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## Alphabet's Google

*We have only scratched the surface of truly being there for our users, anytime, anywhere, across all devices.*

–Google CEO Sundar Pichai<sup>1</sup>

In March 2017, Alphabet's CEO Larry Page, leaned on a dusty wooden railing and gazed across the vastness of Moffett Airfield's Hangar Two. A half-dozen illuminated balloons, each fifteen meters in diameter, were floating before him in the cavern-like space. Three years earlier, he had signed a \$1.2 billion, sixty-year lease for the airfield's largest hangars, which were only a few miles from Alphabet's Mountain View, California headquarters.<sup>2</sup> Originally built in the 1940s to house the US Navy's blimp fleet, the hangars were now being used to house Alphabet's fleet of private jets and some of its more ambitious projects. The balloons were part of Project Loon, a plan to use high-altitude balloons to bring Internet access to the most remote corners of the world. The project's name was chosen both for its connection to flight and its lunacy.<sup>3</sup>

Page's thoughts were interrupted by the buzzing of his Pixel smartphone. It was a reminder that he had scheduled a meeting with Sundar Pichai, the CEO of Alphabet's Google subsidiary. In August 2015, Google's cofounders Larry Page and Sergey Brin announced that they would be restructuring the company as a diversified conglomerate under the name Alphabet. The Google cofounders indicated that they were inspired by Berkshire Hathaway's conglomerate structure through which the famed investor, Warren Buffet, successfully led an ensemble of widely different businesses over several decades.<sup>4</sup> Alphabet's largest subsidiary would retain the Google name and focus on Internet-related services and products with Pichai as CEO. A former McKinsey consultant, Pichai had quickly risen through the Google ranks after joining the technology firm in 2004.

Page walked across the tarmac to his Tesla Model X parked in front of the hangar. As he let the car's autopilot drive him to Google's offices, Page's thoughts switched from Project Loon to more terrestrial concerns. Although perceived as a technology company, Google was in many ways more of an advertising company. In fact, advertising accounted for almost 90 percent of Google's 2016 revenue. Although the portion of revenue from advertising had decreased in 2016, it still funded the clear majority of Google's user services and Alphabet's "Other Bets," including Project Loon (**Exhibit 1**).

Google's 2016 results had been a mix of good and bad news. Google's ad revenues had grown to \$79 billion, an increase of 18 percent over the previous year. However, the cost-per-click paid by advertisers had decreased 11 percent from 2015 to 2016 (**Exhibit 2**). Although Google was the market leader in online advertising, its market share was decreasing as rivals like Facebook increased their take of the advertising pie. Further complicating matters was growing scrutiny of Google by regulators, who were concerned about Google's near monopoly on search services and its profiling of users. Finally, the online advertising industry itself was under threat. Bad ads from fraudsters and spammers reduced public trust in Google's legitimate advertisers. Increasingly, users were installing ad-blocking software and avoiding advertising entirely.

A self-driving Lexus drove past as Page neared Google's campus. Formerly one of Google's "moon-shot ventures," the self-driving cars were now being developed by Alphabet's Waymo subsidiary. Page watched the Lexus in his rear-view mirror as it disappeared around a corner. He found it was a bit ironic. While the car knew where it was going, he was still trying to figure out what direction to take Alphabet's many disparate ventures. What could he do to address the challenges facing Google and Alphabet?

## A Brief History of Alphabet

Cofounders Larry Page and Sergey Brin met in 1995 at Stanford University during a tour for students accepted into the doctoral program. "We both found each other obnoxious," recalls Brin only half-jokingly, "but we spent a lot of time talking to each other, so there was something there."<sup>5</sup> Despite this rocky start, the pair quickly became inseparable friends.

While working on a dissertation topic, Page realized that the number and quality of links to a website could be used as a proxy for the credibility of that website. However, at that time, there was no good way to determine what sites were linking to a web page. Page began working on a program called BackRub that would index links on the web. Creating this index took a mammoth amount of bandwidth and computing power. By the fall of 1996, Page and Brin succeeded in creating an algorithm within BackRub that used the index to sort web pages by relevance. He dubbed the algorithm PageRank (named after himself, not web pages).<sup>6, 7</sup>

The first test of the PageRank system occurred in March of 1996. It became apparent to Page that his system would make an excellent search engine. Page and Brin, assisted by several classmates, began refining this search engine. In September of 1997, they decided to name their engine "Google," which was a misspelling of the mathematical term *googol*: 1 followed by 100 zeros.

On September 4, 1998, Google filed for incorporation and moved its rapidly growing collection of servers into a garage in nearby Menlo Park, CA. Internet use in the U.S. and in other developed countries was growing exponentially during this time. By 1999, 100 million web searches occurred every day, and Google needed capital to continue purchasing servers and hiring computer scientists.<sup>8, 9</sup> On June 7, 1999, Google announced that legendary Silicon Valley venture capital firms, Kleiner Perkins Caufield & Byers (KPCB) and Sequoia Capital, made a joint equity investment of \$25 million in the startup, contingent upon finding Larry and Sergey some "adult supervision." As KPCB principal, John Doerr, observed, "It's not saying anything negative about them, but I thought we would do a much better job of building a world-class management team if they had a world-class CEO. They agreed, and we closed the financing."<sup>10</sup> What would become a lengthy search for a new Google CEO had begun.

On June 26, 2000, Yahoo announced that it had licensed Google's search engine. Jeff Mallett, president and CEO of Yahoo stated, "Our web directory and navigational guide is critical to the essential set of services that we provide."<sup>11</sup> Despite this acknowledgement from Mallett, Google was allowed to insert a message below the search box stating that Google was providing the search results. This agreement introduced Google to Yahoo's 180 million worldwide users who generated 900M average daily page views.<sup>12</sup> More importantly, this vast increase in traffic allowed Google to fine tune its search engine.<sup>13</sup> By performing statistical analyses on logs of hundreds of millions of user interactions, Google's engineers could make its search engine understand contextual clues in search queries. Simply put, the more users searched, the better search results became.

