However, technology also plays a role in the production of content itself. In this sense, *Disney* has probably been the most active acquirer of technology companies. With no doubt, its most successful acquisition was *Pixar*, which pioneered video animation by being the first company to apply computing power to digital 3D content production. *Pixar* is a movie studio, but its pioneering role in writing animation software effectively makes it a technology company. Other *Disney* acquisitions targeted digital game studios (*Rocket Pack* and *Tapulous*) and social networks/games for children and young kids (*Playdom*, *Club Penguin*).

These deals were not all successful. *Club Penguin* was purchased in 2007 for $700 million and lived on for another full decade before being terminated and replaced by an internally developed, underpowered mobile successor. A "massively multiplayer online game", *Club Penguin* allowed hundreds of people to play simultaneously in the same virtual world. The long-term survival of the title and the fact that it allowed *Disney* to enter a category in which it had no expertise would lead us to classify the deal as successful. However, in 2016 the company announced it would shut down its Interactive division and exit all game developing activities. *Playdom*, a second social network game developer which was purchased for over $750 million in 2010 was part of the division that shut down in 2016.

On a much smaller scale, *CNN* agreed to buy *Beme* – a personal video sharing mobile app founded by *YouTube*-star Casey Neistat – hoping to acquire digital capabilities in a more modern, younger video format. The company was acquired for a reported $25 million at the end of 2016, only to be shut down one year later.

Overall, Media companies are the ones whose Tech-acquisition results were the least satisfactory. Part of it was due to an incomplete understanding of the prospects of the technologies being acquired, but bad management post-integration certainly played a role as well.

Automotive

The automotive industry as we know it has developed according to the principles of Fordism and has evolved largely thanks to developments in mechanical engineering, industrial automation and electronics. While software runs in all modern vehicles – from cheap city-cars to luxury one-offs – the industry has traditionally focused on hardware innovation, with R&D investments aiming at making cars mounting combustion engines faster, safer and more fuel-efficient. Software has played a role, but always applied to existing hardware solutions.

Meanwhile, in the last 10 years, technology has evolved in three directions which initially went unnoticed by traditional carmakers. First, platforms like *Uber* began applying software to ridesharing and ride hailing, slowly increasing the average utilization rate of shared vehicles and

bringing into question the need for people living in urban environments to actually even own a personal car.

Second, electric vehicles changed from being a science fiction idea to a commercial reality, with the *Boston Consulting Group* expecting them to take half of the global market by 2030.

Third, advancements in Artificial Intelligence and Machine Learning promise to make self-driving cars a reality in the near future. Reliable Computer Vision technologies, coupled with extra precise sensors and increasingly reliable predictive models are on track to make self-driving cars safer than traditional vehicles.

Governments around the world are playing a decisive role, encouraging zero-emission vehicles, regulating shared mobility and supervising Self-Driving experiments. As an example, California and a few other American states require all car manufacturers selling more than 60,000 traditional vehicles per year to offer at least one electric option. While selling these "compliance vehicles" is often anti-economical for manufacturers, it imposes a minimum R&D commitment in this direction. On the contrary, self-driving prototypes are strictly regulated, with many states declaring them illegal and others limiting the number of special permits granted to test them on the road. The ridesharing economy is also the subject of much political and regulatory attention, with some countries like Italy and Germany (but also the city of London) imposing stringent restrictions on drivers.

The most popular (and to some degree successful) company operating at the intersection of these three ideas is *Tesla*, which was founded with the explicit goal of capitalizing on them. Elon Musk's original vision was to make electric luxury vehicles and reinvest the proceeds to develop ever cheaper electric cars. This vision evolved to encompass clean energy generation and storage, and a fleet of self-driving private vehicles that owners could decide to share when they don't need them, in order to create an efficient, safe and cheap transportation network. The company is periodically hinted to as a possible acquisition target for both *Google* and *Apple*, but so far both companies have explored the mobility space independently, relying on internal resources more than on M&A.

While *Tesla* has been struggling to meet production targets and cost objectives (as well as to conduct safe self-driving tests) recently, incumbents have been paying close attention to the trends that it has helped popularize. All major car manufacturers now offer at least one electric model, are developing and testing self-driving capabilities and are getting ready for a world in which the total number of cars sold in any year could be lower, while their shared usage rate could increase.

Traditional car manufacturers on both sides of the Atlantic are looking at smaller, young companies developing these technologies, acquiring and integrating them into their R&D efforts. In the US, *General Motors* purchased *Cruise Automation* – a forty-people start-up working on fully autonomous vehicles – for a price rumoured to be between $500 million and $1 billion in 2016. *SoftBank* recently announced it would invest $2.25 billion from its *Vision Fund* in exchange for ~20% of the venture, and *GM* has also committed another $1.1 billion. Their goal is to launch an autonomous ride-sharing service in early 2019, addressing all three trends at once and entering in direct competition with companies like *Uber* and *Tesla* at the same time.

Ford also addressed the topic of technological innovation explicitly in 2016, with the creation of a subsidiary called *Ford Smart Mobility* – based in Palo Alto – and the acquisition of *Chariot* – a ridesharing platform – and *SAIPS* – an Artificial Intelligence company developing Computer Vision solutions. However, the company's initiatives in this space seem to be at an earlier stage and to focus on the broader transport system as a whole. *Ford* acquired two more companies in 2018 – *TransLoc* and *Autonomic*, both specializing in transportation infrastructure, vehicle connectivity,

tracking and traffic management – and reorganized its Smart Mobility division into several smaller groups, including *FordX* which welcomed the latest acquisitions.

European companies seem to be moving in a slightly different direction. *Daimler* – the parent company behind *Mercedes Benz* – completed eight Tech acquisitions between 2014 and 2017, but with the exception of *Cinteo* – a "digital service provider" which was rebranded as *Mercedes-Benz.io* and brings digital expertise in-house – the others all focused on Shared Mobility and involved ride-hailing platforms. *FlightCar, MyTaxi, Flinc, Beat, Clever Taxi, Hailo* and, more recently, *Chauffeur Privé* were all acquired as part of the company's goal of becoming "a networked provider of mobility services*".* Consistently with this goal, in early 2018 *Daimler* announced the establishment of a joint venture with *BMW* to create a "mobility powerhouse" combining the two companies' initiatives in Car Sharing, Ride Hailing, Parkin, Recharging and "Multimodal" mobility. The effort brings to light a number of initiatives which we had not previously tracked because they are the product of internal innovation and R&D: *BMW's DriveNow* and *Daimler's Car2Go* were developed in-house by the two carmakers exploring different business models and making sure their car brands would be part of it. The same can be said of *ReachNow* (*BMW*) and *Moovel* (*Daimler*) which focus on Multimodal mobility, by which users rely on multiple means of transportation to reach their final destination.

Parking online payments is another area in which automakers have acquired Tech companies, with *BMW* purchasing *ParkMobile* and *Volkswagen* acquiring *PayByPhone* and *Sunhill Technologies*.

We can drive four general lessons from the way car manufacturers interact with Tech companies.

First, acquisitions are not always necessary in order for companies in established sectors to integrate the latest technologies into their products. This is especially true when these products are physical, because new competitors are likely to face production constraints before they can take over incumbents on a global scale. Traditional players then have time to understand what kind of technologies they need to implement, and whether these can be developed in-house or are better obtained from the outside, through acquisitions or other forms of collaboration. It should be noted that this was not the case with the *iPhone*: *Apple* introduced superior software coupled with a superior hardware technology that did not even resemble what mobile phone manufacturers had been producing until then. The company already had experience and manufacturing contracts with Chinese assemblers from its *Mac* and *iPod* business, so it did not leave enough time for *Nokia* and the likes to adapt.

When products are large and require dedicated distribution channels – as is the case with cars, which at least in several US states only dealerships can sell – incumbents enjoy an extra advantage. Tesla represents the most tangible threat to traditional carmakers but, while impressive, its growth has left plenty of time to the likes of *General Motors* to organize and react.

Secondly, even when traditional companies identify the need to introduce new technologies they may be quick in completing acquisitions but still take years to turn them into commercial products. This form of gradual introduction is not necessarily due to technical difficulties, but rather to the need for these companies to avoid cannibalization. Especially if the new technologies result in initially more expensive products, incumbents are likely to introduce them in their premium segments and to let them trickle down gradually as they become cheaper to roll out.

The third takeaway which emerges clearly from the acquisition strategies of *GM*, *Ford* and *Daimler* is that the acquired companies are very likely to be run as skunk-works, with no interaction between these new "exploratory" units and the acquirer's traditional business (Christensen, 1995; Benner & Tushman, 2003). This autonomy and independence can help explain our finding that Non-Tech companies tend to have better talent retention than GAFAM post-acquisition. Partly because these

acquisitions are often seen as exploratory and need further development, parent companies are likely to only coordinate them through high-level management, agreeing on the direction in which product development should proceed while leaving the original teams free to execute and experiment on a day-to-day basis. What happens next remains to be seen. Daimler's portfolio of ride hailing platforms seems to suggest that with consolidation comes more centralized management, but this remains to be seen.

The last point – which does not emerge directly from an analysis of traditional companies' acquisition strategies – is that M&A is only one of many possible ways in which Tech and traditional companies can interact. Aside from joint ventures and internal R&D, the interaction between Non-Tech players and Tech companies can also take the form of a customer-supplier relationship. This is especially possible when advanced technologies do not replace the product of traditional companies but rather build on it and augment its potential. *Cruise's* fleet of self-driving cars is expected to be based on *Chevrolet* cars (a *GM* subsidiary); *Alphabet's Waymo* is developing self-driving technologies, but is applying them to a fleet of cars produced by *Fiat Chrysler*. *Uber* is doing the same with *Volvo*, and *Apple* has allegedly reached an agreement with *Volkswagen* for a similar supply contract. This equilibrium may be precarious. After all, even *Tesla* started out retrofitting *Lotus* cars, only to move up the supply chain to produce its cars directly. However, *Tesla* still has to prove this was a sensible business idea. In the words of famous venture capitalist Marc Andreessen, "hardware is hard". A more likely option is for GAFAM (or other high Tech companies) to purchase existing Non-Tech players and innovate on this basis. The idea of GAFAM acquiring Non-Tech players is interesting and deserves future analysis. Besides *Amazon's* acquisition of *Whole Foods*, however, very few examples come to mind today.

Sportswear

Virtually no aspect of life has remained untouched by technology, and sport is no exception. GPS trackers, watches and heart rate monitors have been around for decades, but they used to be expensive niche products for competitive athletes and professionals.

A first generation of consumer-oriented activity trackers debuted around 2008 with companies like *Fitbit* and *Withings*, but what really made sport activity tracking mainstream was the introduction of applications that turned smartphones into accurate measuring devices. Their success made them extremely attractive to sportswear companies: they constituted a new channel to communicate with those athletic people who were most likely to be their customers, and they generated plenty of personal data.

The size of the deals in this space is impressive. Between 2013 and 2015 Under Armour spent more than $700 million on just three apps: *MapMyFitness*, *Endomondo* and *MyFitnessPal*. In Europe, *Adidas* purchased *Runtastic* for $240 million. In 2008, the company had purchased *Textronics*, a company producing wearable sensors which provided the technology for *Adidas' miCoach* – a line of wearable trackers – but in 2017 it announced it would be exiting the hardware business to focus on software. In this sense, the acquisition itself was successful in that it allowed a company with no hardware expertise to introduce several consumer products. What turned out to be suboptimal was the decision to invest in hardware in the first place. The introduction of the *Apple Watch* – with a dedicated sports partnership with *Nike* – was probably among the factors that convinced *Adidas* to reorient Its focus.

These deals clearly show that Non-Tech companies are not necessarily outdated players waiting to be disrupted. On the contrary, they are often in the best position to identify technology acquisitions

that would allow them to pursue new opportunities and expand their business in new directions, rather than simply defending it. *Runtastic* was never a threat to *Adidas'* business, although not acquiring it would have meant running the risk that competitors might one day gain access to precious insights about how their products are used.

As in other cases highlighted above, integration with the parent companies has been limited: the buyers' logos have been added to their brands, but this has been the only visible change in most cases. Some features are gradually evolving in a direction that may be indicative of the new ownership – for example, *Runtastic* keeps track of the distance run with a given pair of shoes and suggests users when it is time replace them – but all apps maintain at least a freemium model with a solid set of free features.

In this case, lack of stronger integration is not a sign of unsuccess. On the contrary, keeping these platforms as open as possible allows sportswear manufacturers to gather precious data to better understand both their current and potential customers, understanding habits and identifying trends in time to profit from them.

SECTION 5 – TECH M&A: QUANTITATIVE ANALYSIS

Databases

In order to make our analyses as robust and rigorous as possible, we collected data about Tech acquisitions closed by both GAFAM and select Non-Tech companies, and built two separate databases.

The first database covers the 629 acquisitions made by *Google, Amazon, Facebook, Apple* and *Microsoft* from their establishment until the end of 2017. We kept track of more recent acquisitions but did not include them in the analysis below, as it is arguably too early to determine whether they were successful or not.

The second database includes 96 acquisitions made by traditional companies as defined in Section 1, 84 of which occurred before the end of 2017. The criteria we adopted to select them are explained in detail in Section 4. In general, we focused on sectors that have been strongly exposed to technological change, looking for firms that have interacted significantly with tech through partnerships, minority investments or outright acquisitions and focusing on the latter. A list of the firms is available in *Appendix A*.

We built the two databases simultaneously, collecting the same variables and coding them in the same manner to make them comparable in every aspect. The data we collected can be classified in four clusters, covering:

- Information about the bidder at the time of the acquisition
- Information about the target at the time of acquisition, including funding raised, headcount, reference industry, location and more
- Information about the deal itself, such as whether it was made in cash, stock or a combination of the two; what was the amount of the transaction and whether some form of earn-out was agreed on
- Information about Post Merger Integration, including whether the teams and CEOs stayed on, whether the target contributed to the development of new products, the degree of independence it kept and, crucially, whether it was divested or not

A more detailed description of the structure of the database can be found in *Appendix B*.

We made use of categorical, numerical and dummy variables where appropriate, and did our best to collect as much data as possible. Unfortunately, given the high degree of confidentiality, the relatively limited size and notoriety of some targets and the age of many deals (the oldest dates back to 1987) not every dimension could be filled in for every acquisition. Nevertheless, we collected over 25,000 data points and only recorded 21% of them as “not-available”.

In the analyses that follow, we excluded deals for which the required data was not available. However, we did use deals with incomplete information when the missing dimensions were not relevant to the specific analysis being run (e.g. information about funding in an analysis about geographical distribution of the targets).

The Analyses

We developed two kinds of analyses: on one side, we attempted to quantify the success of each acquisition by coding the definition that was presented in section 1 and applying it systematically to every deal. Following integration theory, our definition relies on some of the Post Merger Integration parameters that we collected, so we integrated it with a number of experiments aimed at assessing whether other factors – such as price, age and other PMI indicators – affected success.

On the other side, we took advantage of our databank to look for patterns and trends that could help us better frame our research problem and back-up our empirical findings, in addition to providing potential insights into the future of Tech acquisitions.

In both cases, we applied regression, correlation and trend analysis techniques to ensure a rigorous outcome.

Descriptive Analyses

It is useful to start with a detailed description of the deals that we covered before assessing their relative success.

Size and Age

Out of the 729 deals that we tracked (including the ones in 2018), the most expensive by far was *Microsoft's* 2016 acquisition of *LinkedIn* for $26.2 billion. However, the transaction was a clear outlier: only 28 acquisitions had a price of $1 billion or more, and only three targets were acquired for more than $10 billion (*LinkedIn*, *WhatsApp* and *Motorola*).