After more than two years, the search for the right Google CEO came to an end when Eric Schmidt accepted the position in August of 2001. Schmidt held a PhD in computer science from the University of California-Berkeley, and had previously served as an executive at Sun Microsystems and Novell. "Most importantly for anyone taking on the CEO role at Google," observed Page, "Eric is a natural fit with our corporate culture."<sup>14</sup>

On December 31, 2001, Google reached another important milestone. It had its first profitable year, reporting net income of \$6.9 million.<sup>15</sup> "When we were still in the dot-com boom days, I felt like a schmuck," recalled Sergey Brin, "I had an Internet startup, so did everybody else. It was unprofitable, like everybody else's, and how hard is that? But when we became profitable, I felt like we had built a real business."<sup>16</sup> With a lucrative licensing agreement, a large capital infusion, a proven method of generating profits, and experienced management in place, Google had indeed become a "real business."

For his first coup as CEO, Schmidt made an agreement with AOL to provide the online portal with web search and contextual advertising services. The contract, signed on May 1, 2002, was a major defeat to rivals Inktomi and Overture, who had previously provided the services. At the time, AOL had 34 million subscribers, and its site handled 22 percent of all web searches.<sup>17</sup> Google's own site served 31.8 percent of worldwide searches, and through its license with Yahoo, it controlled another 36.3 percent of the market.<sup>18</sup> Google was now a behemoth in search. Defeated Inktomi executive Vish Makhijani groused, "They'll learn over time that Google takes your users; it doesn't help you build your property."<sup>19</sup> At the time, Yahoo claimed the AOL deal did not impact their relationship with Google. However, Yahoo removed the Google logo from its homepage in 2002 and, in December of that year, Yahoo purchased search provider Inktomi for \$235 million.<sup>20</sup>

In August 2004, Google made an initial public offering for eight percent of the company (**Exhibit 3**). A dual class structure was used that enabled Page and Brin to retain control of the company while raising outside equity capital. Page and Brin further solidified control of Google with a stock split that gave investors a new class of stock without voting rights in 2014.<sup>21</sup>

In 2005, Microsoft began a nearly year-long campaign to lure AOL away from Google. Though AOL's market share was declining, it was still the nation's largest Internet service with more than 110 million unique visits monthly.<sup>22</sup> Google countered by giving AOL \$300 million of advertising credit, as well as buying a five percent equity stake in AOL for \$1 billion.<sup>23</sup> This prevented Microsoft from its best opportunity to gain market share, according to some experts.<sup>24</sup> At the same time, it also preserved the value of Google ads.<sup>25</sup>

Over the next decade Google's history would be defined by new products and strategic acquisitions. In November 2005, Google released Google Analytics which measured the success of websites and marketing campaigns. Google based analytics on technology it acquired from buying Urchin

Software the previous spring. In 2006, Google released Finance, Translate, and Docs & Spreadsheets. It also purchased YouTube for a then staggering \$1.65 billion. In 2010, Google announced the Nexus One smartphone and acquired the AdMob, a company specializing in mobile advertising. In 2012, Google's Glass project was made public, Google Drive was released, and installation of its high-speed Fiber network began. In January 2014, Google acquired smart thermostat maker Nest for \$3.2 billion.

In 2015, Page and Brin announced that the company would be reorganized as a diversified conglomerate named Alphabet (**Exhibit 4**). The move was aimed at increasing the transparency of the company's finances. Google's spending on "moonshots" had become a concern for shareholders. "All they have done every quarter is offer investors assurances that their spending is controlled and proportional, but now we are going to be able to see if it is," commented Wells Fargo analyst, Peter Stabler.<sup>26</sup> In a letter to shareholders, Larry Page explained that the new structure would allow Alphabet's companies to have independence and establish their own brands.

We liked the name Alphabet because it means a collection of letters that represent language, one of humanity's most important innovations, and is the core of how we index with Google search! We also like that it means alpha-bet (Alpha is investment return above benchmark), which we strive for!

-Larry Page, Alphabet CEO<sup>27</sup>

## Google

### GOOGLE'S CONSUMER PRODUCTS

Google attracts an audience for advertising using consumer products. Google's Search, Android, Maps, Chrome, YouTube, Google Play, and Gmail products each count over one billion active monthly users.<sup>28</sup> Beyond these core offerings, Google also offers dozens of task-specific products such as Google Fonts and Zagat. Since taking the helm as CEO, Pichai has focused first on developing the user experience before monetizing a product.<sup>29</sup> "Inherently, a lot of what people are looking for is also commercial in nature. It'll tend to work out fine in the long run," argues Pichai.<sup>30</sup>

In recent years Google, however, has made efforts to rationalize its product portfolio. Since April 2015, Google has ditched several projects deemed nonessential to the company's future. One notable victim of this effort was Google's Project Ara, a modular smartphone with Lego-like components that had been in development since 2013. After missing a planned ship date, the product was canceled in August 2016.<sup>31</sup>

"In the past, we would say, 'Okay, to do that, let's go build this,' Now, we're deeply committed to doing hardware over multiple product cycles. It's very hard, when you just do one-off product efforts here and there, to tackle the longer-term problems." – Sundar Pichai, Google CEO<sup>32</sup>

A new focal point of Google's product development efforts is making artificial intelligence pervasive. In May 2016, the company unveiled Google Assistant as competitor for Apple's Siri and Amazon's Alexa. The new product is built into Google's Pixel smartphones, Google Home speaker, and Allo messaging service enabling conversational searches for information.

We are evolving search to be much more assistive. We want users to have a two-way ongoing dialogue with Google to help get things done in the real world. We think of this as building each user their own individual Google.

– Sundar Pichai, Google CEO<sup>33</sup>

## CORE PRODUCTS

### Search

Google and web search have been synonymous since 2006, when the term “to Google” was added to the Merriam-Webster Collegiate Dictionary.<sup>34</sup> Google answered over two trillion searches in 2016 up from 1.2 trillion in 2012.<sup>35</sup> Meanwhile, Google’s large share of Internet searches has contributed to the company running up against government concerns. In 2014, Europe passed a “right-to-be-forgotten” law giving individuals the right to request the removal of results that appear when their names are searched.<sup>36</sup> In 2015, the EU began the process of filing antitrust charges against Google for having a 90 percent market share in search in Europe that rivals allege favor Google’s services.<sup>37</sup>

### Android

In April 2005, pioneering smartphone maker Research In Motion reported that its BlackBerry subscriber base had doubled to 2.5 million users and that “we believe we are still in the early days of this market.”<sup>38</sup> Therefore, Google had to determine its strategy in the rapidly burgeoning mobile field even as it wrestled with Microsoft for AOL’s user base. Larry Page recalls the struggle to create a great mobile experience as Google built its software one device at a time.<sup>39</sup> To remedy this problem, Google purchased a Silicon Valley startup called Android in August 2005.

Software development was a significant cost for smartphone manufacturers. To encourage manufacturers to adopt Android, Google made it open source and allowed them to customize it. Android’s adoption, in turn, ensured that users could access Google through their mobile devices. As author Steven Levy observed, “Android would be a Trojan horse for Google’s consumer apps, chief among them mobile search.” Still, Google’s open-source strategy has additional limitations, including making it more susceptible to malware and modification. For example, Chinese search company Baidu has negotiated with smartphone manufacturers to remove all references to Google in Android and replace it with Baidu.<sup>40</sup>

Although Android is open source, its use is not entirely free for manufacturers. Both Apple and Microsoft successfully sued Google alleging that Android’s operating system infringed on their intellectual property in 2011. As a result, manufacturers that use Android pay licensing fees to Apple and Microsoft.<sup>41, 42</sup> Concerns over patents contributed to Google spending \$12.5 billion to acquire Motorola Mobility, and later selling the handset maker to Lenovo for \$2.9 billion in 2012, though Google kept Motorola’s patents.<sup>43</sup>

In the first half of 2017, Android held 67 percent market share in the U.S., while Apple’s iOS held 31 percent. Globally, during the same time period, Android’s lead over Apple’s iOS was even wider: Android held 85 percent for smartphone operating systems, dwarfing Apple’s 15 percent.<sup>44</sup>

In 2017, Google acquired HTC's smartphone engineering group for \$1.1 billion. The Taiwanese smartphone maker developed the Google Pixel phone.<sup>45,46</sup> With this acquisition, Google is making a commitment to handset manufacturing, unlike in the Motorola deal which was more motivated by intellectual property considerations. Integrating HTC's smartphone unit within Google will allow engineers to more tightly integrate hardware and software. This in turn will allow Google to differentiate its high-end Pixel phone more from the competition, especially Apple's newly released iPhone X and Samsung's Galaxy 8 line of phone, including the Note 8.

## Chrome

Google's motivation for developing its Chrome Internet browser was simple. In 2006, Microsoft's Internet Explorer held 80 percent of the market share for browsers.<sup>47</sup> As KPCB principal, John Doerr, explains, "I was quite nearly panicked that Google was getting to all the world's people through Microsoft's browser."<sup>48</sup> Disparagingly nicknamed "chrome" by programmers, Google Chrome was launched on September 2, 2008. A stripped-down browser designed for speed, Chrome eschewed the complicated visual interfaces that slowed other browsers down. By 2014, Google's Chrome browser, with 20 percent market share, had become the second-most used behind Microsoft's Internet Explorer.<sup>49</sup> But Google wouldn't stop there. In 2017, Chrome had 60 percent market share, while Microsoft Internet Explorer's market share had shrunk to some 16 percent.<sup>50</sup>

## Maps

Google Maps got its start in October of 2004, when the company acquired Where 2 Technologies and Keyhole Corporation. Where 2 Technologies was an Australian mapping startup, and Keyhole was a startup, partially funded by the CIA<sup>51</sup> that used "a database of satellite images and aerial photos to create interactive 3D maps."<sup>52</sup> Former Google CEO Eric Schmidt characterized Keyhole as "too fundamental to let someone else control it."<sup>53</sup> Where 2 Technologies became Google Maps, and Keyhole became Google Earth. In 2013, Google Maps was bolstered by the \$1.1 billion acquisition of Waze, a crowd-sourced navigation app that allowed its users to post information such as traffic jams, road construction, and speed traps in real time.<sup>54</sup> In late 2016, Google added "Promoted Places" to Maps. The new feature allows retailers to brand their search results in Google Maps and display ongoing promotions.

## Gmail

Gmail, Google's free e-mail service, uses algorithms to "read" a user's e-mail, determine the subject of the correspondence, and then display relevant advertising when the e-mail is read. Gmail was used in-house for several years before being made available to the public on April 1, 2004. Initially, capacity limitations forced Google to offer Gmail by invitation only. This lent Gmail an air of exclusivity. "It was hailed as one of the best marketing decisions in tech history, but it was a little bit unintentional," admitted Georges Harik, a manager who oversaw the development of Gmail.<sup>55</sup>

## YouTube

Google announced the acquisition of online video clip provider YouTube for \$1.65 billion in October 2006. "This is the next step in the evolution of the Internet," enthused Google CEO Eric Schmidt at the time.<sup>56</sup> The purchase of YouTube allowed Google to extend its reach into the nascent yet rapidly growing field of online video. YouTube had been in operation less than a year when it



garnered an estimated 50 million viewers.<sup>57</sup> By late 2016, viewers were watching more than one billion hours of video a day, nearly surpassing U.S. television consumption.<sup>58</sup> “The corpus of content continues to get richer and richer by the minute, and machine-learning algorithms do a better and better job of surfacing the content that an individual viewer likes,” commented Neal Mohan, YouTube’s Chief Product Officer.<sup>59</sup> According to *The Wall Street Journal*, YouTube earned \$4 billion in 2014 and “roughly broke even.”<sup>60</sup> While most of YouTube’s revenue still comes from advertising run before videos, a subscription advertisement-free version of the service (YouTube Red) was launched in 2015. At the same time, Google is transforming YouTube more and more into bona fide content streaming service, with the development of channels and the curation of content.

## Google Play

Google launched Google Play service in March 2012, combining its Android Market, Music, and eBookstore into a single digital distribution product.<sup>61</sup> Google Play has over one billion active users in 190 countries.<sup>62</sup> Over 2.8 million Android apps are available through the service of which approximately 2.6 million are offered free of charge.<sup>63</sup> In addition to apps, the service also provides books, music, and video content. The \$2.9 billion increase of Google’s non-advertising, “other revenues” were primarily due to revenue growth from Google Play.<sup>64</sup>

## ONLINE ADVERTISING

We work on advertising because it’s what allows us to make our services free; Google Search works the same for anyone with an Internet connection, whether it is in a modern high-rise or a rural schoolhouse.

-Sundar Pichai, Google CEO<sup>65</sup>

Advertising is Google’s largest revenue stream. Google matches advertising relevant to users based on their search queries, browsing history, and email contents. Google classifies advertising as either performance or brand advertising. Performance advertising includes relevant interactive ads that users can click on. These include the text-based ads placed within search results. Brand advertising seeks to increase users’ awareness of an advertiser’s products or services.<sup>66</sup>

The goal of our advertising business is to deliver relevant ads at just the right time and to give people useful commercial information, regardless of the device they’re using...