Figure 2. $1 Billion+ Deals in Our Sample

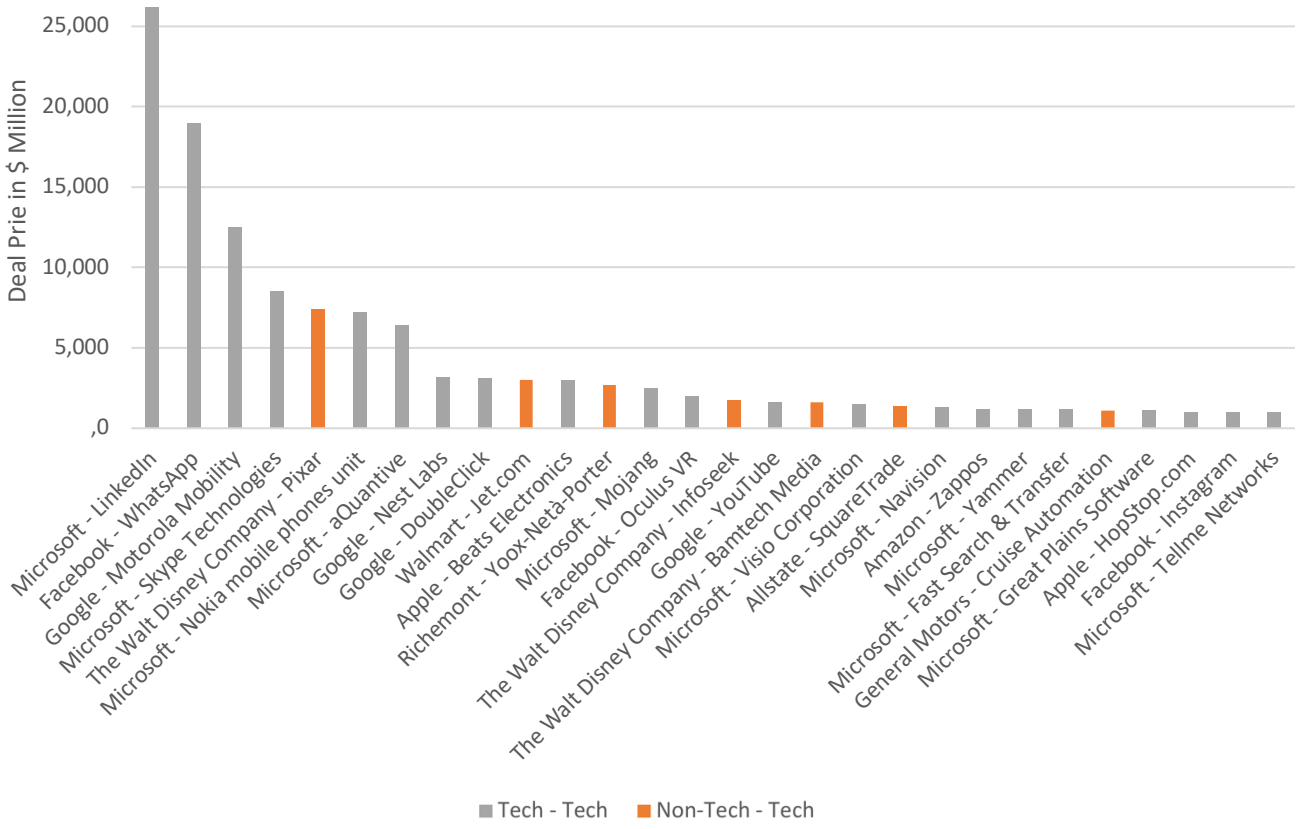
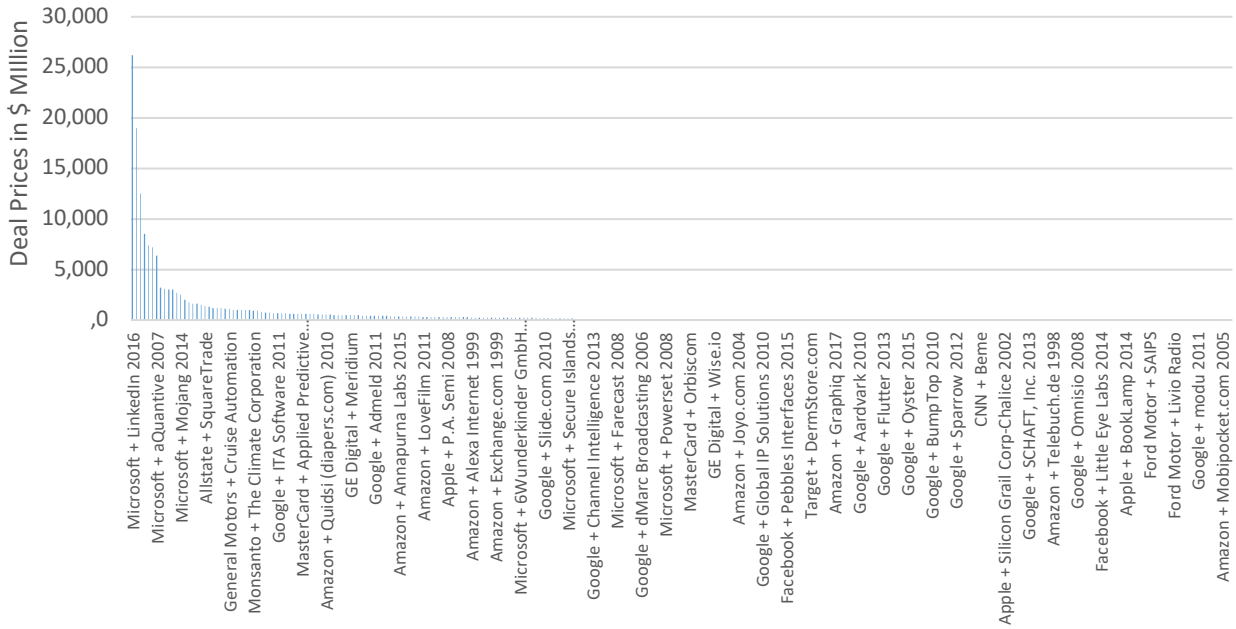


Figure 3. Average Deal Price Distribution



The median price for GAFAM targets was $90 million, while the price of the 75th-percentile deals was $275 million (see *Appendix C* for the most expensive GAFAM deals). Looking at Non-Tech buyers only, the median price paid was $250 million while acquisitions in the 75th percentile had a price of $585 million.

In terms of age of the target, the same pattern applies: the median age of the companies acquired by GAFAM was 4 years, while it was 5.5 years for Non-Tech companies. Looking at the 75th percentile of acquisitions, GAFAM targets were about 8 years old, while those of Non-Tech buyers were 3 years older (at 11 years). In a twist of events, the oldest company was purchased by a Tech company though: it was *Nokia*, which was 148 years old when *Microsoft* bought it in 2013.

Figure 4. Target Age Distribution

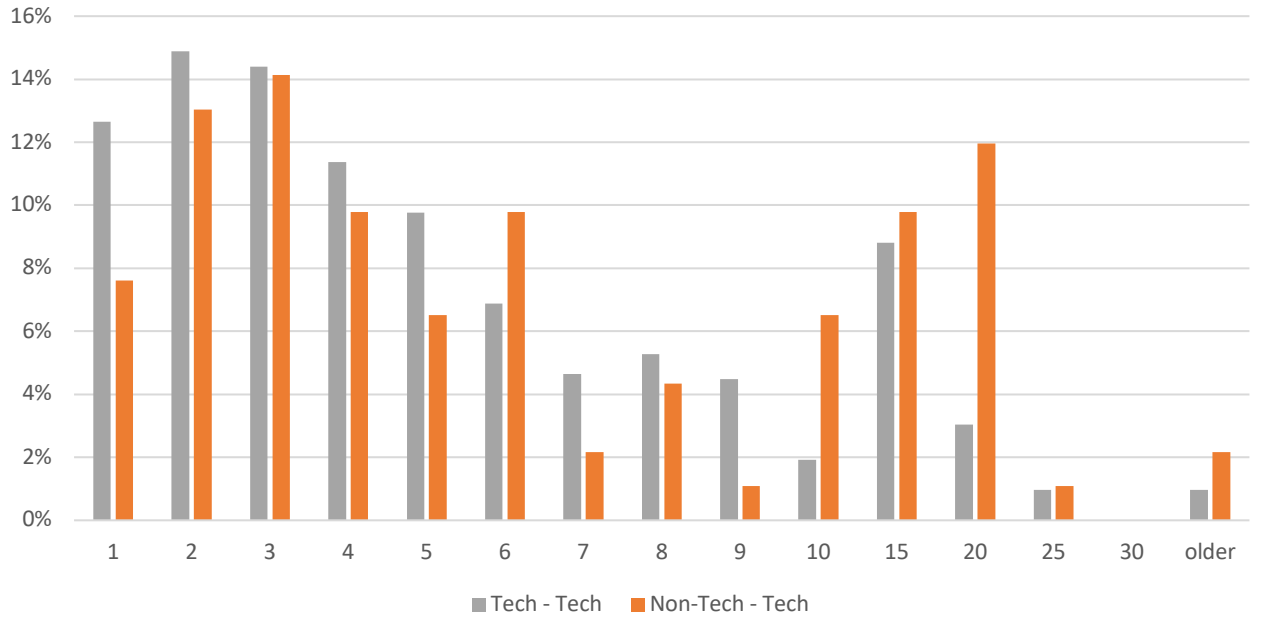


Table 2. Summary of Target Age Distribution by Bidder Type

	GAFAM	NON-TECH
MAX	138 - Nokia	35 - Humedica
75th PERCENTILE	8	11
MEDIAN	4	5.5
25th PERCENTILE	2	3

We can therefore conclude that GAFAM tend to buy younger Tech companies and pay, on average, less for them, although we did report a few outliers. On the contrary, Non-Tech companies tend to buy fewer Tech companies, postpone the purchase and pay a higher price.

We tested this hypothesis regressing the acquisition price on the age of the target, and found that, overall, every additional year of age resulted in an average extra $24.3 million on the final acquisition price. The coefficient was significant with a p-value of 2.25% based on the 274 deals for which we could ascertain a price. The coefficient remains significant at a p-value of 4.95% (albeit slightly smaller at a value of $23.7 million) if we look at GAFAM acquisitions only, while it is less significant for Non-Tech deals alone (p-value 9.1%) but more impactful on the acquisition price (coefficient value of $35.9 million). The complete outputs of these regressions can be found in the *Appendix D, Appendix E and Appendix F.*

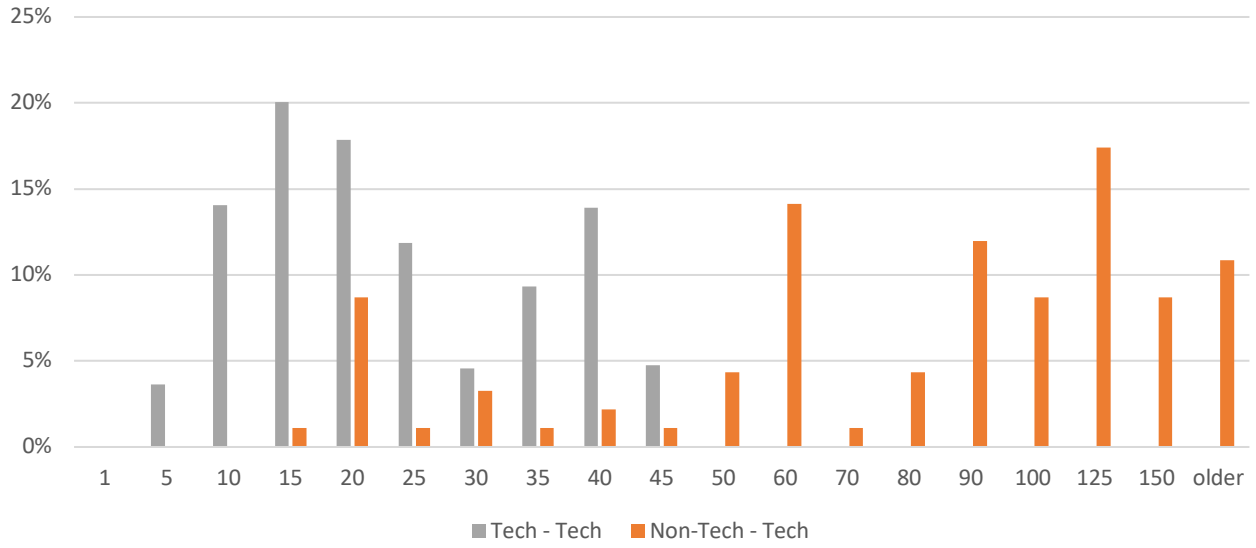
We also tested whether the age of the buyer had an impact on the price of the deals. On one side, we hypothesized that more established firms might be willing to venture into more expensive deals leveraging their cumulated acquisition experience and higher spending power; on the other side, we observed that the opposite might happen, i.e. more experienced firms may be able to negotiate more favourable terms, in part due to their reputation and brand-power. We found no significant relationship (see *Appendix G*), suggesting that the two hypotheses probably offset each other on a case-by case basis.

Regardless of any possible impact on prices, the different distribution in the age of GAFAM and Non-Tech buyers is an interesting topic per se. 56% of all acquisitions made by GAFAM companies happened within 20 years from their incorporation. Over the same interval, Non-Tech companies only carried out 14% of their Tech acquisition. The explanation for this stark difference is straightforward: many Non-Tech buyers have been around for decades or even centuries (the oldest buyer, Hudson's Bay, was incorporated in 1670), and "Tech companies" the way we define them simply did not exist at the time. Even more so, some of them were technology companies in the past.

General Electric is probably the clearest example: when it was established at the end of the XIX century, electricity and heavy industry were at the forefront of innovation, and the firm was listed on the *Dow Jones Industrial Average Index*. Although *GE* took part in the computing revolution of the '60s, it exited the sector in the early 70s to focus on heavier industries. As electricity was commodified and the software industry developed, *GE* lost ground to more innovative companies which chose to focus on this sector. The decision to acquire capabilities in software and analytics only came in 2011 and was an explicit change in strategy decided by its CEO Jeff Immelt. It was implemented through a series of acquisitions – which we tracked – that resulted in the creation of the *GE Digital* subsidiary. This explicit change – coupled with the rise of the Internet of Things – is helping *GE* reposition itself at the intersection between Heavy Industry and Digital. However, it

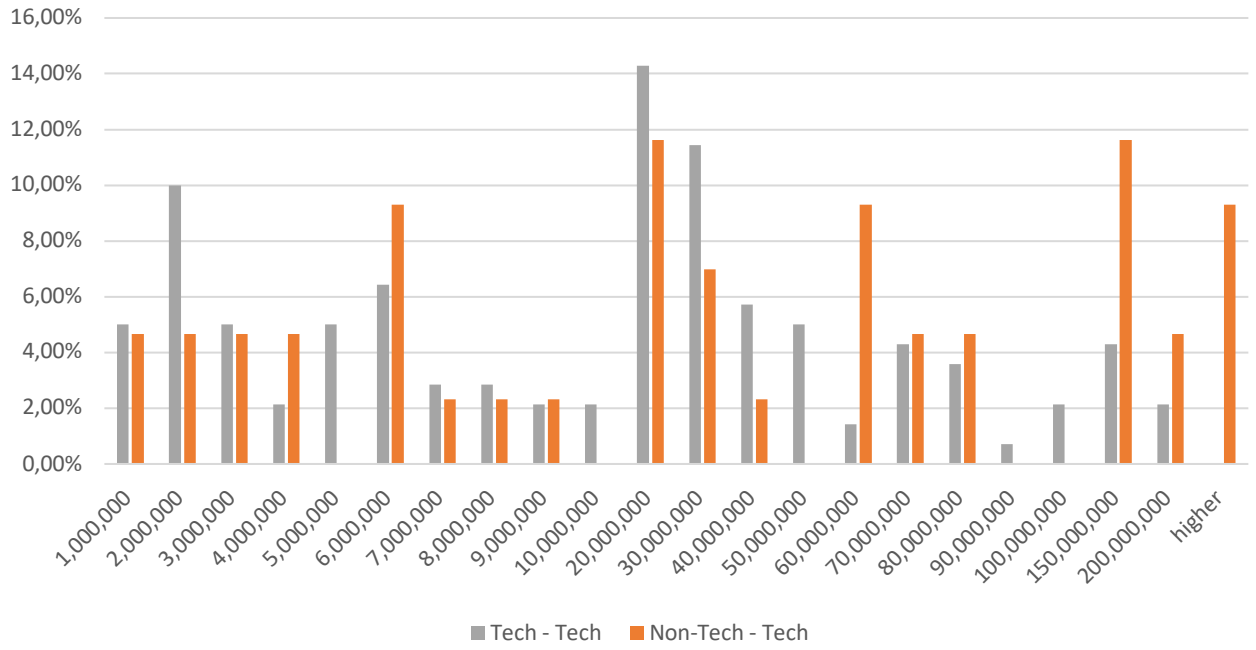
supports our argument that *GE* is closer to being an Industrial company than to being a Tech one. If it succeeds in becoming one, that will be thanks to its acquisition strategy.

Figure 5. Tech Bidder Age Distribution



In terms of funding, the median GAFAM target raised $14 million, while the corresponding figure for Non-Tech acquirers was almost double ($27.8 million). The difference only amplifies as targets get bigger: GAFAM targets in the 75th percentile had "only" raised $43 million, while Non-Tech targets raised more than $107 million. This is consistent with our finding that the targets of Non-Tech buyers tend to be older and more expensive.

Figure 6. Target Funding Distribution (amounts raised in USD)

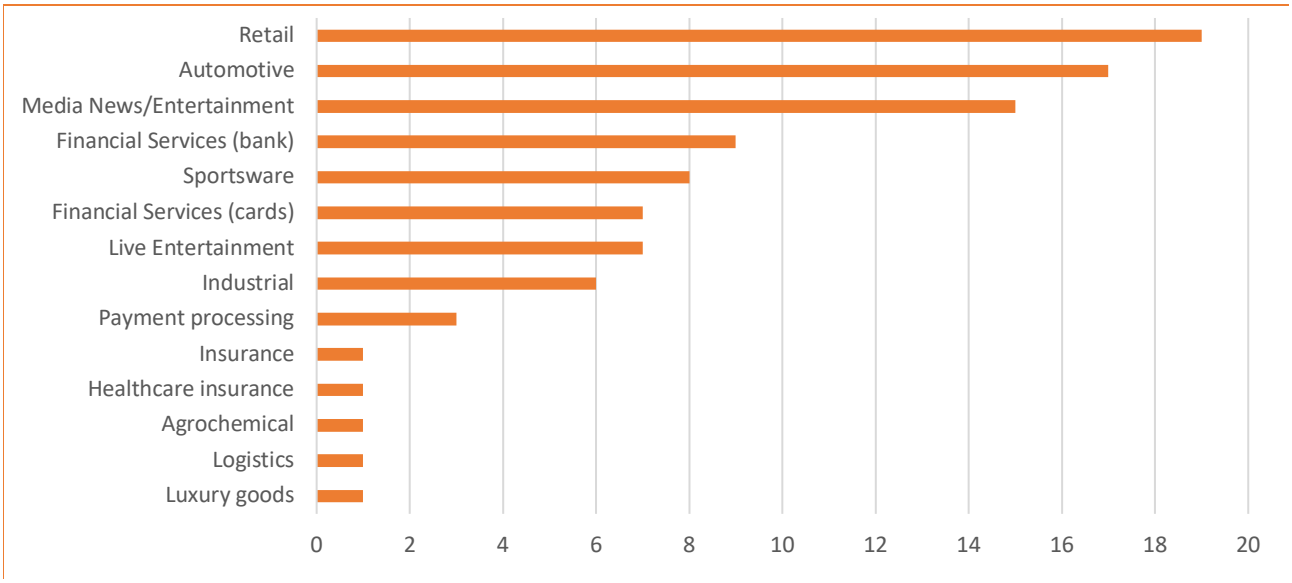


Bidder and Target Sectors

We classified both bidders and targets into industry sectors. Overall, bidders spanned 13 broad categories with limited overlap: from Agrochemical (e.g. *Monsanto*) to Retail (e.g. *Walmart*), they covered very different industries that have all been reshaped by technology to some extent. Some sectors like Media, Banking and Logistics were born offline and have naturally expanded to more modern channels over time, investing in automation, digitization and online presence. Others, like the Industrial sector and the Payments industry, were born from previous waves of technological innovation, but would no longer be considered "high-tech" if they had not invested in firms developing newer technologies that have not been commoditized yet.

Looking into more detail at Non-Tech bidders, we observe that Retail, Automotive and Media are the three traditional sectors that were responsible for the most deals (19, 17 and 15 respectively).

Figure 7. Non-Tech Bidder Sectors by Number of Deals

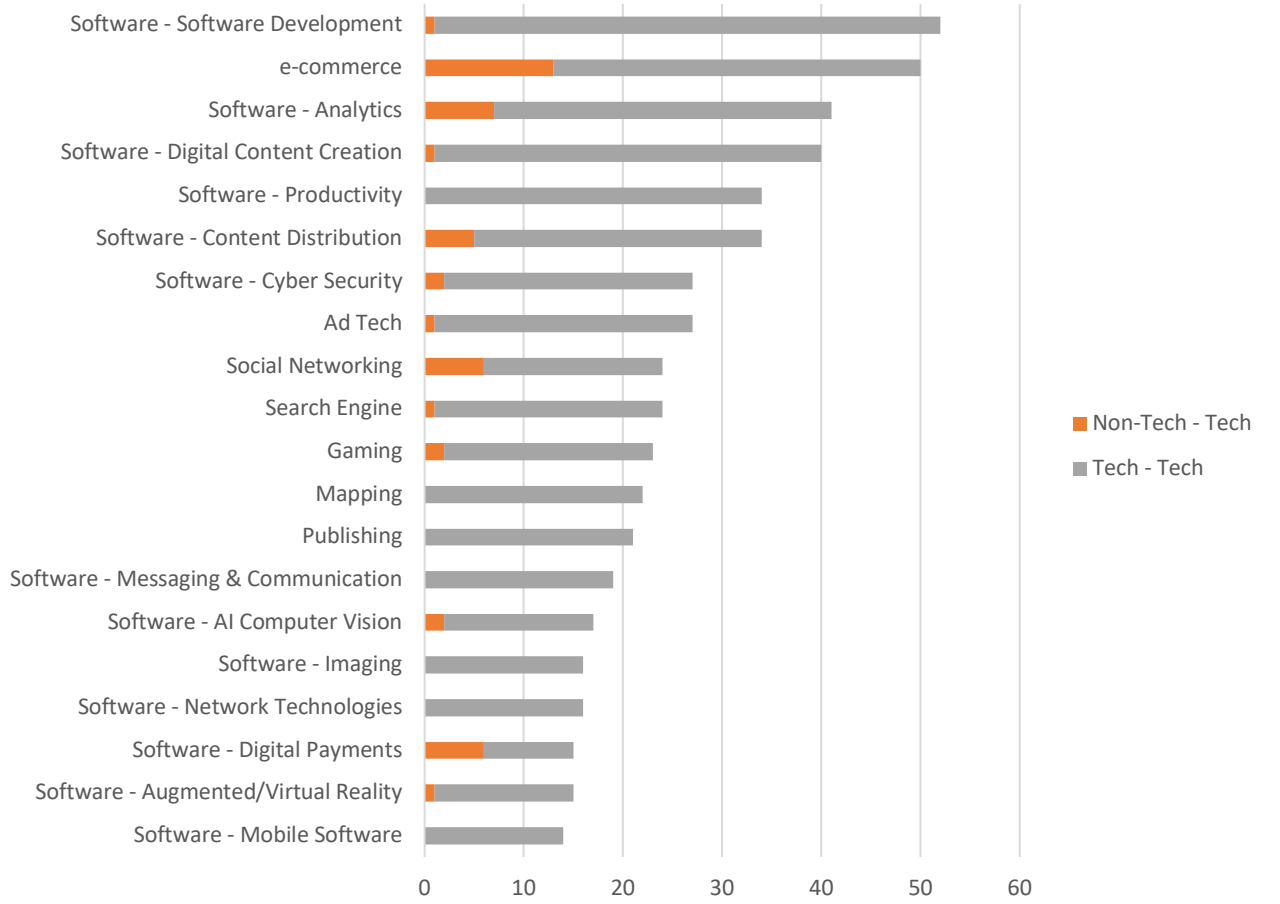


While we grouped bidders into macro industries for the sake of comparison, we adopted a more granular classification for targets. Indeed, we were interested in exploring the industries that interacted the most with technology companies in general, but our ultimate goal was to be as specific as possible about the types of technologies acquired, so a more segmented classification was deemed suitable. In order to develop it, we adopted a hybrid approach: we realized that some companies were acquired for the potential that their technologies offered (be them in hardware or software), while others specialized in a single industry.

We therefore classified targets based on their specific application when one existed, and on the broader nature of their technology otherwise. In the latter case, we kept hardware and software companies separate. Corner cases existed, but we applied out best judgment throughout the process.

We identified 15 specific applications, 15 different types of hardware and 25 types of software companies, which are listed in detail in *Appendix H*.

Figure 8. Top-20 Target Categories by Number of Deals



GAFAM companies were more active than their Non-Tech counterparts in almost every target industry, with three notable exceptions: CRM, IoT and Logistics. While the numbers are small (12 acquisitions in total, not shown in Figure 8) they seem to suggest that GAFAM see limited potential in these industries, while Non-Tech companies are more likely to find natural synergies with their core businesses. Both *Walmart* and *American Express*, for example, acquired Tech companies focused on managing customer relationships and fostering loyalty. In the Internet of Things domain, it was *General Electric* that invested in three companies, all of which converged in its newly-established Digital division. Things change when the Logistics sector is considered: even though traditional retailers were responsible for more deals than Tech companies, that was only because they were playing catch-up with *Amazon*. While *Amazon* was able to leverage a single acquisition (*Kiva*) and scale it worldwide, each of its local competitors felt the need to acquire at least one delivery company to address the omni-channel and mounting competition form e-commerce.

In many cases, traditional companies engaged in M&A activity to enter digital channels and pursue their core businesses with the latest technologies, only to find themselves in direct competition with GAFAM. This was evident in sectors as diverse as e-commerce and Digital Payments, Education, and Health Data Collection.

Out of the 55 target categories which we identified, 20 attracted both GAFAM and Non-Tech companies. However, an analysis of our PMI parameters reveals that, even when Tech and Non-Tech companies compete in the same target industry, they tend to do it with different objectives. Looking at e-commerce, for example, we see that Amazon tends to make most of its acquisitions to reinforce its existing platform, with only 20% of its targets remaining independent. Conversely, 80%

of the e-commerce websites purchased by traditional retailers are operated as stand-alone platforms. In 80% of the cases, Non-Tech companies purchase e-commerce websites to enter new channels or verticals, while this only happens 50% of the time with *Amazon*.

CEOs and Teams

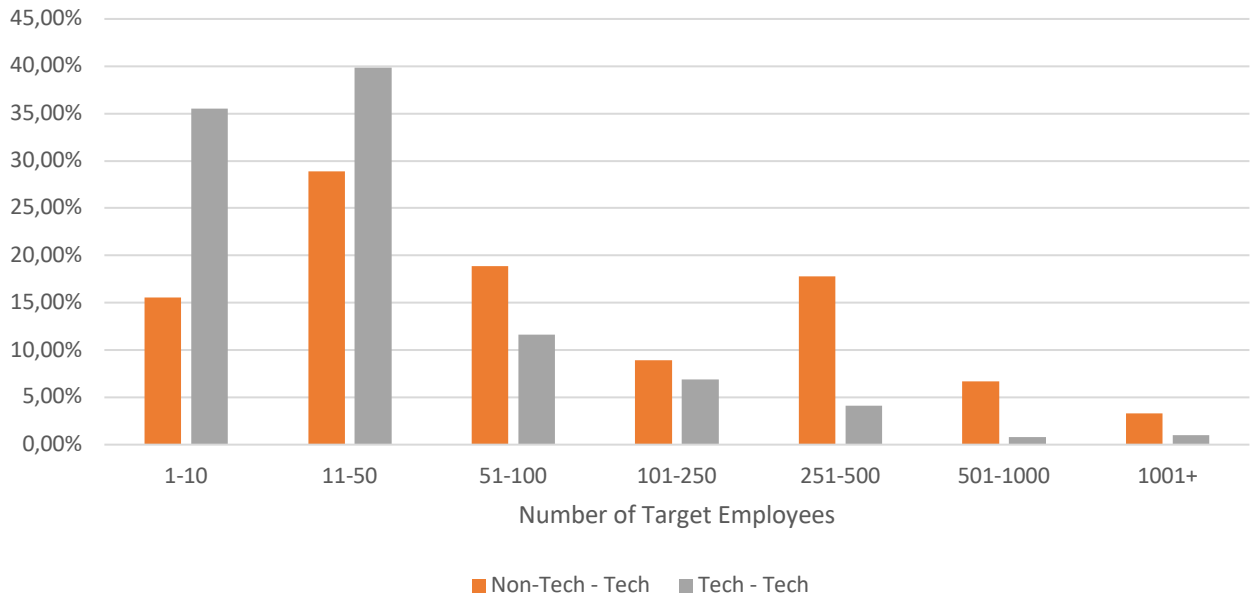
Human capital is without doubt one of the main assets that comes with Tech acquisitions. Besides any patent, technology or possible user base, talent acquisition is often the number one driver behind acquisitions. This is especially true for GAFAM and Tech companies in general, which already have a solid technical base and are more likely to be looking for talents working on next-generation technologies and more innovative ideas.

Conversely, Non-Tech firms are more likely to make Tech acquisitions to compensate for a lack of internal technical skills and capabilities. This implies the need for larger organizations which translates into higher headcount. Even in terms of management, while Technology companies are likely to have existing products and teams in which to integrate their targets (or a broader structure which makes it easy to incorporate new product teams), this is often not the case for Non-Tech companies.

Our data supports this argument: we found that Non-Tech companies let their targets operate stand-alone products in 49% of the cases, whereas only 23.8% of the deals made by GAFAM resulted in the acquired target's products remaining independent. This does not always correlate with the team behind a given product staying separate from the main parent organization, but it is often the best proxy we can rely on.

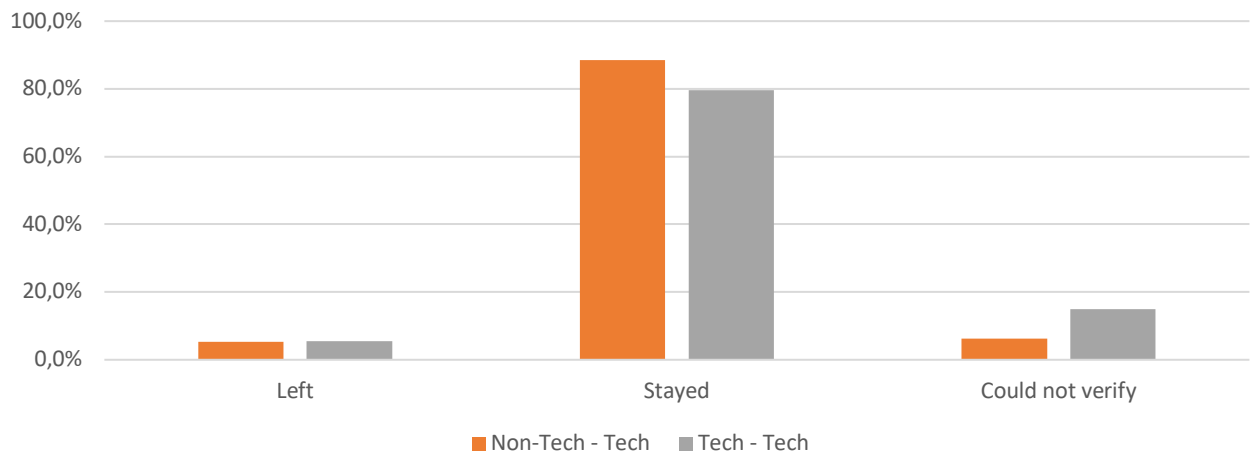
While it was not always easy to establish whether an acquisition qualified as an "acqui-hire" or not (that is, whether any IP or product was being purchased along with the teams), we observed that over 35% of all the companies acquired by GAFAM had fewer than 10 employees, and 87% of the companies they acquired employed less than 100 people. As expected, Non-Tech firms tended to acquire larger teams: only 63% of their targets had less than 100 employees. In both groups, teams between 11 and 50 members were the most frequent (38.2% of total deals).

Figure 9. Target Employees Distribution



The larger the teams, the more likely they were to remain with their buyer. Overall, 88.5% of the teams remained after being acquired by a Non-Tech company, versus 79.6% for GAFAM targets (however, it should be noted that the percentage of deals for which we could not verify this variable was higher for Tech companies, and could compensate for the lower value).

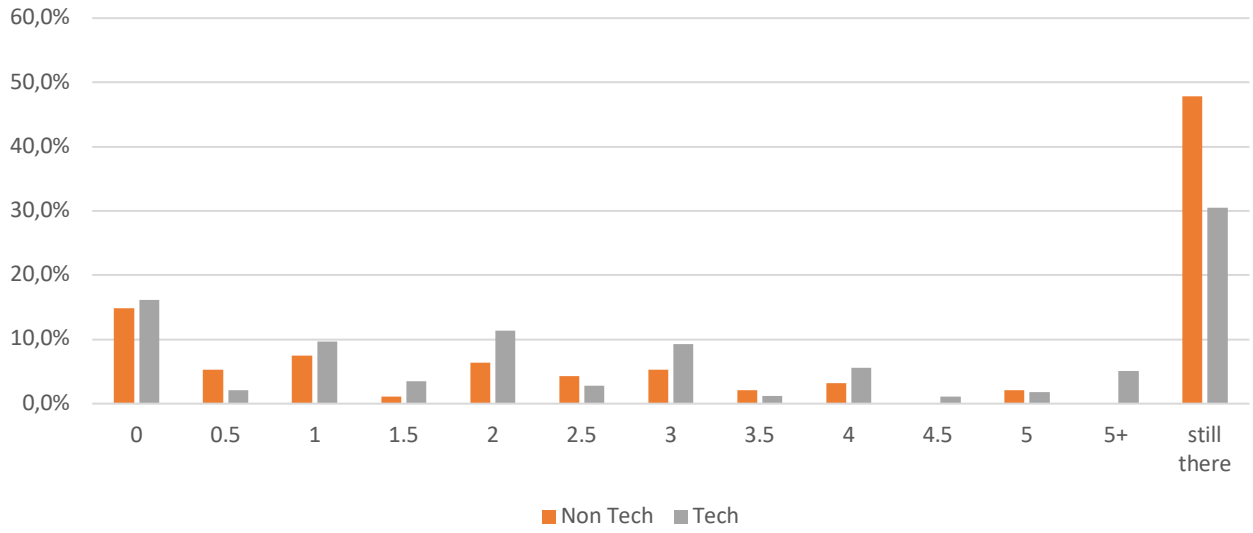
Figure 10. Team Retention Post-Acquisition



As far as retention is concerned, the CEOs of 48% of the companies acquired by Non-Tech companies were still on board as of May 2018, versus only 30.5% of the CEOs of GAFAM's targets. In interpreting this result, it should be kept in mind that Non-Tech companies entered the Tech market later than GAFAM (see later section).

In plotting the frequency distribution of different CEO tenures in GAFAM targets (as can be seen in Figure 11), we noticed two peaks at 2 and 3 years: among the CEOs who did not leave immediately after their company was acquired, the mode was for them to leave after 2 years (11.4% of the total), followed by 3 years (9.3% of the cases, the second most popular time frame). We do not have enough evidence, but we suspect this has to do with standard vesting periods and earn-out clauses which are often kept confidential.

Figure 11. CEO Tenure Post-Acquisition



We further explored whether a causal relationship existed between the average value of a deal and the tenure of the CEOs who stayed, but the model we used to test this hypothesis was not statistically significant, as shown in *Appendix I*.