-Google 2016 Form 10-K<sup>67</sup>

Most of Google’s advertising customers pay Google on a cost-per-click basis, which means that users needed to engage with an ad for Google to earn revenue from it. Google also offered advertisers other payment options, such as cost-per-impression, which enabled brand advertisers the option to pay based on the number of times their ad was displayed.<sup>68</sup>

Google places advertising both on its own properties such as YouTube or Gmail and on the properties of Google Network Members. The Google Network includes over two million websites and reaches over 90 percent of internet users.<sup>69</sup>

Google pays traffic acquisition costs to Google Network members for ads shown on their properties. Other traffic acquisition costs include payments to distribution partners that include Google’s search and other services in their products. For example, in 2014 Google paid Apple \$1 billion to keep

Google's search engine as the default on Apple's iPhones. The move yielded roughly \$8.9 billion in mobile-search revenue for Google from Apple devices.<sup>70</sup>

## ADVERTISING PRODUCTS

### Adwords

Google introduced AdWords in October of 2000.<sup>71</sup> AdWords made advertising more effective by displaying advertisements that were contextually relevant to a user's search query. Advertisers bid on key search terms, called "keywords," in AdWords' auctions. AdWords determines the winner of the auction based both on the advertiser's bid amount and on the probability that a Google user will click on the ad. This probability is determined by an algorithm. Then, when a Google user submits a search query containing the keyword of the winning bidder, that bidder's advertisement is displayed alongside the search results. AdWords was the key to making Google profitable.

### AdSense

Google announced the acquisition of Applied Semantics on April 23, 2003 for \$102 million in cash and stock. At the time, it was Google's largest acquisition.<sup>72</sup> Applied Semantics' most important product was AdSense, a program that could distill the content of a website into a handful of keywords. AdSense, when combined with Google's existing Google technology, opened the entire web to Google advertising. AdSense algorithms match advertising from Google's inventory to the context of third-party websites. The revenue generated by the advertising is then split between Google and the website owner.

### DoubleClick

Google diversified its online advertising capabilities with the \$3.1 billion acquisition of DoubleClick in 2007. DoubleClick was a leading ad server, delivering display and video ads to third-party websites. This was a key acquisition for Google because, as Group Product Manager Alex Kinnier observed, "Google...has been a minor player in display advertising."<sup>73</sup> The acquisition was also motivated by the deep relationships DoubleClick had developed with both advertisers and web publishers.<sup>74</sup> By October of 2010, Google claimed that its display advertising business was bringing in \$2.5 billion annually.<sup>75</sup>

### AdMob

AdMob places advertisements on mobile websites and in mobile applications. The product was developed in 2005 by serial entrepreneur Omar Hamoui while he was attending Wharton's MBA program.<sup>76</sup> The launch was well timed. When Apple's iPhone launched in 2007, AdMob was one of the few ad companies ready for the smartphone market. "We had no competition. I don't think our next competitor got there...for maybe another six months," reflected Hamoui.<sup>77</sup> In May 2010, Google acquired AdMob in May 2010 for \$750 million. Over one million apps use AdMob and over one billion dollars has been paid to app developers through AdMob's platform.<sup>78</sup>



## ADVERTISING COMPETITORS

### Facebook

Businesses are no longer asking if they should market on mobile, they're asking how. This is a shift that we think we're very well-positioned to take advantage of and build on.

-Sheryl Sandberg, Facebook COO<sup>79</sup>

In 2016, Facebook earned \$26.89 billion in advertising revenue, an increase of 57 percent over the previous year.<sup>80</sup> Facebook sells targeted advertising on its own site, as well as on other websites and mobile apps. The company's detailed knowledge about users allows it to match relevant advertising based on demographics, behaviors, and interests.<sup>81</sup> Businesses can also communicate directly with customers and the public using Facebook's Pages, Instagram, and Messenger services. By 2017, Facebook counted some two billion monthly active users, an increase of almost 20 percent over 2015.<sup>82</sup>

Facebook's CEO, Mark Zuckerberg, commented in 2015 that the company's, "strategy is much less [about] increasing the volume of ads and much more about increasing the quality of content and the quality of targeting to get the right content to the right people."<sup>83</sup> This is reflected by Facebook's ad sales. From 2014 to 2015, the average price per ad increased by 140 percent while the number of ads delivered decreased by 38 percent.<sup>84</sup> Mobile advertising grew from 65 percent of total revenue in 2014 to 77 percent in 2015.<sup>85</sup>

In 2017, Facebook earned some \$40 billion in online advertising, which is about one half as much as Google. Yet, Facebook market share has been rising rapidly over the last few years, while Google's market share has been declining (**Exhibit 5**). In the mobile ad space Facebook is Google's strongest competitor. Some estimate that Facebook earns as much as 75 percent of all revenue from its mobile ad business. In 2017, Facebook's mobile ad revenue grew by over 42 percent over 2016.<sup>86</sup>

### Microsoft, Yahoo, Verizon, & AOL

In February 2016, Microsoft launched the Bing Network, an ad sales network with access to Microsoft's and partners' properties including AOL, *Wall Street Journal*, and Infospace.<sup>87</sup> Microsoft had previously sold advertising with partner Yahoo as part of the Yahoo Bing Network, but a 2015 renegotiation of Microsoft's search deal with Yahoo resulted in the companies splitting the ad network.<sup>88</sup> The move is one of several recent changes Microsoft has made to its online advertising business to focus on its Bing search engine. Microsoft claims 31 percent market share of the US online search market.<sup>89</sup> In June 2016, this represented 160 million unique users who made five billion searches over the month.<sup>90</sup>

As part of a June 2015 deal, AOL took over display, mobile, and video advertising sales for Microsoft's properties in the US and eight foreign markets.<sup>91</sup> These include Microsoft's MSN, Outlook.com, Skype, Windows, and Xbox. Under the terms of the deal, Microsoft's Bing will be used to power search results and advertising across AOL's online properties such as The Huffington Post, TechCrunch and Engadget for ten years.<sup>92</sup> "The long-term plan is for us to be the sole auctioneer of all [of Microsoft's] non-search monetization," commented AOL's global head of media sales, Jim Norton.<sup>93</sup> The arrangement provides