Geographical Distribution

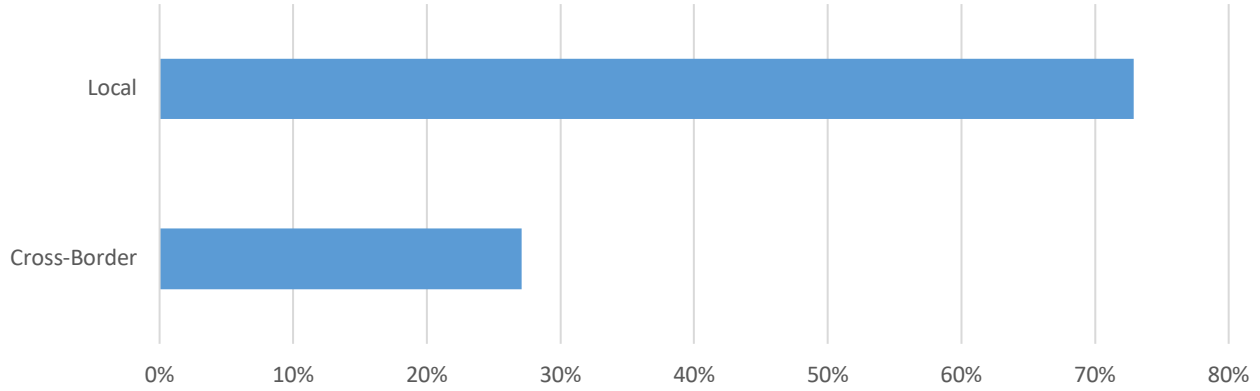
The overwhelming majority of bidders in our sample is headquartered in the United States. Out of 37 buyers, 86.5% are American and account for 98.22% of the 729 deals we covered.

The only exceptions can be found among Non-Tech buyers: *Adidas*, *BMW* and *Daimler* are German companies, *Hudson's Bay* is headquartered in Canada and *Richemont* is Swiss.

A more diverse picture emerges when looking at target companies: a solid 73.1% of them still originates from the US, but 32 additional countries were represented in the sample, as can be seen in Figure 12 and Figure 13.

When looking at the geographical proximity of target companies – i.e. whether they are headquartered in the same country as their buyer – we did not observe any difference at all between the GAFAM and Non-Tech bidders within our sample. For both types of bidders, only 27% of deals (26 for Non-Tech and 171 for GAFAM) were cross-border.

Figure 12. Deal Proximity Distribution



An obvious explanation is the fact that most Tech companies (all bidders and most targets) are based in the US. This likely limits the need for GAFAM companies to look for targets abroad, while urging international Non-Tech companies to focus on the US market. Easier prospects of integration, cultural similarities and knowledge about the local regulatory framework are all factors that further encourage local acquisitions.

Excluding the US, the three countries that produced the most targets are the UK, Canada and Israel.

The dominance of the UK (19.5% of cross-border and 5.2% of total deals) and Canada (17.9% of cross-border and 4.8% of total deals) is not particularly surprising and could be attributed to the same factors that tend to favour US targets – Anglo-Saxon origins provide both a common language and a similar culture, making the prospects of scouting and integration less daunting.

The role of Israel is more peculiar and deserves attention. While relatively small, the country benefits from a unique ecosystem that encourages and promotes technological innovation through public investment, academic research and commercial spin-offs. Many of the local founders are professors who hold PhDs and many successful technologies were first developed in universities and in the army, where their inventors often met. The venture capital industry is developing rapidly

but military R&D expense has been funding technological breakthroughs for the past 20 years. Our results support the academic research that particular geographical areas may provide comparative advantages to Tech companies (Malecki, 1981; de Haan, 2011).

Perhaps the most surprising insight from this analysis is the near absence of Asian targets within our database, especially given the strong reputation that many Asian countries enjoy in terms of advanced technological development. Cultural differences between Eastern and Western countries are among the most likely causes for this under-representation. Additionally, local laws may prevent foreign ownership or make the acquisition and integration of local companies by foreigners practically difficult. Mere risk of proprietary knowledge leakage is likely to be a sufficient concern preventing GAFAM companies from investing in regions where protecting IP could be challenging.

In contrast, European countries make up the majority of international targets, with 19 countries (corresponding to 60% of the 32 countries), and 120 deals, representing 16.5% of the total deals made. UK, Germany, France and the Nordics produced the most targets on the continent, a result that could be attributed to a relatively open culture, friendlier foreign ownership legislature and a stronger focus on STEM education and technology investments.

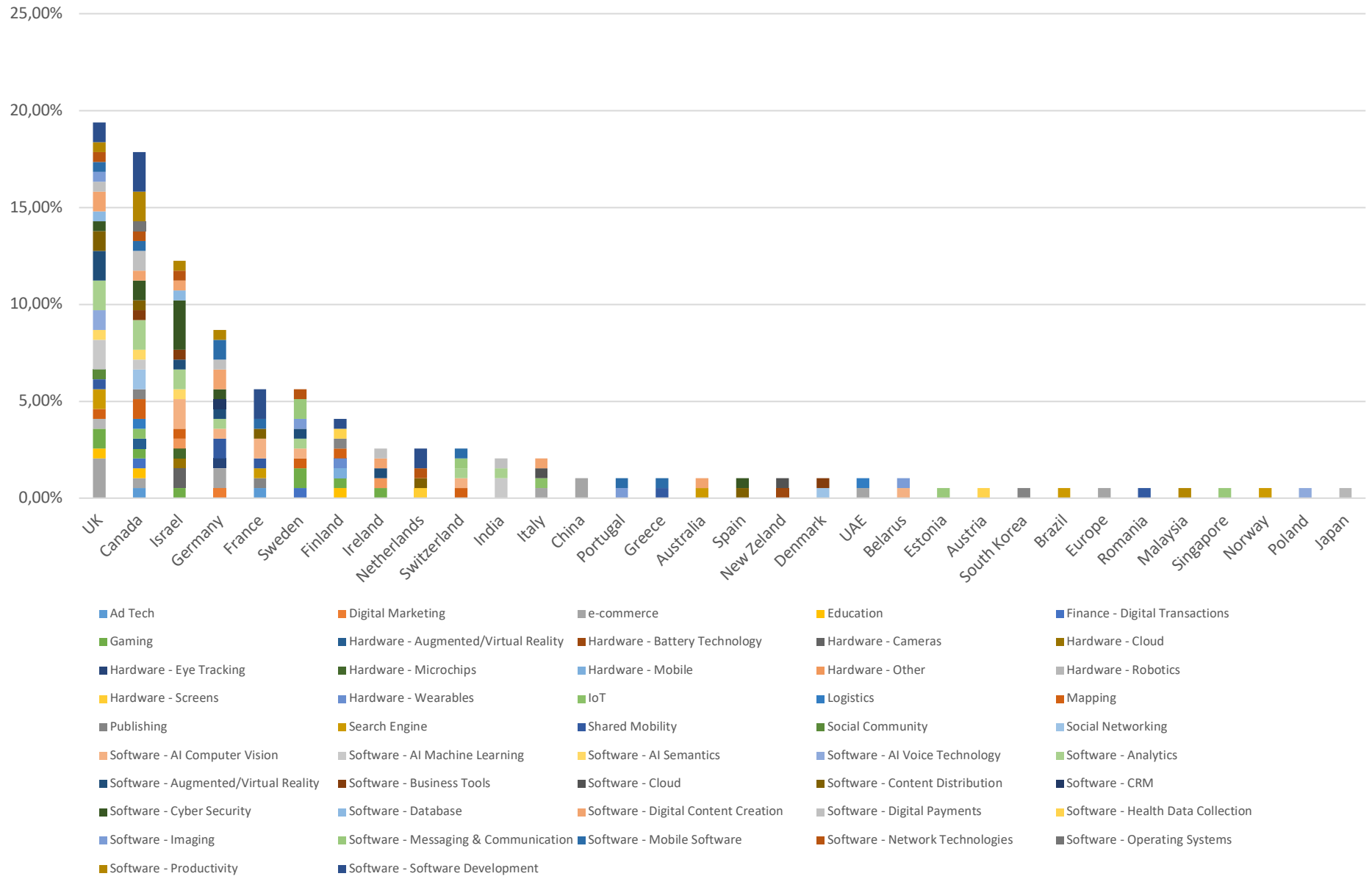
Our data allows us to take a closer look at the individual countries and to identify the Technology sub-sectors in which each of them seems to be strongest, at least according to potential buyers. As an example, 2% of all deals outside of the US involved British e-commerce platforms. Machine Learning, Software Analytics and Augmented/Virtual Reality are UK specialties too, each accounting for 1.5% of all non-US deals.

Several Software Analytics targets were also based in Canada, which also seems to specialize in Productivity Software and in Software Development.

As expected, Israel emerges as a global power in Cybersecurity, with 2.5% of all Non-US deals involving an Israeli target operating in this sector. Computer Vision targets stood out as well, often with applications in the Autonomous Driving space.

Figure 13 maps out these acquisition patterns in more detail. The picture that emerges highlights that, while episodes of industry specialization can be found, the countries that produce the most Tech companies do so across multiple sectors. In other terms, the difference between countries is not really about the technologies they focus on, but rather whether they generally invest in Technology in the first place or not.

Figure 13. International Target Country of Origin by % of Deals, Split into Target Sector



Means of Payment: Cash vs Stock

Based on the acquisitions that we could verify, cash seems to be the preferred means of payment for Tech acquisitions, with 65% of all deals being settled this way. While GAFAM companies acquired 21% of their targets for stock and 18% through a combination of cash and stock, Non-Tech buyers displayed a stronger preference for cash, with 76% of their acquisitions settled in cash and only 7% of all deals paid in shares.

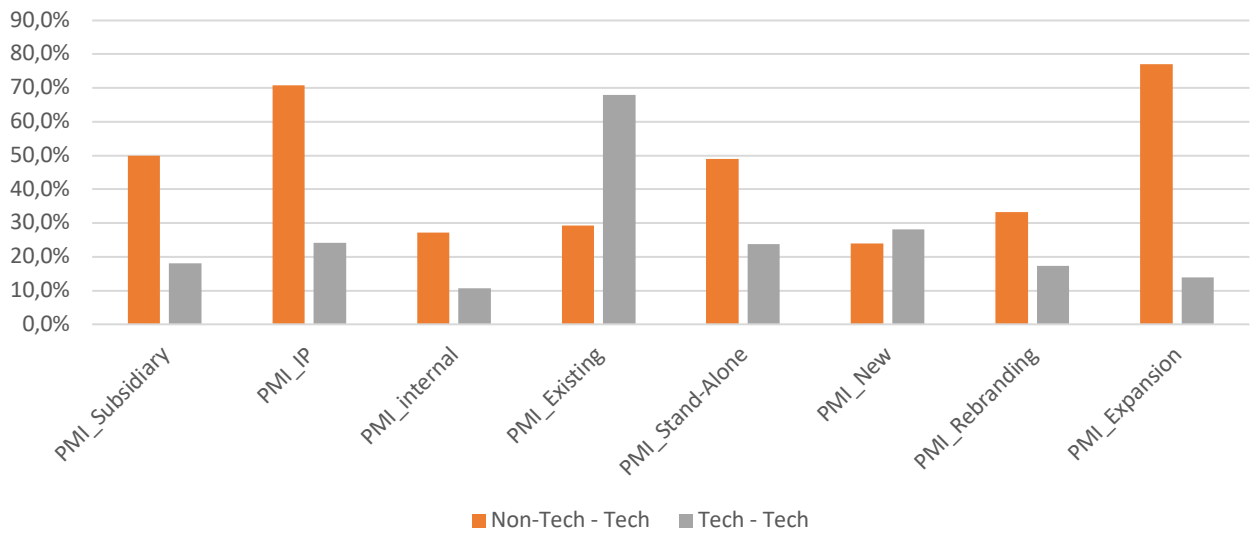
Overall, we observed that Stock was only used for US and Canadian targets. Mixed offers were made in a few countries (China, Denmark, Germany, Israel and the UK) while Cash was the exclusive means of transaction elsewhere.

Our conclusion is that cash was preferred in cases where geographical and industrial proximity were limited. This was especially true when the bidder was a Non-Tech company. It is not clear whether the choice was dictated by the targets' preferences or by the buyer, but we suspect that Tech companies being bought by bidders with limited to no experience with Technology may have been more reluctant to accept stock as compensation, afraid of PMI implementation. We tested this hypothesis for both GAFAM and Non-Tech acquirers, but the results were puzzling and the adjusted R^2 of the models quite poor, as shown in *Appendix J*.

Post-Merger Integration

Taking a closer look at post-merger integration, we can see some clear differences between Non-Tech and GAFAM bidders, which are representative of the differences in the bidders' strategies and needs.

Figure 14. PMI Distribution



First of all, we notice that within our sample the acquired target is more likely to maintain a distinct subsidiary or division status post-acquisition if the bidder is Non-Tech (50% versus 18.1% of deals). This ties in to the differences in both the abilities of the bidders to absorb an acquired company – where Tech bidders are more likely to have the structure to absorb other Tech companies than Non-Tech bidders – and the needs of the two types of acquirers. This difference is also reflected in the proportion of the subsidiaries' products which are kept on the market as stand-alone solutions (something we recorded in our *PMI_StandAlone* variable).

Conversely, GAFAM tend to acquire companies in order to improve their own products: 68% of their targets' technologies and teams were integrated into existing products, against just 29% of the companies bought by Non-Tech bidders.

We also observed that Non-Tech companies were more likely to rebrand their targets' products when they remained independent. Our definition of rebranding encompasses cases in which the name of the bidder is added to the one of the target (as in the case of *Honest Dollar by Goldman Sachs* or *servicemax from GE Digital*) as well as cases in which the product's original name was dropped in favour of a new one, which often implied a demotion from full-fledged product to simple feature (e.g. *SmartSignal* becoming a feature of *GE's Asset Performance Management solutions on the Predix platform).*

Finally, we tracked whether Tech acquisitions were used to enter new markets or not. Our definition of market expansion encompassed new geographies, new channels and new verticals. *Amazon* provides plenty of examples about the first kind of expansion, having used acquisitions to enter many of its non-US markets: *Telebuch.de*, *Bookpages.co.uk* and *Joyo.com* allowed it to enter Germany, the UK and China, and were later rebranded as *Amazon.de*, *Amazon.co.uk* and *Amazon.cn*. More recently, the company acquired *Souq.com* to enter the Middle East. *Souq* has been held as an independent entity so far, but Amazon's track record suggests that further integration could be ahead.

Non-Tech companies were more likely to expand in the second direction we tracked, using acquisitions to gain online presence. This has been the case for *Walmart* – which acquired *Jet.com*, *Bonobos* and a few other e-commerce websites - as well as for *Richemont*, the luxury conglomerate that recently announced its consolidation of *Yoox-Net-à-Porter*.

The third type of expansion offered even more variety: it included buyers that explored new business models – such as *Daimler* investing in ridesharing platforms like *MyTaxi* and *Cahauffeur Privé* – as well as new customer segments – such as *Goldman Sachs* acquiring *Clarity Money* and *Final* to develop its B2C business – and new verticals – as in the case of *Target* purchasing *Cooking.com* and *DermStore.com* to expand the range of product categories it offers online.

Overall, 77% of all deals made by Non-Tech companies involved some form of expansion, as opposed to a mere 14% of GAFAM acquisitions. This highlights the need for Non-Tech companies to keep up with technological advancements and adapt their specific businesses to their customers' new needs and increased expectations, capitalizing on opportunities while defending themselves from new competitors. In this context, GAFAM companies are "digital natives" and enjoy an inherent advantage, so their need to rely on acquisitions to expand across channels is more limited.

Evolution over Time

Just from looking at the press, Tech funding rounds and exit amounts seem to be getting larger and larger, but we wanted to test whether these trends were reflected in our data.

Indeed, we found positive trends for both funding and exit prices over time. Part of it is certainly due to inflation, but technological development, increased liquidity in private markets and increased competition from PE funds and non-Tech investors (2016 was the first year in which Non-Tech companies made more acquisitions than Tech companies (Ledbetter & Sacks, 2017)) are very likely to have played a role, too.