AOL and its parent company, Verizon Communications, with greater ad inventory and customer access. Rik van der Koori, vice president of Microsoft Search Advertising, believes that it makes sense for Microsoft to line up with AOL based on industry trends, though they also feel strongly about the advertising model.<sup>94</sup>

In July 2016, Verizon announced it intended to acquire Yahoo's Internet businesses raising the possibility of uniting Yahoo and AOL's online advertising businesses. Combined, Verizon and Yahoo achieve about a six percent share in the US online advertising market. "It has the potential to be a third force to Google and Facebook," observed Sir Martin Sorrell, chief executive of WPP, the world's largest advertising group.<sup>95</sup> The acquisition has been delayed by data breaches at Yahoo, and is now scheduled to be completed in 2017.<sup>96</sup>

## ADVERTISING CHALLENGES

### Market Share

From 2012 to 2016 Google's global market share in online advertising slipped from 35 percent to 33 percent (**Exhibit 5**). Google is struggling to maintain its grip on advertising as more people turn to mobile devices and voice enabled search for information. In October 2015, Google announced that more than half of its 100 billion monthly searches were done from mobile devices.<sup>97</sup> Although Google prepared for the transition to mobile with the acquisition of AdMob, Google's mobile advertising margins are estimated to be 30 percent lower than on desktop.<sup>98</sup> Further complicating Google's ad business is the move by users to voice enabled search. In late 2016, nearly 20 percent of searches on Android were done using voice instead of text.<sup>99</sup> In March 2017, Google tested a seventeen-second promotion for Disney's *Beauty and the Beast* on its Google Home speaker and some Google Assistant enabled smartphones that played after users asked the devices about their schedule. Google quickly pulled the test after user complaints. "We're continuing to experiment with new ways to surface unique content for users and we could have done better in this case," commented a Google spokesperson.<sup>100</sup>

### Regulation

Google's dominance in search has invited criticism and scrutiny. This is especially pronounced in Europe, where Google holds some 90 percent market share of all online searches, significantly higher than its roughly 70 percent market share in the U.S.<sup>101</sup> Google has found itself stuck in European courts on issues ranging from privacy to unpaid taxes. In April 2016, European Union regulators accused the company of forcing phone makers and telephone companies into favoring Google's search engine and browser on devices using Google's Android operating system.<sup>102</sup> In a separate case, the EU has also charged Google with skewing search results to favor Google's comparison shopping tool. Google has denied the allegation. "Google is making it clear that they will fight this to the bitter end and the EU is making clear that the bitter end will have a lot of intermediate steps for Google," commented antitrust attorney, Gary Reback.<sup>103</sup> Each of the cases has the potential to cost Google as much as 10 percent of its annual revenue and loosen its tight grip on advertising sales.<sup>104</sup>

### Bad Advertisements and Bad Content

Google took down 1.7 billion bad ads in 2016 that violated its policies. According to Google's Scott Spencer, "...bad ads can ruin the online experience for everyone. They promote illegal products and unrealistic offers. They can trick people into sharing personal information and infect devices

with harmful software.”<sup>105</sup> In September 2016, Google helped form “The Coalition for Better Ads.” The group consists of trade associations, advertisers, publishers, and ad agencies and aims to eliminate bad ads by creating global standards for online advertising. Stephan Loerke, CEO of coalition member World Federation of Advertisers, commented that “We are seeing in our membership significant concern about the uptake of ad blocking, not because it is immediately affecting [marketers], but because of the drivers, which are the frustration of people with the quality of their interaction with ads.” In June 2015, 198 million people were using ad blocking browser extensions. A figure that is growing 41 percent annually.<sup>106</sup>

In March 2017, Google promised to overhaul its policies after major advertisers including the BBC, L'Oréal, Audi, and Toyota boycotted the company's advertising platforms.<sup>107</sup> Advertisers protested that their ads were appearing alongside objectionable content such as racist websites, videos supporting terrorism, and fake news. In doing so, marketers were inadvertently funding the content and damaging their own brands. With over two million websites hosting Google's advertising, it is difficult to distinguish safe content from the objectionable. Google uses software to attempt to screen for objectionable content, but the system's false positives have led to controversy as well. The company was forced to apologize recently after the system blocked music videos from pop stars Tegan and Sara from YouTube.<sup>108</sup>

## Other Strategic Initiative and Current Challenges

### ALPHABETIZATION

The creation of Alphabet moved many of Google's non-advertising products and projects into subsidiaries labeled “Other Bets.” These Other Bets includes businesses like Access (Google Fiber), Calico, CapitalG, GV, Nest, Verily, Waymo, and X. Alphabet's \$809 million revenue in 2016 from Other Bets was derived mostly through the sales of Nest hardware products, selling Internet and television services through Google Fiber, and licensing, research, and development.<sup>109</sup> However, despite increasing the Other Bets revenue over 80 percent from the previous year, the businesses collectively lost \$3.6 billion in 2016. Since joining the company in March 2015, Alphabet's CFO Ruth Porat has attempted to impose fiscal discipline on the speculative ventures. “As we reach for moonshots that will have a big impact in the longer term, it's inevitable that there will be course corrections along the way and that some efforts will be more successful than others,” commented Porat in 2016.<sup>110</sup>

### WAYMO

The challenges of managing Alphabet's Other Bets are illustrated by its Waymo subsidiary. The company traces its history to software and sensor technology developed by Google in 2009. It has since accomplished major technical milestones, but financial achievements have been conspicuously absent. Meanwhile, competitors are catching up, often aided by former Alphabet employees.

In October 2015, Google achieved the world's first fully self-driving trip on public roads, in a car without driver controls.<sup>111</sup> Steve Mahan, the blind 63-year-old passenger, commented that the “cars will change the life prospects of people such as myself.”<sup>112</sup> The self-driving car project was made an Alphabet subsidiary in late 2016 and dubbed Waymo, short for “a new way forward in mobility.”<sup>113</sup> The reorganization was motivated in part by maturity of the self-driving technology. “We're getting ready. And we want to tell the world about it,” commented Waymo CEO John Krafcik.<sup>114</sup>

Although Google has developed its own pod-shaped “Koala” cars, the company has publicly disavowed any intentions to manufacture cars itself. “We are a self-driving technology company. We’ve made it pretty clear that we are not a car company,” stated Krafcik.<sup>115</sup> Instead Waymo is partnering with existing auto manufacturers like Fiat Chrysler to commercialize its technology. By 2017, Waymo’s test fleet of commercial and custom-built vehicles had accumulated over 2.5 million miles of autonomous driving.<sup>116</sup> Between 2015 and 2016, the company reduced the number of times a human safety driver had intervene from an average of once every 1,250 miles to once every 5,000 miles.<sup>117</sup>

Waymo is not alone in its quest to develop driverless cars. Uber and Tesla both have cars with self-driving capabilities on the road. Tesla launched its autopilot feature in October 2015 that automatically steers on the highway, changes lane, and adjusts speed.<sup>118</sup> Tesla’s CEO, Elon Musk, expects the company to be able to demonstrate a fully autonomous vehicle (Level 5: system takes over entire dynamic driving, person as driver is no longer needed) by the end of 2017.<sup>119</sup> Uber began testing self-driving cars with a human backup driver in Pittsburgh in late 2016. Uber is using the tests to gather feedback from customer’ and further its goal of developing an autonomous fleet of cars.<sup>120</sup>

In 2017, Waymo sued Uber for allegedly stealing Waymo’s proprietary self-driving technology. Uber acquired the autonomous-vehicle startup Otto for \$700 million in 2016. Otto was founded by Anthony Levandowski during the same time he was working for Waymo on its autonomous-vehicle program. Waymo claims Levandowski stole more than 14,000 proprietary files. In particular, Waymo alleges that Levandowski set up Otto to steal trade secrets and proprietary designs, and to turn around and use this knowledge to advance self-driving technology at Uber.<sup>121</sup> This is a stark turnaround from the earlier close relationship between Alphabet and Uber. Google Ventures, Alphabet’s venture capital unit, had made a \$200 million investment in the fledgling ride-hailing service in 2013. Alphabet’s chief legal counsel was also a board member at Uber. He resigned from Uber’s board one week after Uber acquired Otto.

Other technology and car companies are joining the fray as well. Intel has agreed to purchase Mobileye NV for \$15 billion. Mobileye specializes in driver assistance systems and is working with several major automakers including BMW, Ford, General Motors, Nissan, Volvo, Audi, and Hyundai.<sup>122</sup> General Motors spent \$1 billion to acquire self-driving startup Cruise Automation in 2016. In early 2017, Ford announced that it would invest \$1 billion in Argo AI to develop a virtual driver system for its fully autonomous vehicle due in 2021.<sup>123</sup>

## RETAINING TALENT

Alphabet’s ability to attract top talent is evident throughout the organization. It is often considered one of the hardest corporations to break into. Not only does the company look for talent from world-class institutions, it also requires that its employees embody “Googleness,” an intangible trait that refers to someone’s ability to work in teams, handle ambiguity, and think outside of the box.<sup>124</sup> Now that Alphabet has captured top talent in the industry, it’s facing a new challenge in retaining those key resources. The high-profile cases of Sheryl Sandberg and Marissa Mayer, both of whom left Google for executive roles at Facebook and Yahoo respectively, illustrate the challenge that the company faces.<sup>125</sup> The talent retention issue is snowballing as Alphabet matures in its operations. Employees at Alphabet are being poached by pre-IPO ventures that have a promising future, such as Uber and Airbnb, and most recently Snap.<sup>126</sup>

Although Waymo's vehicles are adept at avoiding obstacles, the company has been hitting potholes in human resources. Bloomberg writers Alistair Barr and Mark Bergen described the company as a "talent sieve" in 2017 resulting from leadership changes, strategy doubts, and rivals luring key employees away.<sup>127</sup> Waymo's compensation scheme is another factor in the talent loss. Employees hired for the self-driving car project were granted equity and bonuses tied to the project's success. According to Barr and Bergen, the payouts had become so large by 2015 that many employees no longer needed job security. The employee exodus is threatening Waymo's investments in research and development.

## The Road Ahead

As the Tesla X parked itself, and as Page walked up the Google's lobby staircase to Pichai's office, he caught a panoramic view of the numerous office buildings composing Google's campus. He thought back on the fact that many of them had been built by Silicon Graphics. Once a highly successful tech firm, the company was now defunct. The recollection made him a bit uneasy as he considered Google's current position as the leader in online advertising. What could Google do to tackle the challenges of market share loss, regulatory pressures, and bad ads? More and more critics, not just in Europe but also in the U.S., were calling Google a "news and information utility" (a so-called digital monopoly), and demanding stricter regulation and editorial curation of content.

What could Alphabet do to maintain its edge over the competition? What would Alphabet need to do to set the standards in self-driving technology much like it did with the Android operating system for mobile phones?

## EXHIBIT 1 Alphabet Key Financial Data

Alphabet Consolidated Statement of Income (in millions except earnings per share)					
Year Ended December 31,	2012	2013	2014	2015	2016
Revenues	46,039	55,519	66,001	74,989	90,272
Costs and expenses:			30.1%	19.9%	22.5%
Cost of revenues	17,176	21,993	25,691	28,164	35,138
Research and development	6,083	7,137	9,832	12,282	13,948
Sales and marketing	5,465	6,554	8,131	9,047	10,485
General and administrative	3,481	4,432	5,851	6,136	6,985
Total costs and expenses	32,205	40,116	49,505	55,629	66,556
Income from operations	13,834	15,403	16,496	19,360	23,716
Other income (expense), net	635	496	763	291	434
Income before income taxes	14,469	15,899	17,259	19,651	24,150
Provision for income taxes	2,916	2,552	3,639	3,303	4,672
Net income from continuing operations	11,553	13,347	13,620	16,348	19,478
Net income from discontinued operations	(816)	(427)	516	-	-
Net income	10,737	12,920	14,136	16,348	19,478
Earning per share (basic) excluding extraordinary items	17.66	20.05	20.61	23.11	28.32

Alphabet Revenues by Source (in millions):					
Year Ended December 31,	2012	2013	2014	2015	2016
Advertising revenues:					
Google websites	31,221	37,422	45,085	52,357	63,785
Google Network Members' websites	12,465	13,125	14,539	15,033	15,598
Subtotal Advertising revenues	43,686	50,547	59,624	67,390	79,383
Other revenues:					
Google Segment Other revenues	Not available		6,050	7,154	10,080
Other Bets revenues			327	445	809
Subtotal Other revenues	2,353	4,972	6,377	7,599	10,889
Total revenues	46,039	55,519	66,001	74,989	90,272