Figure 15. Average Deal Prices Per Year, Tech Vs Non-Tech (amounts in USD)

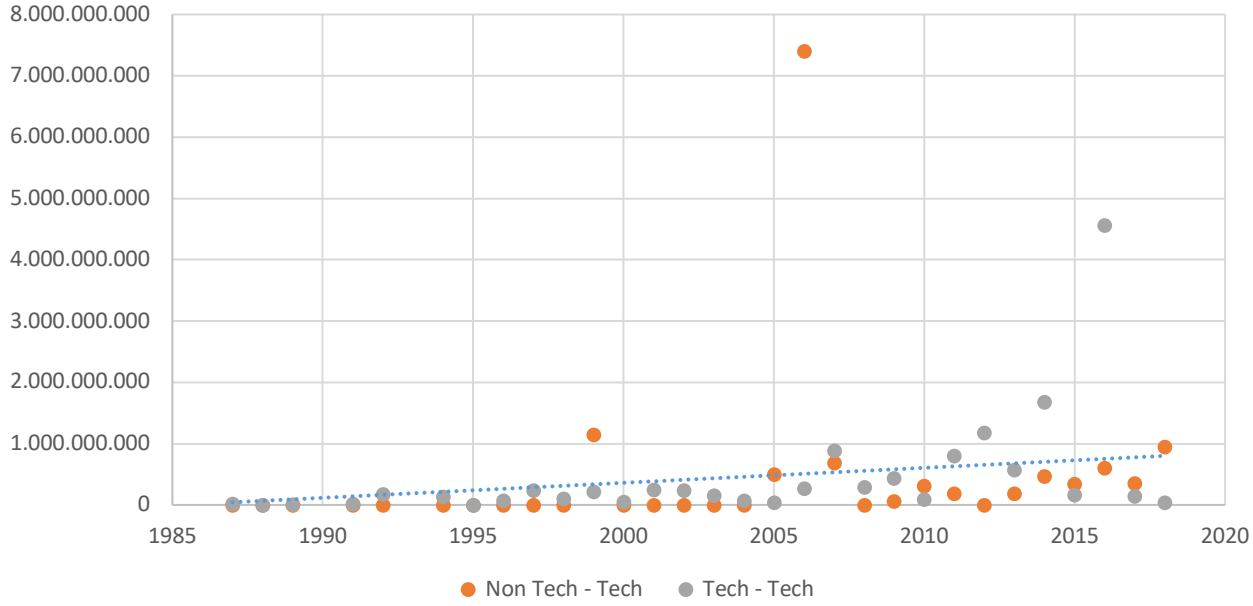
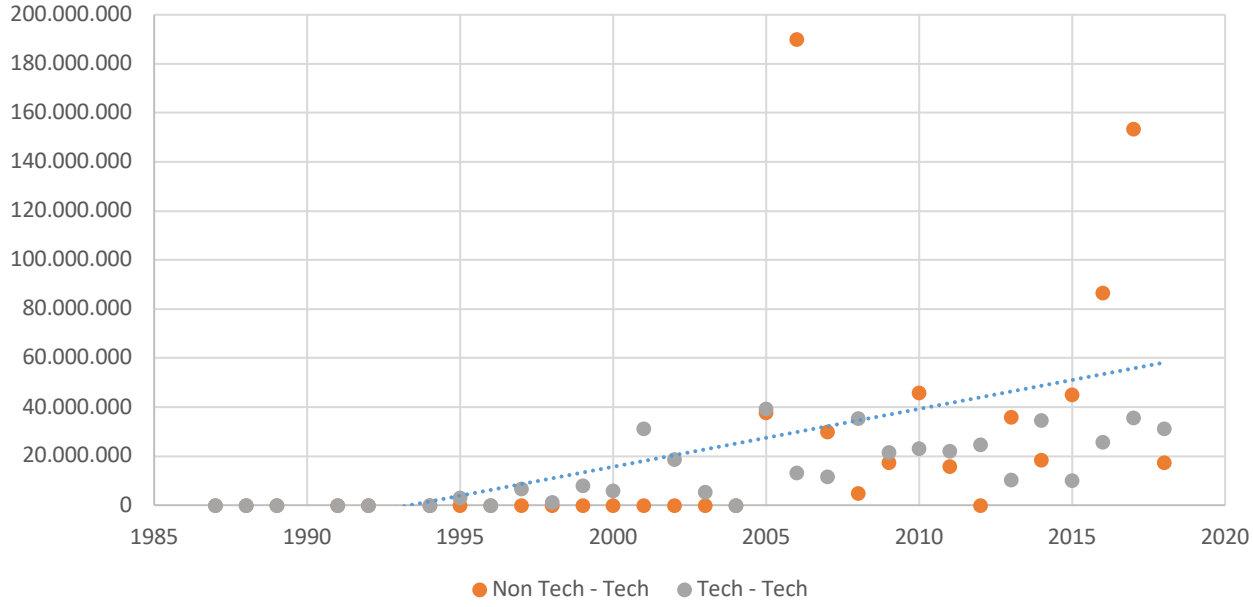


Figure 16. Average Funding of Targets Each Year, Tech vs Non-Tech (amounts in USD)



Plotting our PMI indicators over time, we noticed an interesting evolution in the drivers behind acquisitions. While the proportion of deals made to integrate and reinforce existing products has increased over time, the proportion of acquisitions that contribute to the development of entirely new products has grown only for Non-Tech bidders, while it has been declining for GAFAM. Because our PMI indicators only track the way in which the acquired assets were used ex-post, an alternative hypothesis is that the original strategies of the two types of companies have not changed, but their ability to implement them has deteriorated. We find this hypothesis unlikely, but we recognize the limits of the variables we tracked, which do not capture the original intentions of buyers, but only their outcomes.

Figure 17. Evolution of Acquisitions Resulting in Existing Product Improvement

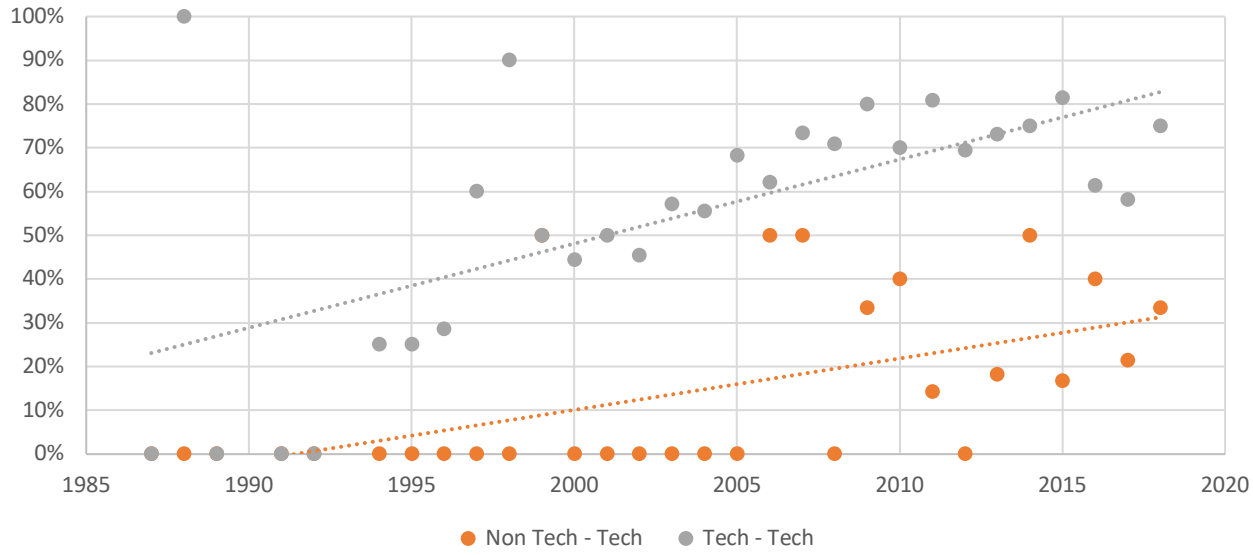
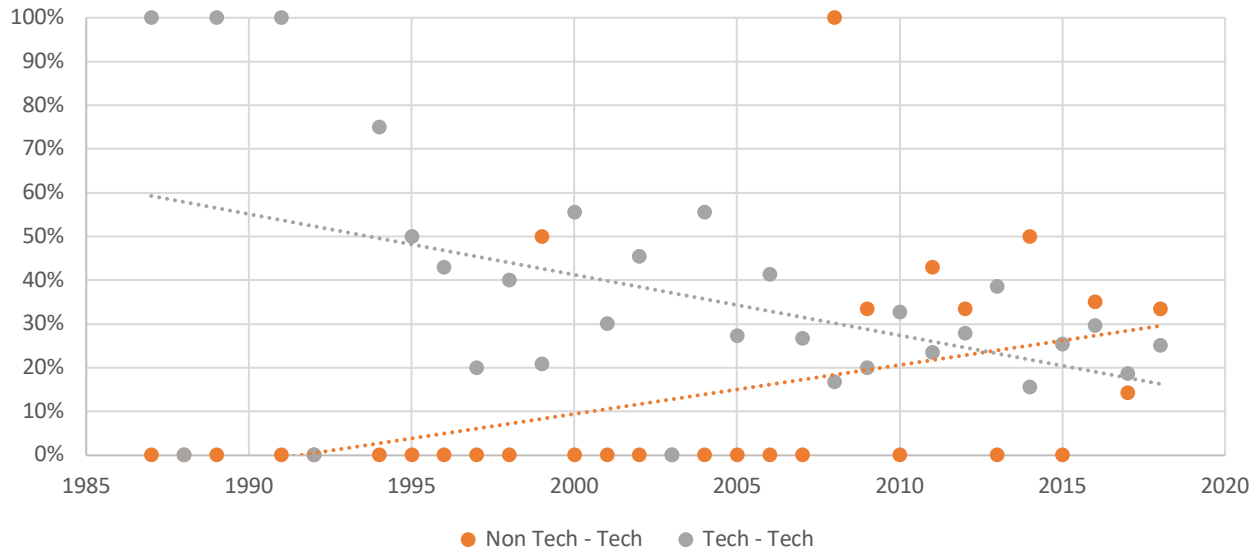


Figure 18. Evolution of Acquisitions Contributing to the Development of New Products



Further analysis would be needed to investigate the reasons behind this decline over time, which may hint at a shift towards internal R&D and may not be homogeneous across GAFAM companies.

Success Analysis

The information outlined in the previous sections provides context for our analysis of the relative success of Tech acquisitions carried out by GAFAM and Non-Tech companies.

As anticipated, the abundance of dimensions, the lack of publicly available information and the sheer diversity of possible scenarios make it hard to develop a one-size-fits-all measure of success. For example, in order to assess whether targets were overpaid or not – a factor that a rigorous approach could not ignore – knowledge about the opportunity cost of internal development would be required every time the external acquisition option was favoured. Precise information about the extra profit attributable to the acquisitions would also be necessary, but companies report financial data in aggregated form, at best breaking it down by division.

Especially when the target teams are small, acquisitions can often be compared to the purchase of an option to develop a given technology, and purchasing a small target to explore an obscure technology on the frontier of innovation could be cheaper than developing the equivalent capabilities in-house. However, the associated costs are hard to estimate from the outside.

Even if this type of data were available, we would further need to know the strategic driver behind each deal and compare it to the actual outcome. Business development, sales growth and talent acquisition are often regarded as the main goals of this type of M&A, but other rational objectives are possible: successful incumbents may want to purchase and shut down younger, more innovative competitors when they challenge their current margins (e.g. *Amazon* buying *Quidsi.com*); or they might purchase a given company only to prevent a competitor from acquiring its technology or talent. These are only two of many possible situations in which a deal could be regarded as successful from a strategic and overall economic point of view, even if no immediate benefit could be identified.

Such cases do exist, but they are rare and almost impossible to identify for an outsider. We therefore based our definition of success on Post Merger Integration indicators, recognizing that these do not constitute an exhaustive set of parameters to gauge success but rather an efficient compromise. Our definition is rather lenient and gives the benefit of the doubt to many acquisitions. Two factors led us to mark a particular deal as a failure: Divestiture and lack of PMI.

- The starting point for our analysis was that both GAFAM and Non-Tech companies in general are not Private Equity funds: they acquire companies in order to keep them and grow their own business. Because they mostly generate value directly through sales – as opposed to capital gains – the main driver behind their acquisitions is business development, which can take many shapes (we excluded PE-like deals for those companies that have separate Corporate Venture Capital or Private Equity arms). Technology acquisitions can also result in long term savings but these come in the form of economies of scale – which require a growing business – rather than cost synergies. In other terms, the introduction of technology through acquisitions is not likely to generate value by reducing the total cost base of the combined entity as it stands, but rather by making it scalable, allowing companies to grow their revenues faster than their costs.
  Within the sample we observed, divestiture happened when a fit could not be found between the buyer and the target company. While this could happen because the strategy of the buyer changed in response to external factors, we found that in most cases the sale of an acquired subsidiary reflected the inability of the buyer to execute its existing plans. The causes could be lack of a coherent strategy, underestimation of needed PMI efforts, management shortcomings or a mix of the three.

In other cases, the bidder was unable to integrate its target but preferred shutting it down completely rather than selling it.
We classified both cases as "divestiture", and even though we coded them differently, we gave all divestitures the same weight in our assessment of the deal.

- Business development may be carried out in a variety of ways: the creation of new products or services, the amelioration of existing ones, the opening of a new distribution channel or the entry in a new market are only some of the possible examples. In assessing how buyers handled Post-Merger Integration, we looked at whether their acquisitions led to:
    - The acquired team staying on board the combined organization
    - Intellectual Property (Patents, Licences, Exclusive rights etc) being transferred to the parent organization
    - Improvements in the way the bidder operates internally (e.g. *Kiva* revolutionizing the way *Amazon* handles inventories, without customers observing any change)
    - Improvements of an existing product
    - The survival of the acquired company's products as stand-alone solutions for customers
    - The development of new products
    - An expansion into a new market, channel or vertical

We marked a deal as successful when the acquired company was not divested and at least one of the seven PMI indicators described above was satisfied. Acquisitions that were followed by a divestiture or in which none of these PMI indicators was observed were deemed unsuccessful.

Having defined the context and our criteria for success, we can now address our main research question:

Are GAFAM more successful than Non-Tech companies when acquiring Technology targets?

Looking at our sample of 729 deals, we found that 96.52% of GAFAM acquisitions were successful, while only 85.70% of Non-Tech acquisitions had a favourable outcome. Differences existed within both groups but – based on our data – Non-Tech firms performed worse on average (see *Appendix K* for complete *Success* variable statistics).

Even though this first result seemed to provide an answer to our research question, we ran further checks to assess its robustness. In fact, considering the relatively small size of our Non-Tech database, we could not conclude that Non-Tech firms are less successful *in general* simply based on the proportion of failures observed in the sample. It could well be the case that the correlation between a firm's status as GAFAM and the factors that define success was spurious, or that important variables were omitted. We therefore ran multiple regression analyses on our combined databases to test other possible factors that could predict the success of a deal.

The first test was a regression of the *Success* variable on the price of a deal: since we observed that Non-Tech companies tend to buy larger firms, we wondered if more expensive deals were negatively correlated with success. The test was not significant: the coefficient we found was approximately 0 and its p-value was 6.64%, based on the 273 deals for which we had been able to collect acquisition prices. See *Appendix L* for complete regression outputs.

A second regression of *Success* on total *Target Funding* also returned a non-significant result, with a p-value above 60%, as shown in *Appendix M*.

Next, we proceeded with a more ambitious test. Our definition of success is purely theoretical and considers seven Post-Merger Integration indicators which we deemed essential for a successful deal, but we had collected 12 PMI variables in total. We therefore regressed the *Success* variable on all 12 variables and on the *Divestiture* variable in order to test their relative significance in determining a favourable outcome, as well as the solidity of our definition as a whole. We were aware that regressing a function on the variables that define it (among other factors) would be statistically redundant, but we noticed that, in general, the individual PMI variables were not conceptually interdependent. Additionally, our definition of success looks at PMI variables as a whole – marking a deal as unsuccessful when none of them is positive – while this regression would look at the contribution of the individual variables. Our reasoning was that the logical independence of most PMI variables should minimize any risk of multicollinearity, while the addition of extra PMI factors would provide more room for the model to identify statistically significant factors that would co-exist with the *Divestiture* variable.

Excluding all deals for which we did not have a complete set of regressors, we ran our analysis on 494 acquisitions, summarized in *Appendix N*.

The resulting model had an adjusted R^2 of 60.00%. We were surprised to observe that – at least in this model – neither *CEO* nor *Team* retention played a statistically significant role in predicting success. Furthermore, the integration of acquired targets into existing or new products was also statistically not-significant: all four variables had p-values above 50%. The use of acquisitions to explore new channels (*Expansion)* had a p-value of 7.33% and also had to be discarded as an explanatory variable.

On the contrary, IP transfer and the use of acquisitions for internal improvement were confirmed to be statistically significant and to each increase the likelihood of success by 3.98% and 4.8% respectively. The percentage computation was enabled by our use of 0-1 dummy variables for both the dependent and the independent variables. The preservation of the target's products as stand-alone was also confirmed to be statistically significant and to have a negative effect on the deal, suggesting a 10.65% decrease in its likelihood of success. This makes intuitive sense as it signals that integration is limited and, more importantly, that the acquired product could practically be spun off.

As we suspected, the divestiture variable was confirmed to be the single most important factor for our analysis: it was statistically significant, negative and large (coefficient of -28.12%).

Four PMI factors we had not considered in our definition of success resulted to be statistically significant too: moving the target's employees to the buyer's headquarter resulted in 5.82% higher chances of success and rebranding the target's products also suggested an average 3.44% improvement in the prospects of the deal. Conversely, the survival of a target's website had a negative impact on the success of a deal (-5.97%), and the same effect was produced when the target was maintained as a distinguishable subsidiary (-6.73%).

Table 3. Summary of Significant Initial Regression Coefficients

VARIABLE	COEFFICIENT	P-VALUE
PMI_MoveHQ	0.05815	0.00%
PMI_Web	-0.05968	0.00%
PMI_Subsidiary	-0.06729	0.00%
PMI_IP	0.03980	0.13%
PMI_Internal	0.04804	1.23%
PMI_StandAlone	-0.10649	0.00%
PMI_Rebranding	0.03442	3.70%
Divestiture	-0.28125	0.00%

The two main takeaways from this test were the relative weight of *Divestiture* in predicting success and the strong R^2 of the model. A more careful analysis revealed their strong interdependence: we looked at all of the unsuccessful deals one by one and noticed that divestiture was the event triggering this classification in 100% of the cases. Some deals had very few positive PMI indicators, but they all had at least one. Put differently, the set of unsuccessful deals coincided precisely with the set of deals resulting in divestiture.