(continued)



## EXHIBIT 1 (continued)

Alphabet Revenues by Geography (in millions):					
Year Ended December 31,	2012	2013	2014	2015	2016
United States	21,287	24,752	29,482	34,810	42,781
United Kingdom	4,846	5,600	6,483	7,067	7,787
Rest of the world	19,906	25,167	30,036	33,112	39,704
Total revenues	46,039	55,519	66,001	74,989	90,272

Alphabet Operating Income (in millions):					
Year Ended December 31,	2012	2013	2014	2015	2016
Operating income (loss):					
Google	Not available		18,965	23,319	27,892
Other Bets			-1,893	-3,456	-3,578
Reconciling items*			-576	-503	-598
Total income from operations	13,834	15,403	16,496	19,360	23,716

\*Reconciling items are primarily corporate administrative costs and items that are not allocated to individual segments.

Excerpts from Balance Sheet (in millions):					
Year Ended December 31,	2012	2013	2014	2015	2016
Assets	93,798	110,920	131,133	147,461	167,497
Liabilities	22,083	23,611	25,327	27,130	28,461
Stockholders' equity	71,715	87,309	103,860	120,331	139,036

Source: Depiction of publicly available data.

**EXHIBIT 2** Ad Statistics

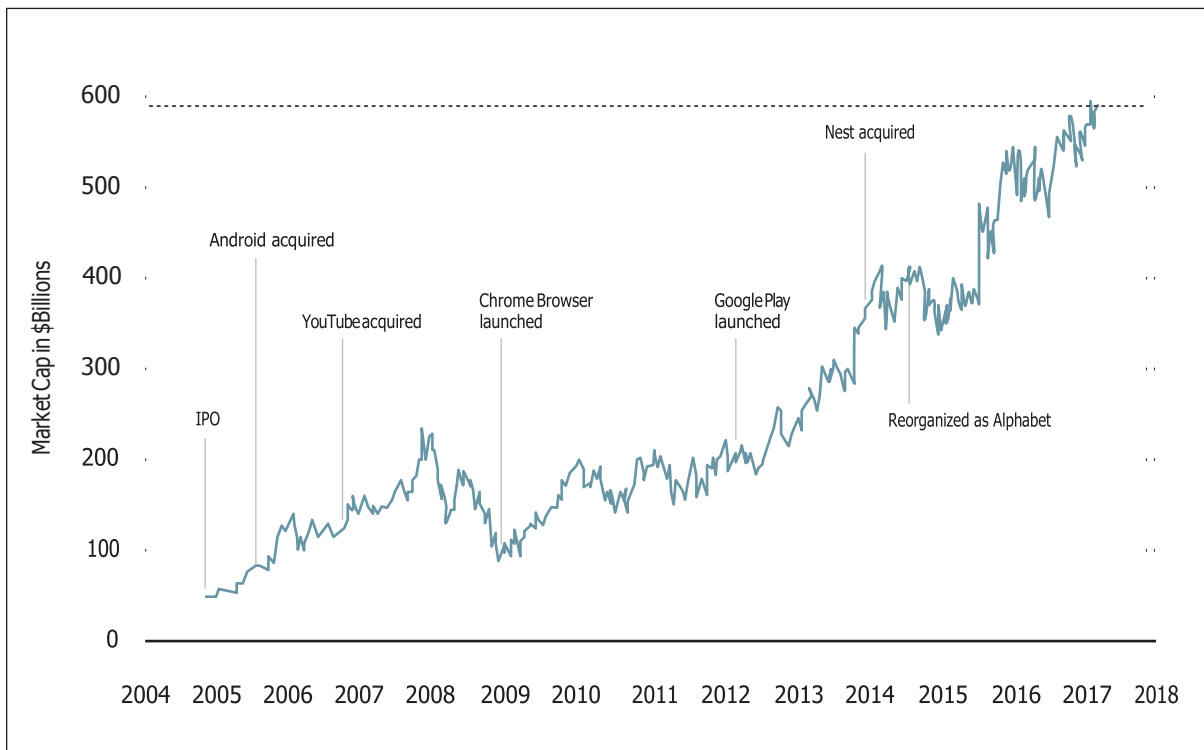
<b>% Change in Paid Clicks</b>				
	<b>2012-2013</b>	<b>2013-2014</b>	<b>2014-2015</b>	<b>2015-2016</b>
Aggregate paid clicks	25%	20%	22%	32%
Paid clicks on Google Properties	33%	29%	33%	40%
Paid clicks on Google Network Members Prop.	11%	2%	-7%	3%

<b>% Change in Cost-per-click</b>				
	<b>2012-2013</b>	<b>2013-2014</b>	<b>2014-2015</b>	<b>2015-2016</b>
Aggregate cost-per-click	-8%	-5%	-11%	-11%
Google Properties cost-per-click	-10%	-7%	-15%	-13%
Google Network Members Prop. cost-per-click	-8%	6%	-3%	-13%

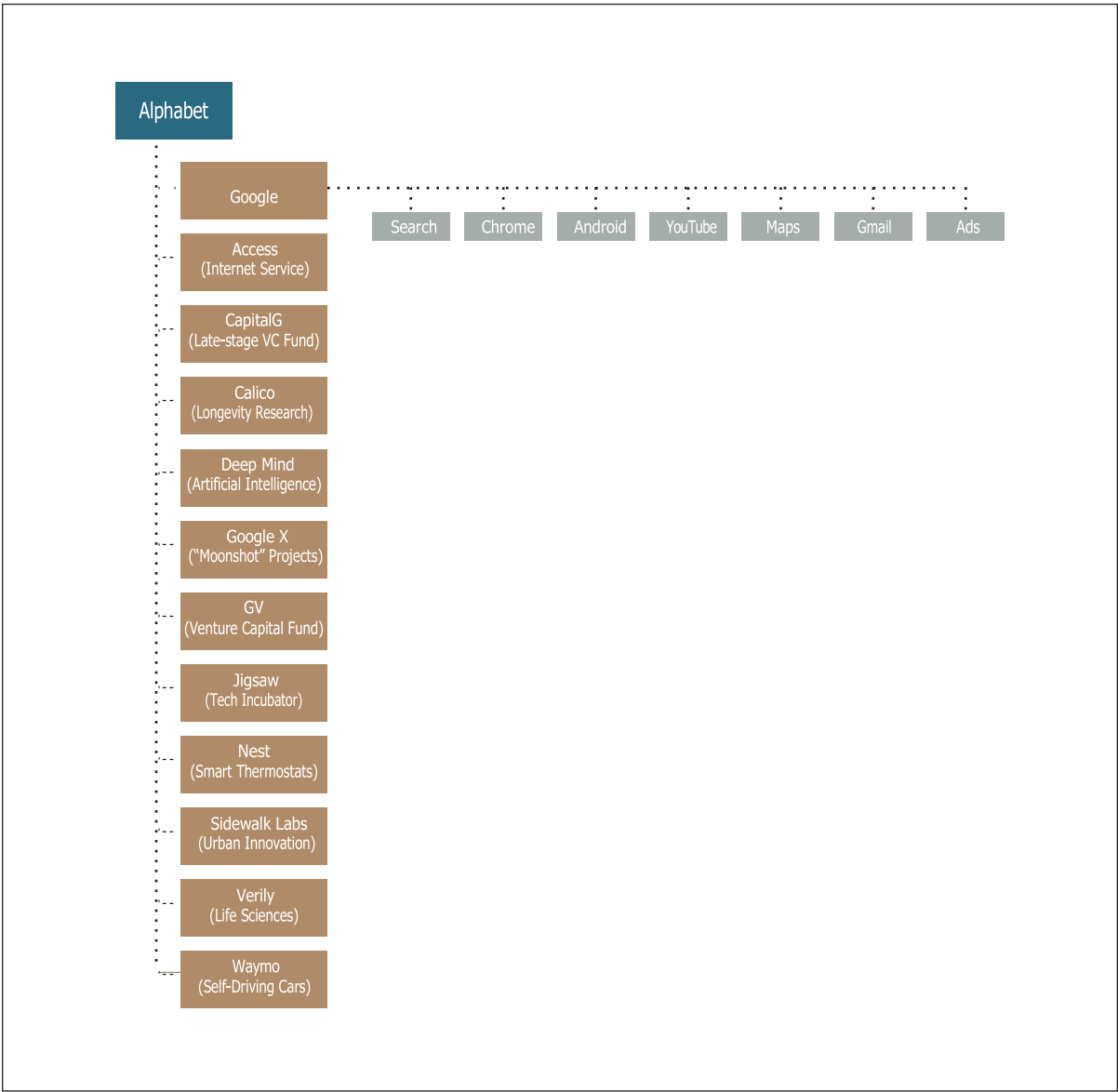
Source: Depiction of publicly available data.

EXHIBIT 3 Alphabet Market Cap with Major Events, 2004–2017



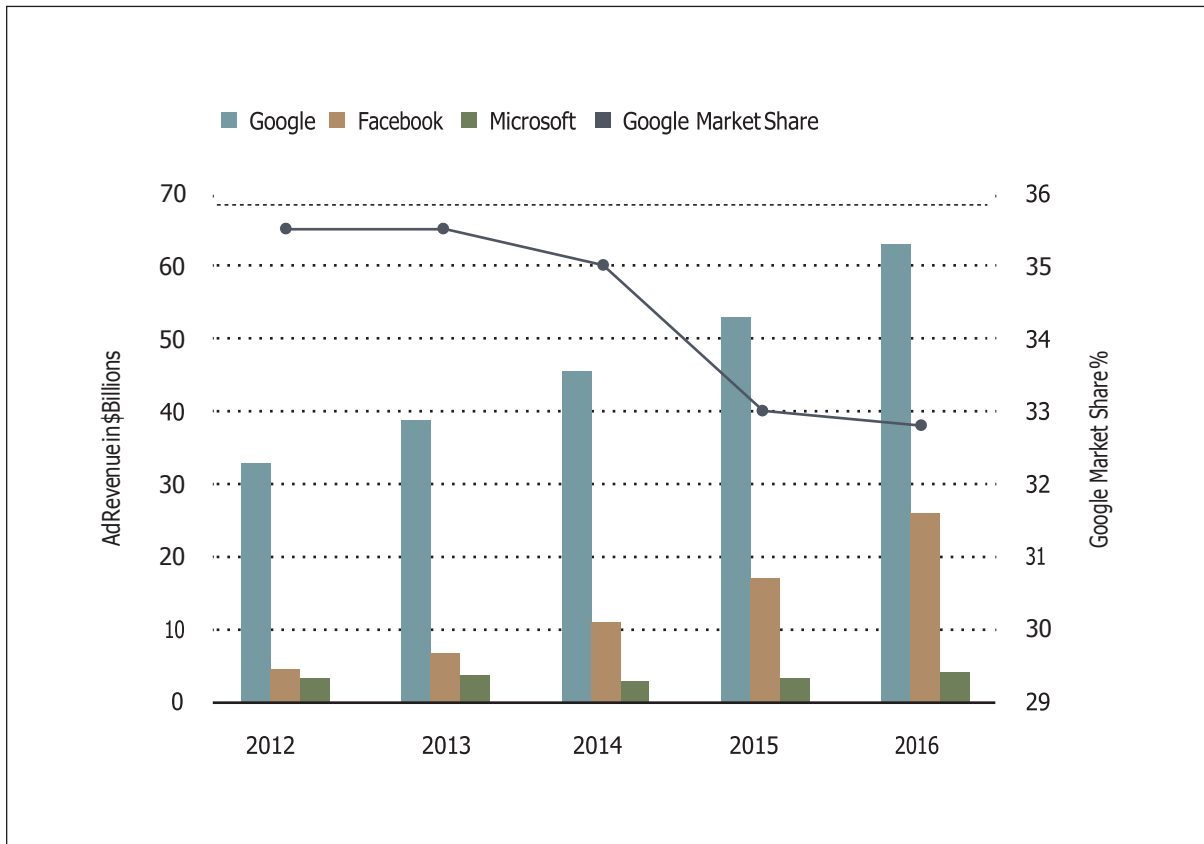
Source: Author's depiction of publicly available information.

EXHIBIT 4   Alphabet Organizational Structure



Source: Depiction of publicly available information

EXHIBIT 5 Google Ad Revenue vs Competitors, 2012–2016



Source: Depiction of data from “Google privacy-policy change faces new scrutiny in EU,” *Wall Street Journal*, accessed January 24, 2017.

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