Two issues therefore needed to be addressed: the role of the technological connotation of the buyer (GAFAM or traditional company) on one side, and the relationship between Post Merger Integration and Divestiture on the other.

We proceeded step by step, addressing the former issue first. We coded GAFAM deals as 1 and Non-Tech deals as 0 and added this dummy variable to the previous model. The results were interesting: the newly-created Tech/Non-Tech variable predicted a positive 4.12% improvement in the likelihood of success of the deals, with a p-value of 4.53% which made it statistically significant.

The other factors remained largely unchanged, except for the *Rebranding* variable – whose significance deteriorated (p-value of 5.58%), and the *Expansion* variable – which remained positive (4.28%) and became significant. The details are available in *Appendix O*.

Next, we turned to the role of divestitures. We had developed our definition of success on purely theoretical grounds and did not anticipate one factor to prevail on all others to such a great extent. Having discovered that unsuccess and divestiture were effectively synonymous within our sample, updating the specifications of our regression was necessary: if lack of divestiture and success were effectively the same concept, then regressing one on the other was not useful and only inflated the explanatory power of our model. We should therefore remove the divestiture factor from our set of regressors and identify those PMI variables that had a statistically significant impact on the success of a deal and were relevant when divestiture did not happen. Regressing *Success* on PMI variables was conceptually symmetrical to regressing the *Divestiture* variable on them.

The results were surprising: the adjusted R^2 of the resulting model deteriorated to just 8.29%, CEO retention became a significant variable with a positive – albeit very small – influence on *Success*, and three other variables that had previously appeared to be valid became statistically non-significant: the structuring of the acquired entity as a separate division, the use of technology acquisitions to improve the internal operations of the acquirer and the transfer of intellectual property. A summary of this regression is shown in *Appendix P* .

As a final step, we reiterated the previous regression removing non-significant variables one by one and reassessing the validity of the resulting model at every step. With the exception of the PMI variable that tracks the survival of the acquired targets' websites – whose p-value rose above 5% when the Subsidiary PMI factor was removed – all other significant variables remained as such, confirming the limited multicollinearity across PMI variables.

The final model, shown in Appendix Q, had an R^2 of 8.03% and five significant variables. The preservation of the acquired company's products as stand-alone offers decreased the likelihood of success of a deal by 7.4%; relocating the target's workforce to the buyer's headquarters increased the prospects of success of acquisitions by 5.89%, and deals that aimed at expanding into new channels enjoyed an extra 6.4% chances of success. CEO retention improved the outlook of acquisitions too[5]. Crucially, the technological nature of the buyer – GAFAM or Non-Tech – improved the chances of success of deals by 8.48%.

Table 4. Summary of Significant Regression Coefficients in Our Final Model

VARIABLE	COEFFICIENT	P-VALUE
GAFAM/Non-Tech Bidder	0.08485	0.47%
PMI_CEO	0.00007	0.02%
PMI_MoveHQ	0.05896	0.46%
PMI_StandAlone	(0.07403)	0.07%
PMI_Expansion	0.06405	0.95%

Our conclusion is cautious: the data suggests that GAFAM companies might enjoy a small advantage over Non-Tech companies. This advantage is statistically significant and relatively strong when compared to other variables, but it is only one of many factors that influence the overall success of Tech deals. Our model identifies four others, and its low adjusted R^2 clearly indicates that many more hidden variables are at play.

This suggests that Non-Tech companies stand a solid chance of successfully acquiring Tech companies, provided they pay close attention to some key aspects of Post-Merger Integration, with a multi-year plan that prevents the need to divest. In other terms, both GAFAM and Non-Tech companies should make sure that any Tech acquisition is part of a long-term strategy and, equally as important, that they have the practical ability to implement it, i.e. to integrate their targets into the larger organization that is expected to deliver on this strategy.

We suspect that the same conclusions will hold regardless of the nature of the prospective target. However, given the inherent complexity of modern technologies, these concerns are all the more important when Tech targets are approached.

[5] As explained in Appendix B , we adopted a hybrid approach for the classification of CEO tenure: the variable captures how many years CEOs spent at the buyer company post-acquisition, but it uses the code 1000 to identify cases in which the CEO never left the company. When this is the case, the variable suggests a 7% improvement in the likelihood of success of Tech acquisitions, while the impact is negligible for cases in which the CEO left. The validity of this variable is limited because it assigns the same value to the tenure of CEOs who have been with the buyer for decades and those whose companies have only recently been acquired.

SECTION 6 – ARE GAFAM BETTER TECH ACQUIRERS THAN COMPANIES IN TRADITIONAL SECTORS?

In the previous section, we arrived at the conclusion that GAFAM do enjoy a statistically significant advantage over Non-Tech companies when acquiring Technology targets, although this advantage is limited. The proportion of successful technology deals is higher in our GAFAM sample than in the Non-Tech one, and our data-driven analysis suggests that this advantage does depend on the technological nature of the acquiring company, at least to some extent.

This conclusion strongly depends on the methodology we adopted and is the product of a double generalization. First of all, we provided our own definition of success and faced trade-offs between models with a higher overall explanatory power and models with fewer but more significant variables. As the variable that distinguishes GAFAM and traditional companies became more significant, the overall model became weaker.

Secondly, acquisition performance was not homogeneous within the GAFAM group, and even less so within the Non-Tech sample we built, which spans very different industries with different exposure to technology. For example, while all GAFAM are broadly successful based on our definition, their success rates range from *Amazon's* 94% to *Facebook's* 100%. And while the size of our Non-Tech sample is limited and does not allow for very granular analyses, we can say that the acquisitions made by Automotive companies were more successful than the ones made by Retailers (for all *Success* rates per Bidder, see *Appendix K*).

With these warnings in mind, we can argue that – all else equal – the chances of success of a GAFAM approaching a Tech target would only be marginally higher than those of a traditional company attempting a similar acquisition. While GAFAM do tend to have a better understanding of the technical value of their targets, this does not automatically translate into more successful acquisitions, at least not according to the definition of success which we have put forward in this paper. In other terms, the relationship of causality between the nature of a company (GAFAM or Non-Tech) and the outcome of a Tech acquisition is statistically significant but very limited.

Many other variables are responsible for the success of Tech acquisitions. By combining our quantitative and qualitative analyses, we have identified four such pillars, which are illustrated below.

Strategic Fit

Needless to say, none of the successful acquisitions we observed was improvised. For both GAFAM and Non-Tech companies, lack of a cohesive long-term strategy undermined the prospects of any technology acquisition from the start. Deals that were made with no clear intentions – like "catch-up" acquisitions – were destined to fail, with the acquired entity being either sold off or shut down and no technology transfer taking place. Such cases were observed in both samples (e.g *Microsoft's* purchase of *Nokia mobile unit* and *Hudson Bay's* acquisition of *Gilt Europe*).

Crucially, technology acquisitions do not necessarily need to fit a firm's current strategy: some of the most successful deals allowed the buyer to expand in new directions and acquire entirely new capabilities, as confirmed by the significance of our *PMI_Expansion* variable. What is essential is the existence of a roadmap – no matter how long – that successfully positions the acquisition target in a productive context. Among GAFAM, Apple is probably the company with the longest and clearest (ex post) roadmaps, while *Microsoft* has historically been less clear about its plans. To some extent, *Google* has also been applying its moonshot strategy to acquisitions as well as internal projects, sometimes betting on individual technologies with no explicit connection to its core business and

no ex-ante clear position within its ecosystem. This dispersive approach has been compensated by adherence to a set of principles that implicitly embody the core values of the company and ensure that no totally incompatible acquisition is made. *Facebook* and *Amazon* have been more focused.

Among Non-Tech companies, the financial sector has been more driven than the media industry as a whole. In general, banks and financial institutions seem to have been able to better identify technological opportunities, while media companies have been more naïve on average, sometimes chasing trends without understanding their drivers or long-term implications – and therefore without being able to ride them as planned. *The New York Times'* acquisition of *About.com* is a clear example of a media company misunderstanding the way a new technology fitted and affected its business. Instead of looking at the internet as a new channel to sell subscriptions, the *NYT* initially understood it as an ads business exclusively dominated by search engines. As content farms gained popularity, the *Times* could not see any other internet-based business model and decided to acquire one without having a clear plan (or understanding) of how a clickbait-based digital model would fit with the overall strategy of a reliable institution trusted by millions of subscribers. As content farms lost their popularity, the *NYT* realized it did not have a digital strategy and took years to develop one (subscription-based): had it spent more time pondering the strategic fit of *About.com*, it would have saved hundreds of millions of dollars and years of missed online revenues.

Post-Merger Integration

PMI is often quoted as the #1 cause of failure for mergers and acquisitions, and Tech deals are no exception. Given the specificity of most technologies, however, PMI acquires a subtler meaning in these types of deals: especially in mergers involving Non-Tech players, the integration of technological targets has to be understood on a strategic level first, and only secondarily in terms of structural integration. In other terms, the first step following an acquisition is to make sure that the acquired company and its products are aligned with the long-term strategy of the acquirer. While the first point we made about strategic fit applies to the planning phase of Tech M&A and to its theoretical potential, this point is about the actual, practical integration of the two businesses following an acquisition.

The clearest illustration of this principle comes from the analysis of *Amazon's* acquisition of *Zappos*. Nine years after the deal, *Zappos* still operates as an independent company, its website shows no connection to the parent company (except for a brief mention in its *about* section) and customers can still have separate account identities on the two websites. And yet, the two companies' cultures are perfectly aligned, their guiding principles overlap and even as their management styles differ they both bring forward the same vision of customer-centric service.

When Non-Tech buyers are involved, strategic overlap with targets is likely to be more limited: the potential strategic fit (pillar #1) of smaller Tech companies may be excellent, but their current strategies may diverge and need aligning even before these companies are integrated in the buyer's structure. When *Under Armour* purchased health tracking app *My Fitness Pal* in 2015, it did not prioritize the formal integration of the team behind the app within its structure. On the contrary, it kept the product as largely independent, but it made sure to tweak its website to position it within the broader context of *Under Armour's* portfolio of performance-tracking apps which included *MapMyFitness*. It also added links to its apparel website.

Our model suggests that moving the acquired teams to the buyer's headquarters has a positive effect on the prospects of success of a Tech deal, but we must bear in mind that this is only true on average. Especially for Non-Tech acquirers, granting formal independence and leeway to Tech

targets can be good for the long-term success of the products being developed. Even among Tech acquirers, *Facebook* and *Google* are recognized for the relative freedom they grant to their targets, which often even comes with extra resources. On the contrary, in the past *Microsoft* developed a negative reputation for its inability to preserve the culture of its targets with a stifling management and integration process. This was the case, for example, with the first game studios that the company acquired. What cannot wait is the strategic alignment of the two entities.

Long-Term Commitment and Talent Appreciation

Technology workers are "special" in the sense that they operate at the forefront of innovation. Over the past few decades, their relative scarcity has given them significant leverage, allowing the best engineers and technologists to move relatively easily to the most promising companies – be them start-ups or mature companies.

Talent retention is therefore one of the most important factors required for a successful Tech deal. When the buyer is another technology company, smaller acquisitions often come in the form of acqui-hires, with the target being purchased for its talent rather than for the products it develops. The existence of patents and hard assets gives most companies some intrinsic value; however, the success of technology deals stems from the application of the target's technology to the buyer's business, and human capital is essential in ensuring that technology is successfully transferred and adapted to the buyer's systems. Furthermore, the value of Tech firms often rests in their innovative potential for the future more than in their current products. While patents protect existing IP, the engine of value creation is obviously represented by human talent.

On this specific point, Tech acquirers seem to enjoy a more favourable position because their technical nature makes their future plans more credible in the eyes of the target's workforce.

What really makes a difference, however, is the acquirer's commitment to its strategic plans. Even when strategic fit is proven and post-merger integration is underway, it is essential that the acquiring entity sticks to a well-defined roadmap and makes sure the acquired talent is involved.

Our model dismisses the role of the acquired teams and only recognizes CEO retention as a significant variable in driving acquisition success, but this statistical result hides important differences between Tech and Non-Tech buyers.

For Non-Tech buyers, the need to protect and nurture talent results in a forced trade-off between structural integration of the target in the short term and long-term success of the acquisition: given the markedly different nature (and maturity) of buyer and target, it may be necessary for the acquirer to proceed slowly with the integration of the target, in order to give it the time to perfect its product and adapt it to the broader strategy of the parent company. *Walmart* is one of the Non-Tech companies that have been giving the most independence and resources to its targets, taking as much time as needed in the process and postponing formal integration. As of today, both *Jet.com* and *Bonobos* operate as independent entities while receiving funds from the giant.

Iteration – Practice makes perfect

Regardless of the nature of the acquiring company and its pre-acquisition level of technology, we have found that the odds of successfully acquiring a Tech company increase with the number of similar companies that the acquirer purchased before.

Amazon is a good example: having acquired multiple companies in certain domains (e-commerce and cyber security, for example) it is now able to integrate similar companies much more safely and quickly than in its early days, to the point that the third pillar (talent retention) plays a more limited role in making these acquisitions successful. This does not mean that human talent becomes irrelevant; however, as a company acquires more and more similar targets over time, it develops sufficient internal resources and retains sufficient talent to make up for occasional departures or lower talent retention rates.

Among Non-Tech companies, *American Express* and *Mastercard* have acquired several fraud-prevention Tech firms developing specific integration skills in this domain.

In line with previous research of Puranam and Srikanth (2007), more experienced acquirers may be able to better mitigate possible adverse effects post-acquisitions. We can also see that some may outright prevent them by not pursuing a deal that is likely to not be successful, based on past acquisition experience. An example would be *Microsoft* walking away from a potential acquisition of *Slack*, after making a few communication-related acquisitions in the past.

Our analysis indicates that the relative exposure to these four factors is responsible for the outcome of Tech M&A.

Intuitively, one might assume that technology companies should enjoy a strong relative advantage against Non-Tech competitors when bidding for a given Tech target. However, our analysis suggests that such an advantage might be smaller than expected.

Regardless of the level of technical development of the buyer, strategic fit, PMI, long-term commitment and iteration are the factors that predict the success of Tech deals: the potential of Tech targets is not quantifiable in absolute terms, because it depends on the combination of its technologies with the business of the buyer. What makes a difference is the size of the opportunities unlocked by the application of a given technology to the domain of the buyer.

While the second and third pillars might seem to give the upper hand to GAFAM, traditional companies can compensate for their limited experience in Tech with more financial resources and a longer timeframe for the integration of their targets. This is the game that Walmart seems to be playing, keeping its e-commerce division and incubator separate from the traditional retail business, and providing long-term funding.

That said, some founders and teams do not respond to financial incentives as predicted by traditional economic theory, and are more concerned with the prestige of their acquirer and with the "meaningfulness" of their jobs in the post-acquisition context: being able to keep innovating and experimenting might be more appealing than adapting existing technologies to less-advanced businesses and being forced to find ways to monetize them. In these cases, Tech buyers enjoy a theoretical advantage as exemplified by *Keyhole*, the mapping company which favoured *Google* over a private equity fund because they thought they could do more good for the world by offering a free product under the search giant.

However, buyers in traditional sectors are unlikely to find themselves competing with Tech companies over extremely innovative, game changing technologies: more often than not, the targets that fit their needs the best are not the most revolutionary but rather the safest promises. This concept is the clearest illustration of our first pillar: very few of the companies that were acquired by GAFAM would have made good targets for Non-Tech companies. The reason is that very few of them had a finite product or a technology that would have benefitted traditional companies.

More often than not, they developed software or component which became features of the products commercialized by GAFAM but would have found no application in other businesses.

The same conclusion holds for the companies purchased by Non-Tech firms: while integration into one of the GAFAM may have been technically feasible, the lack of a clear strategic rationale would have resulted in unsuccessful acquisitions. Things may change in the future, as GAFAM expand into more and more aspects of consumers' lives (e.g. in entertainment, retail, banking etc), but for the moment competition between Tech and Non-Tech bidders has been limited.

A final consideration should be made about the relative ability of Tech and Non-Tech companies to source promising deals. Tech companies certainly possess more technical knowledge and are better able to run due diligence and assess the intrinsic value of early stage ventures. They are also more likely to discover good targets in their infancy, before their Non-Tech competitors. These considerations would be irrelevant to our question about the relative success of acquisitions if it was not for the fact that Non-Tech companies might run the risk of finding themselves in a "lemon market" scenario and of falling victim to the winner's curse. These concerns are widely exaggerated, because the potential for Tech companies to be good acquisition targets is unlikely to be clear in their early stages, especially when the would-be acquirer is not a Tech company. Some of the companies that were acquired by GAFAM may have had a chance to remain independent and one day reach a stage of development that might make them attractive to Non-Tech buyers as well. At the time these early-stage companies were bought, however, firms in traditional sectors would have been unable to integrate and exploit them. And without the support of GAFAM, some of these start-ups might not have survived.

Again, strategic intent and long-term commitment are decisive factors for successful acquisitions, and they are unlikely to be verifiable for traditional firms before a Tech target has at least a minimum viable product – or better, some initial commercial application.

SECTION 7 – SUMMARY AND CONCLUSIONS

We started out with the goal of assessing the relative success of *Google*, *Amazon*, *Facebook*, *Apple* and *Microsoft* (GAFAM) on one side, and traditional Non-Tech firms on the other side, when acquiring Technology companies. To this end, we needed to develop a number of operative definitions of what makes a Technology firm and what constitutes success, as well as a research framework to make our assessment as rigorous as possible. We identified and classified all Tech acquisitions made by GAFAM up to the end of 2017, as well as a diverse set of similar deals made by traditional, Non-Tech companies.

We took advantage of this large dataset to identify a number of trends and patterns that characterize the two groups of acquisitions and may help us predict how GAFAM and traditional companies interested in Technology targets will behave in the future. We showed that the Tech companies acquired by firms in traditional sectors tend to be older and to have raised more capital, and on average are more expensive than the ones acquired by GAFAM. We also identified a gradual decrease in the proportion of GAFAM acquisitions aimed at developing entirely new products, a trend which is reversed if we look at Tech acquisitions made by traditional companies.

We analysed and compared the two samples extensively from both quantitative and qualitative perspectives, and found only a small relative advantage in favour of GAFAM. Such ostensible edge was statistically significant based on the specifications of our model. However, the overall explanatory power of this model was limited, suggesting the existence of a much broader range of factors ultimately determining the success of a Tech deal. Combining these findings with our empirical analyses of the two samples, we identified strategic fit, post-merger integration, long-term commitment and iteration as the four key drivers behind successful Tech acquisitions, regardless of the nature of the buyer – be it a GAFAM or a Non-Tech company. These four success factors are crucial for any type of M&A deal but acquire an extra dimension when the target is a Tech firm, in particular with regards to the management of technical talent.

Our conclusion is that managers of traditional firms should not feel at a disadvantage when approaching Technology targets, as long as they have a clear understanding of the level of commitment required to integrate them into their companies' broader structures and strategies. Conversely, GAFAM should not underestimate M&A competition coming from Non-Tech firms. While GAFAM may be in the best position to acquire specialized Technology firms that fit well with or represent natural extensions of their core businesses, they should be conscious of the mounting interest of traditional firms in Technology targets. As *Google*, *Amazon*, *Facebook*, *Apple* and *Microsoft* expand their business and bring technology to traditional industries, and as cash-rich traditional companies digitalize and look for ways to improve and grow their operations through technology, competition in Tech M&A is only going to intensify.

Our research was ambitious, but it has limitations. To start with, in defining what a "Technology company" is we faced a trade-off between precision and generalization. A more detailed description would have made it easier to recognize today's Tech companies and clearly distinguish them from traditional players. At the same time, more precision would have made our analyses immediately obsolete, because the technology space is constantly evolving. We opted for a more general definition, which we believe would have been applicable a century ago and that we hope will remain valid in the future, but we are aware of the ambiguity that this choice introduced from the start.

A similar argument could be made for our definition of success, which introduces a clear limitation to our work: in the absence of any internal information, we had to rely exclusively on parameters observable from the outside. We did our best to justify the choice of variables which we used to

measure M&A success, but it is possible that our interpretation of the rationale behind some of the deals was mistaken, resulting in partial mis-classification and in distorted conclusions. Deals which we considered successful may in fact have been a disappointment for the companies closing them, and deals which we marked as unsuccessful may have provided more value to the acquirers than we were able to capture.

More generally, our reliance on publicly available data meant that we were unable to collect all the variables we would have needed in order to have a full picture of each single deal. Information about funding, headcount, post-merger integration and even core activity was sometimes impossible to find.

Another critical aspect of our research is the composition of the sample of traditional companies acquiring Technology targets. We based it on the sectors that have been most significantly exposed to technological innovation in recent years, and within them we focused on the most active acquirers. This approach has at least two potential drawbacks: it ignores the performance of those companies which made few acquisitions and it does not consider the outcome of acquisitions in sectors in which technology has not yet made a tangible impact.

Considering the first issue, we admit that we do not know whether the companies which made fewer deals were more selective and focused or rather failed in their early attempts and gave up. Regarding the second drawback, our research does not explore whether the companies in extremely traditional sectors that did venture in Tech M&A (if any) were successful in building some form of competitive advantage. An additional issue is that the size of the sample is much smaller than that of the GAFAM dataset.

The conclusions of our research rest on the statistical significance of the variable we employed to capture the difference in nature between GAFAM and Non-Tech acquirers. In our model, this variable was significant, but the low explanatory power of the model itself suggests that many more other factors play a role when the success of a Tech acquisition is at stake. Future research may look for additional variables and for ways to enlarge the Non-Tech sample in order to make it more comparable to the GAFAM set of acquisitions. Higher-quality data could also be collected by directly involving some of the companies in the two samples through management interviews and partnerships.

The operative definitions employed in our research could also be challenged and made more specific, possibly adapting them to answer more precise questions. In particular, one aspect that could be explored is whether the relative advantage which we identified for GAFAM also extends to other Tech companies more generally.

Finally, the significance of the four success factors that we identified for the acquisition of Technology companies could be tested for both other Tech bidders (e.g. Uber and Salesforce) and for cases in which GAFAM and Technology firms at large acquire Non-Technology targets. *Amazon's* acquisition of *Whole Foods* is the example that immediately comes to mind, but as the business trajectories of Tech and Non-Tech companies converge, more such deals are to be expected.

We consider our paper a solid starting point and welcome any attempt to improve and build on it.

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SUPPORTING APPENDICES

Appendix A. Non-Tech Bidders

Bidder	***Sector***
Adidas	*Sportswear*
Albertson's	*Retail*
Allstate	*Insurance*
Ally Financial	*Financial Services (bank)*
American Express	*Financial Services (cards)*
BMW	*Automotive*
C.H. Robinson Worldwide	*Logistics*
Citigroup	*Financial Services (bank)*
CNN	*Media News/Entertainment*
Daimler	*Automotive*
E.W. Hearst Scripps	*Media News/Entertainment*
Ford Motor	*Automotive*
GE	*Industrial*
GE Digital	*Industrial*
General Motors	*Automotive*
Goldman Sachs	*Financial Services (bank)*
Hudson's Bay	*Retail*
Live Nation	*Live Entertainment*
MasterCard	*Payment processing*
Monsanto	*Agrochemical*
New York Times	*Media News/Entertainment*
NewsCorp	*Media News/Entertainment*
Nike	*Sportswear*
Nordstrom	*Retail*
Richemont	*Luxury goods*
Staples	*Retail*
Target	*Retail*
The Walt Disney Company	*Media News/Entertainment*
Under Armour	*Sportswear*
UnitedHealth Group	*Healthcare insurance*
Volkswagen	*Automotive*
Walmart	*Retail*

Appendix B. Database Variables, Detailed List*

Metric	Type	Description	Use	Units	Coding	Sources**
Deal_Name + Date	Created	A synthetic metric constituted from the bidder and target company names and the deal date	To identify the acquisition deal easier within the database	Text	-	-
Bidder - Target	Assigned	Metric identifying the type of the bidder and the type of the target	To identify within different types of deals within the database	Text		
Bidder_Name	Collected	The company name of the bidder	-	Text	-	-
Bidder_Location	Collected	The locations of the bidder's headquarters	To create Target_Proximity	Text	-	Company website
Bidder_Founded	Collected	The founding date of the bidder	To create Bidder_Age	Date	-	Company website
Bidder_Age	Calculated	The age of the bidder at the time of the acquisition	To verify whether this had an effect on success of the deal	Years	-	-
Bidder_Employees	Collected	Number of employees working at the bidder company during the year of the acquisition	To estimate the relative size of the bidder	Employees	-	Statista and company annual reports
Bidder_Sales	Collected	Annual revenues of the bidder at the time of the acquisition	To estimate the relative size of the bidder	USD	-	Statista and company annual reports
Bidder_Open	Collected	The opening stock price of the bidder at the date of the acquisition	To calculate Bidder_Pop	USD	-	Yahoo Finance
Bidder_Close	Collected	The closing stock price of the bidder at the date of the acquisition	To calculate Bidder_Pop	USD	-	Yahoo Finance
Bidder_Pop	Calculated	The difference between opening and closing stock prices of the bidder at the date of the acquisition	To identify the impact of the acquisition announcement on the bidder's stock price	Percentage	-	-
Bidder_Industry	Collected	The principal industries that encompass the activities the bidder is engaged in	To see whether this had any effect on our analyses	Text	-	

Bidder_International	Collected	Identification whether the bidder had any international activities at the time of the acquisition		Binary	0 – no international activity 1 – some international activity	*Various*
Target_Name	Collected	The company name of the target	-	Text	-	-
Target_Founded	Collected	The founding date of the target (exact when available or using January 1st as a proxy when only the year is available)	To create Target_Age	Date	-	Company website, Wikipedia, Crunchbase, LinkedIn (self-reported)
Target_Age	Calculated	The age of the target (in years) at the time of the acquisition	To verify whether this had an effect on success of the deal	Year	-	-
Target_TotalFunding	Collected	The total amount of funding the target company had received by the time of the acquisition	To verify whether this had an effect on success of the deal	USD	-	Crunchbase; *various*
Target_FundingRound	Collected	The number of funding rounds the target had raised by the time of the acquisition	To verify whether this had an effect on success of the deal	Numerical	-	Crunchbase, *various*
Target_Funding/Year	Calculated	The average yearly amount of funding the target company had received by the time of the acquisition	To verify whether this had an effect on success of the deal	USD	-	-
Target_Employees	Collected	Number of employees working at the target company at the time of the acquisition (exact number when available or an estimated range)	To estimate the relative size of the target	Employees (exact or estimated groups)	-	Crunchbase; LinkedIn; *various*
Target_EmployeesBin	Coded	Number of employees working at the target company at the time of the acquisition grouped into standardized buckets	To estimate the relative size of the target	Numerical	0; "1-10"; "11-50"; "51-100"; "101-250"; "251-500"; "501-1000"; "1001+"	-
Target_Sales	Collected	Annual revenues of the target at the time of the acquisition deal	To estimate the relative size of the target	USD	-	*various*

Target_International	Collected	Identification whether the target had any international activities at the time of the acquisition deal	To verify whether this had an effect on success of the deal	Binary	0 – no international activities 1 – some international activities	*various*
Target_Location	Collected	The country in which the target's headquarters are located	To create Target_Proximity	Text	-	Crunchbase; Wikipedia; LinkedIn
Target_Proximity	Coded	Measure whether the target company's headquarters is located in the same country as the bidder company's headquarters	To verify whether this had an effect on success of the deal	Binary	0 – cross-border 1 – local	-
Target_Activities	Collected	The specific activities the target company was engaged in at the time of the acquisition	To create Target_Industry	Text	-	Crunchbase; Wikipedia; *various*
Target_Industry	Created	The grouping variable of the target's activities	To create Target_Diversification	Text	*Full list of target industry categories can be found in Appendix H*	-
Target_UserBase	Collected	The user base of the target company at the time of the acquisition	To estimate the relative size of the target company	*Varied*	-	*Various*
Target_Notoriety	Coded	Variable signifying the notoriety of the target company at the time of the acquisition. Assessed by the frequency of the target's coverage in press	To verify whether this had an effect on success of the deal	Numerical	1 – Low 2 – Medium 3 – High	*Various*
Deal_Date	Collected	The date when the deal was announced	To create Bidder_Age and Target_Age	Date	-	Wikipedia; Crunchbase; *various*
Deal_Price	Collected	The consideration paid for the target by the bidder in the acquisition deal (exact or approximate amount)	To verify whether this had an effect on success of the deal	USD	-	Wikipedia; Crunchbase; *various*

Deal_Notoriety	Collected	Variable signifying the notoriety of the acquisition deal company at the time of the acquisition. Assessed by the frequency of the deal's coverage in press	To verify whether this had an effect on success of the deal	Numerical	1 – Low 2 – Medium 3 – High	*Various*
Deal_Stock	Collected	Variable signifying whether the deal consideration was paid with the stock of the bidder	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Crunchbase; *various*
Deal_Cash	Collected	Variable signifying whether the deal consideration was paid with cash	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Crunchbase; *various*
Deal_Mixed	Collected	Variable signifying whether the deal consideration was paid with a mix of cash and bidder's stock	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Crunchbase; *various*
EO_Proposed	Collected	Variable signifying whether the acquisition deal included earn out or retention clauses	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Crunchbase; *various*
EO_Achieved	Collected	Variable signifying whether the earn out or retention clauses proposed were achieved	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Crunchbase; *various*
PMI_CEO	Collected	Variable signifying the amount of time that a key member of the target company (CEO or founder) has stayed on as an employee of the bidder company post-acquisition	To verify whether this had an effect on success of the deal	Half-years	0 – key member did not join the bidder post-acquisition *other values expressed as half years* 1000 – key member is still with the bidder company	LinkedIn (self-reported); *various*
PMI_Team	Coded	Variable signifying whether at least one other team member has moved to the bidder post-acquisition	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	LinkedIn (self-reported); *various*
PMI_MoveHQ	Coded	Variable signifying whether the joining members of the target moved to the bidder's headquarters post-acquisition	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	LinkedIn (self-reported); *various*

PMI_Website	Coded	Variable signifying what happened to the target's website post-acquisition (as assessed in Q1 of 2018)	To verify whether the target was absorbed post-acquisition	Numerical	0 – non-existent or a 404 error 1 – partially absorbed or redirecting 2 – standalone	*manual verification*
PMI_Subsidiary	Coded	Variable signifying whether the target became a separate division of the bidder post-acquisition	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Wikipedia; *various*
PMI_IP	Coded	Variable signifying whether the bidder obtained any IP via the acquisition of the target	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Wikipedia; *various*
PMI_Internal	Coded	Variable signifying whether the target company was used in internal improvements post-acquisition	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Wikipedia; *various*
PMI_Existing	Coded	Variable signifying whether the target company was used in existing product improvements post-acquisition	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Wikipedia; *various*
PMI_StandAlone	Coded	Variable signifying whether the target company's offer was maintained as a stand-alone product post-acquisition	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Wikipedia; *various*
PMI_New	Coded	Variable signifying whether the target company's offer was used as part of a new product post-acquisition	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Wikipedia; *various*
PMI_Rebranding	Coded	Variable signifying whether the target company's offering was rebranded and offered by the bidder post-acquisition	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Wikipedia; *various*
PMI_Expansion	Coded	Variable signifying whether the target company was used as a means of market or distribution channel expansion post-acquisition	To verify whether this had an effect on success of the deal	Binary	0 – no 1 – yes	Wikipedia; *various*

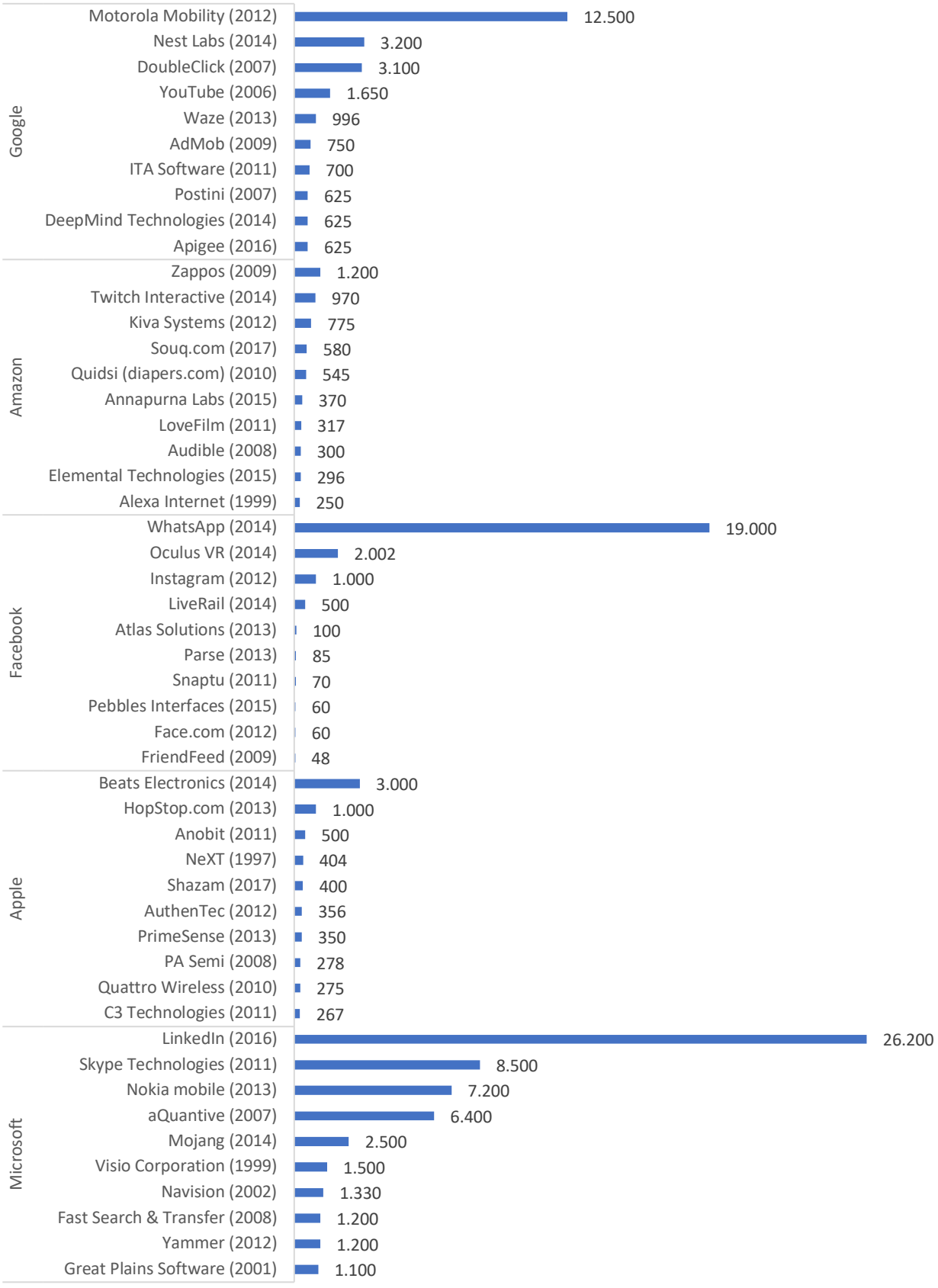
Divestiture	Coded	Variable signifying whether the bidder company divested this particular target and/or wrote-off significant value of its assets and/or spun-off the target as a separate company	To signify the outcome of this deal	Binary	1 – integration 2 – sale 3 – complete write-off	Wikipedia; *various*
Acquihire	Calculated	Measure of the type of the acquisition deal based on the retention of target's employees	To signify the outcome of this deal	Binary	0 – no 1 – yes	
Success	Calculated	Measure of success of the deal, based on the definition of the success outlined in section I. In some cases, we adjusted the outcome of the formula based on more qualitative analysis.	To signify the outcome of this deal	Binary	0 – no 1 – yes	

**It should be noted that not all of the variables collected were used in our final analyses, after assessing their availability post-collection.*

***Various refers to an array of press releases and news articles covering the acquisition and providing relevant information*.

Appendix C. 10 Most Expensive Acquisitions for Each of the GAFAM

Figure 19. 10 Most Expensive Deals of Each GAFAM (amounts in millions of USD)



Appendix D. Price-Target Age Regression for Both Bidder Types

Regression Statistics	
Multiple R	0.13785
R Square	1.90%
Adjusted R Square	1.54%
Standard Error	2,263,449,161.75
Observations	274

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.69956E+19	2.69956E+19	5.26928	0.02247
Residual	272	1.39351E+21	5.1232E+18		
Total	273	1.42051E+21			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	412,512,208.13	160,268,861.67	2.57388	1.06%	96,987,078.16	728,037,338.10
Target_Age	**24,308,332.40**	**10,589,598.79**	**2.29549**	**2.25%**	**3,460,336.72**	**45,156,328.07**

Appendix E. Price-Target Age Regression for Tech Bidder Type

Regression Statistics	
Multiple R	0.13322
R Square	1.77%
Adjusted R Square	1.32%
Standard Error	2,479,376,253.03
Observations	218

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.39914E+19	2.39914E+19	3.90275	0.04948
Residual	216	1.32782E+21	6.14731E+18		
Total	217	1.35181E+21			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	432,952,960.62	191,169,437.24	2.26476	2.45%	56,156,571.41	809,749,349.83
Target_Age	**23,660,145.87**	**11,976,558.55**	**1.97554**	**4.95%**	**54,259.49**	**47,266,032.26**

Appendix F. Price-Target Age Regression for Non-Tech Bidder Type

Regression Statistics	
Multiple R	0.22801
R Square	5.199%
Adjusted R Square	3.44%
Standard Error	1,097,495,088.07
Observations	56

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3.56707E+18	3.56707E+18	2.96146	0.09100
Residual	54	6.50428E+19	1.2045E+18		
Total	55	6.86098E+19			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	247,876,702.89	237,442,016.42	1.04395	30.12%	(228,165,877.96)	723,919,283.75
Target_Age	35,991,209.28	20,914,291.00	1.72089	9.10%	(5,939,419.57)	77,921,838.12

Appendix G. Price-Buyer Age Regression for Both Bidder Types

Regression Statistics	
Multiple R	0.00785
R Square	0.01%
Adjusted R Square	-0.36%
Standard Error	2,289,136,692.63
Observations	273

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	8.7509E+16	8.7509E+16	0.01670	0.89727
Residual	271	1.42008E+21	5.24015E+18		
Total	272	1.42017E+21			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	590,543,449.93	185,767,527.12	3.17894	0.16%	224,812,458.01	956,274,441.84
Bidder_Age	456,064.57	3,529,162.30	0.12923	89.73%	(6,491,995.99)	7,404,125.14

Appendix H. Target Categories

Application	Hardware	Software
Ad Tech	Hardware - Audio	Software - AI Bots
Autonomous Driving	Hardware – Augmented /Virtual Reality	Software - AI Computer Vision
Digital Marketing	Hardware - Battery Technology	Software - AI Machine Learning
e-commerce	Hardware - Cameras	Software - AI Semantics
Education	Hardware - Cloud	Software - AI Translation
Finance - Consumer Tech	Hardware - Computers	Software - AI Voice Technology
Finance - Digital Transactions	Hardware - Eye Tracking	Software - Analytics
Finance - Fraud Prevention	Hardware - Fingerprint Scanner	Software - Augmented/ Virtual Reality
Finance - Insurance	Hardware - Home	Software - Business Tools
Gaming	Hardware - Microchips	Software – Cloud
IoT	Hardware - Mobile	Software - Content Distribution
Logistics	Hardware - Other	Software – CRM
Mapping	Hardware - Robotics	Software - Cyber Security
Publishing	Hardware - Screens	Software – Database
Search Engine	Hardware - Wearables	Software - Digital Content Creation
Shared Mobility		Software - Digital Payments
Social Community		Software - Health Data Collection
Social Networking		Software – Imaging
		Software - Messaging & Communication
		Software - Mobile Software
		Software - Network Technologies
		Software - Operating Systems
		Software - Processing
		Software - Productivity
		Software - Software Development

Appendix I. CEO Tenure (10 buckets) – Average Transaction Value

Regression Statistics	
Multiple R	0.39706
R Square	15.77%
Adjusted R Square	5.24%
Standard Error	1.47366
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3.25162	3.25162	1.49729	0.25590
Residual	8	17.37338	2.17167		
Total	9	20.62500			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	3.46099	0.74484	4.64663	0.17%	1.74339	5.17860
PMI_CEO	(0.00000)	0.00000	(1.22364)	25.59%	(0.00000)	0.00000

Appendix J. Use of Cash in Acquisitions Made by Non-Tech Buyers

Regression Statistics	
Multiple R	0.73425
R Square	53.91%
Adjusted R Square	16.20%
Standard Error	0.35286
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	9	1.98393	0.22044	1.42972	0.28374
Residual	11	1.69599	0.15418		
Total	20	3.67992			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	(2.18184)	0.92912	(2.34829)	3.86%	(4.22681)	(0.13686)
# Deals	0.00003	0.00651	0.00514	99.60%	(0.01430)	0.01437
% Deals per Industry	(0.81722)	2.80080	(0.29178)	77.59%	(6.98174)	5.34730
Average of Target_Age	0.04462	0.02906	1.53523	15.30%	(0.01935)	0.10858
Average of Target_TotalFunding	0.00000	0.00000	1.24860	23.77%	(0.00000)	0.00000
PMI_Team	**1.53977**	**0.67504**	**2.28101**	**4.35%**	**0.05402**	**3.02551**
PMI_Internal	0.90635	0.45750	1.98110	7.31%	(0.10060)	1.91329
PMI_Existing	(0.57391)	0.50990	(1.12554)	28.43%	(1.69618)	0.54837
PMI_StandAlone	**1.07244**	**0.41631**	**2.57604**	**2.58%**	**0.15614**	**1.98874**
PMI_New	**2.04240**	**0.73242**	**2.78855**	**1.76%**	**0.43034**	**3.65445**

Appendix K. Success Rating per Bidder

	Success Rate
Non-Tech Buying Tech	**87.50%**
Agrochemical	**100.00%**
Monsanto	100.00%
Automotive	**100.00%**
BMW	100.00%
Daimler	100.00%
Ford Motor	100.00%
General Motors	100.00%
Volkswagen	100.00%
Financial Services (bank)	**77.78%**
Ally Financial	100.00%
Citigroup	0.00%
Goldman Sachs	85.71%
Financial Services (cards)	**100.00%**
American Express	100.00%
Healthcare insurance	**100.00%**
UnitedHealth Group	100.00%
Industrial	**100.00%**
GE	100.00%
GE Digital	100.00%
Insurance	**100.00%**
Allstate	100.00%
Live Entertainment	**85.71%**
Live Nation	85.71%
Logistics	**100.00%**
C.H. Robinson Worldwide	100.00%
Luxury goods	**100.00%**
Richemont	100.00%
Media News/Entertainment	**53.33%**
CNN	0.00%
E.W. Hearst Scripps	100.00%
New York Times	0.00%
NewsCorp	0.00%
The Walt Disney Company	70.00%
Payment processing	**100.00%**
MasterCard	100.00%
Retail	**89.47%**
Albertsons	100.00%
Hudson's Bay[6]	100.00%
Nordstrom	100.00%
Staples	100.00%
Target	75.00%
Walmart	90.91%
Sportswear	**100.00%**
Adidas	100.00%
Nike	100.00%
Under Armour	100.00%
GAFAM Buying Tech	**96.52%**
Tech	**96.52%**
Amazon	94.19%
Apple	97.94%
Facebook	100.00%
Google	96.30%
Microsoft	96.00%
Total Average	**95.34%**

[6] Our Database was closed before Gilt was divested

Appendix L. Deal Price vs. Success

Regression Statistics	
Multiple R	0.11124
R Square	1.24%
Adjusted R Square	0.87%
Standard Error	0.26579
Observations	273

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.23989		0.23989	3.39567
Residual	271	19.14473		0.07064	
Total	272	19.38462			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.93096	0.01665	55.92868	0.00%	0.89819	0.96373
Deal_Price	(0.00000)	0.00000	(1.84273)	6.65%	0.00000	0.00000

Appendix M. Target Funding vs. Success

Regression Statistics	
Multiple R	0.02418
R Square	0.06%
Adjusted R Square	-0.21%
Standard Error	0.16128
Observations	376

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.00569	0.00569	0.21884	0.64019
Residual	374	9.72835	0.02601		
Total	375	9.73404			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.97482	0.00885	110.11815	0.00%	0.95742	0.99223
Target_TotalFunding	(0.00000)	0.00000	(0.46781)	64.02%	(0.00000)	0.00000

Appendix N. PMI Factors and Divestiture vs. Success

Regression Statistics	
Multiple R	0.78140
R Square	61.06%
Adjusted R Square	60.00%
Standard Error	0.13611
Observations	494

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	13	13.94221	1.07248	57.89486	0.00000
Residual	480	8.89180	0.01852		
Total	493	22.83401			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	1.14336	0.03108	36.79064	0.00%	1.08229	1.20442
PMI_CEO	0.00001	0.00001	0.47436	63.55%	(0.00002)	0.00003
PMI_Team	0.00996	0.02386	0.41744	67.65%	(0.03692)	0.05683
PMI_MoveHQ	**0.05815**	**0.01376**	**4.22758**	**0.00%**	**0.03112**	**0.08518**
PMI_Web	**(0.05968)**	**0.00936**	**(6.37411)**	**0.00%**	**(0.07807)**	**(0.04128)**
PMI_Subsidiary	**(0.06729)**	**0.01629**	**(4.12958)**	**0.00%**	**(0.09930)**	**(0.03527)**
PMI_IP	**0.03980**	**0.01231**	**3.23225**	**0.13%**	**0.01561**	**0.06400**
PMI_Internal	**0.04804**	**0.01912**	**2.51206**	**1.23%**	**0.01046**	**0.08561**
PMI_Existing	(0.00860)	0.01572	(0.54717)	58.45%	(0.03949)	0.02228
PMI_StandAlone	**(0.10649)**	**0.01668**	**(6.38423)**	**0.00%**	**(0.13926)**	**(0.07371)**
PMI_New	0.00944	0.01571	0.60091	54.82%	(0.02143)	0.04030
PMI_Rebranding	**0.03442**	**0.01646**	**2.09154**	**3.70%**	**0.00208**	**0.06676**
PMI_Expansion	0.02952	0.01644	1.79506	7.33%	(0.00279)	0.06182
Divestiture	**(0.28125)**	**0.01115**	**(25.21558)**	**0.00%**	**(0.30317)**	**(0.25933)**

Appendix O. PMI Factors, Divestiture and Non-Tech/GAFAM Dummy vs. Success

Regression Statistics	
Multiple R	0.78348
R Square	61.38%
Adjusted R Square	60.25%
Standard Error	0.13568
Observations	494

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	14	14.01634	1.00117	54.38612	0.00000
Residual	479	8.81767	0.01841		
Total	493	22.83401			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	1.10653	0.03601	30.73150	0.00%	1.03578	1.17728
GAFAM/Non-Tech Bidder	**0.04117**	**0.02052**	**2.00666**	**4.53%**	**0.00086**	**0.08148**
PMI_CEO	0.00001	0.00001	0.71906	47.25%	(0.00002)	0.00004
PMI_Team	0.01119	0.02379	0.47044	63.83%	(0.03555)	0.05793
PMI_MoveHQ	**0.05118**	**0.01414**	**3.61849**	**0.03%**	**0.02339**	**0.07898**
PMI_Web	**(0.06021)**	**0.00934**	**(6.44892)**	**0.00%**	**(0.07856)**	**(0.04187)**
PMI_Subsidiary	**(0.06172)**	**0.01648**	**(3.74550)**	**0.02%**	**(0.09410)**	**(0.02934)**
PMI_IP	**0.04332**	**0.01240**	**3.49356**	**0.05%**	**0.01896**	**0.06769**
PMI_Internal	**0.04885**	**0.01907**	**2.56193**	**1.07%**	**0.01138**	**0.08631**
PMI_Existing	(0.01041)	0.01569	(0.66298)	50.77%	(0.04124)	0.02043
PMI_StandAlone	**(0.10649)**	**0.01663**	**(6.40448)**	**0.00%**	**(0.13916)**	**(0.07382)**
PMI_New	0.00578	0.01576	0.36691	71.38%	(0.02519)	0.03676
PMI_Rebranding	0.03157	0.01647	1.91692	5.58%	(0.00079)	0.06393
PMI_Expansion	**0.04289**	**0.01769**	**2.42388**	**1.57%**	**0.00812**	**0.07766**
Divestiture	**(0.27957)**	**0.01115**	**(25.07257)**	**0.00%**	**(0.30148)**	**(0.25766)**

Appendix P. PMI Factors and Non-Tech/GAFAM Dummy vs. Success

Regression Statistics	
Multiple R	0.32717
R Square	10.70%
Adjusted R Square	8.29%
Standard Error	0.20610
Observations	494

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	13	2.44414	0.18801	4.42597	0.00000
Residual	480	20.38987	0.04248		
Total	493	22.83401			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.80366	0.05153	15.59712	0.00%	0.70242	0.90491
GAFAM/Non-Tech Bidder	**0.07983**	**0.03108**	**2.56886**	**1.05%**	**0.01877**	**0.14089**
PMI_CEO	**0.00006**	**0.00002**	**3.12013**	**0.19%**	**0.00002**	**0.00010**
PMI_Team	0.03789	0.03610	1.04946	29.45%	(0.03305)	0.10882
PMI_MoveHQ	**0.06628**	**0.02147**	**3.08763**	**0.21%**	**0.02410**	**0.10847**
PMI_Web	**0.02686**	**0.01317**	**2.04023**	**4.19%**	**0.00099**	**0.05273**
PMI_Subsidiary	(0.03804)	0.02499	(1.52225)	12.86%	(0.08715)	0.01106
PMI_IP	0.01409	0.01875	0.75125	45.29%	(0.02276)	0.05094
PMI_Internal	(0.02162)	0.02865	(0.75457)	45.09%	(0.07791)	0.03467
PMI_Existing	(0.01155)	0.02384	(0.48432)	62.84%	(0.05839)	0.03530
PMI_StandAlone	**(0.09162)**	**0.02524**	**(3.62967)**	**0.03%**	**(0.14122)**	**(0.04202)**
PMI_New	(0.03101)	0.02384	(1.30061)	19.40%	(0.07786)	0.01584
PMI_Rebranding	(0.00629)	0.02491	(0.25236)	80.09%	(0.05523)	0.04266
PMI_Expansion	**0.06629**	**0.02684**	**2.46978**	**1.39%**	**0.01355**	**0.11903**

Appendix Q. Significant-Only PMI Factors and Non-Tech/GAFAM Dummy vs. Success

Regression Statistics	
Multiple R	0.29931
R Square	8.96%
Adjusted R Square	8.03%
Standard Error	0.20640
Observations	494

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	2.04563	0.40913	9.60407	0.00000
Residual	488	20.78838	0.04260		
Total	493	22.83401			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.82518	0.03210	25.70309	0.00%	0.76210	0.88826
GAFAM/Non-Tech Bidder	**0.08485**	**0.02989**	**2.83823**	**0.47%**	**0.02611**	**0.14358**
PMI_CEO	**0.00007**	**0.00002**	**3.72424**	**0.02%**	**0.00003**	**0.00011**
PMI_MoveHQ	**0.05896**	**0.02069**	**2.85038**	**0.46%**	**0.01832**	**0.09961**
PMI_StandAlone	**(0.07403)**	**0.02161**	**(3.42592)**	**0.07%**	**(0.11648)**	**(0.03157)**
PMI_Expansion	**0.06405**	**0.02460**	**2.60361**	**0.95%**	**0.01571**	**0.11239**