



# Turning Silicon into Gold

The Strategies, Failures,  
and Evolution of the Tech Industry

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Griffin Kao  
Jessica Hong  
Michael Perusse  
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**Apress**<sup>®</sup>

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*To our family, friends, and the summer of 2019.*

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# About the Authors

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**Griffin Kao** has a background in computer science, mechanical engineering, and economics from Brown University. He's worked as both a software engineer and product manager at B2B and B2C tech companies, both large and small, and has acquired a lot of insight into how the industry operates.

**Jessica Hong** studied at Cornell University where she received a bachelor's degree in computer science. She's been able to gain a deeper understanding of the impact of technology in the world through her previous roles as a software engineer, product manager, and venture capital partner.

**Michael Perusse**, Harvard University class of 2020, studied computer science and mathematical sciences. He's worked in product management at both Google and Microsoft and at start-ups, and has written for a variety of magazines and web sites.

**Weizhen Sheng** studied networked and social systems engineering for her bachelor's degree and data science for her master's degree at the University of Pennsylvania. She has previously worked as a product manager and software engineer in the tech industry and as an analyst at an investment board, offering her varying perspectives on the role of technology.

# Introduction

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So you're curious about how the tech industry operates? Then you've come to the right place! In this book, we present you with stories of both blinding success and utter failure, as well as of odd and unexpected phenomena, that paint a picture of a Silicon Valley simultaneously capricious and rational in nature. We've packaged these narratives in 25 easy-to-digest cases that each focus on a concept relevant, but not obvious, to anyone exploring a career at the intersection of technology and business.

In particular, we've grouped the cases into the five sections that comprise this book. The first, "Getting Started," largely analyzes how budding companies or individuals generate the initial spark. The second, "Gaining the Edge," focuses on the middle part of a company's storyline marked by growth and strategic perfecting. The third, "Extending the Lead," brings the discussion to mature companies, their dominance, and the problems they now face. Finally, the last two sections, "Failing" and "Society," respectively, consider what contemporary failure in the tech industry can look like and ways in which the tech industry interacts with broader societal dynamics.

In choosing the topics for these cases, we tried to avoid those we felt were already evident or self-explanatory. At the same time, we attempted to speculate as little as possible, providing analysis for past events and their implications, rather than predicting the future. For those coming from backgrounds in computer science or software engineering, you'll notice that we've abstracted away much of the implementation details when talking about technical solutions. We did this on purpose, since we believe that while technology itself certainly drives the narrative of the tech industry, it's the decisions made by humans regarding how technology is used or distributed that provide the most unique and transferable insights (and may be the most interesting to read about)!

We had a lot of fun writing this so we really hope you enjoy reading.



PART

I

# Getting Started

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# The Second Mover Advantage

## What Facebook, the iPhone, and Airbnb All Have in Common

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Like that of the Roman Empire many years before, the meteoric rise of MySpace beginning in 2003 was sweeping and absolute. Although MySpace was preceded by several smaller social networking sites like Friendster and SixDegrees, none could match the user base, the press coverage, and the valuation given to MySpace by investors. For all intents and purposes, MySpace was the forefather of our modern-day notion of the “social media” platform—the behemoth with over 100 million monthly active users and millions, if not billions, of dollars in ad revenue.<sup>1</sup> In fact, MySpace was purchased after a huge bidding war by the renowned News Corporation (parent company of the Fox Broadcasting Company) for \$580 million in 2005, one of the largest acquisitions of the time.<sup>2</sup> And in 2006, the social networking site surpassed Google as the most visited web site, then continued to dominate the social network space for the next couple of years.

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<sup>1</sup> <https://martechtoday.com/despite-ongoing-criticism-facebook-generates-16-6-billion-in-ad-revenue-during-q4-up-30-yoy-230261>

<sup>2</sup> <http://news.bbc.co.uk/2/hi/business/4695495.stm>

## The Rise of Facebook

In theory, MySpace was destined for everlasting greatness—too big to possibly fail, just like the Roman Empire in its heyday. And yet, also like the Roman Empire, a competitor (the Byzantium Empire) laid in waiting to deliver a hard reality check. At the same time MySpace was enjoying its time in the limelight, Harvard students Mark Zuckerberg and Eduardo Saverin were quietly expanding their social network, initially called TheFacebook and limited only to Harvard students, to other colleges. In 2005, after having changed the name of the platform to just “Facebook,” Zuckerberg’s company received \$12.7 million in funding from Accel Partners, and then in 2006, Facebook became available to the general public.<sup>3</sup>

Facebook’s growth since opening to the general public was explosive, and in 2008, the site overtook MySpace in the Alexa rankings, which are based on Internet traffic. The next year, Facebook surpassed MySpace in unique monthly visitors to the web site. In the years after, Facebook continued to gain users, while MySpace saw its user base plummet—forcing a series of layoffs, management changes, and revenue losses. In 2011, News Corporation finally threw in the towel and sold the site for \$35 million, a fraction of the price they originally paid.<sup>4</sup> Today, MySpace is largely relegated to the nostalgic memories of an era long past. The platform has redefined itself as an entertainment site that provides music, video, and news content with 15 million monthly visitors as of 2016, a far cry from the social media titan that it used to be.<sup>5</sup> At the same time, Facebook has grown to 2.41 billion monthly active users in the first quarter of 2019 and has a colossal market cap of \$581 billion.<sup>6</sup> Despite being a latecomer to the social media space, Facebook is the clear winner over MySpace.

## Breaking Down the Second Mover Advantage

By conventional logic, Facebook’s triumph is counterintuitive. How many potential start-up founders have hesitated to enter a space because “someone has already done it”? However, this is actually a well-documented phenomenon called “the second mover advantage,” the advantage a company obtains by following others into a market. There have been numerous examples of a market follower prevailing over a pioneer—Airbnb over CouchSurfing, the iPhone over the Blackberry, Gmail over Hotmail, Zappos over Shoebuy, and the list goes on and on. The second mover advantage has given these challengers the ability to learn from the mistakes of their

<sup>3</sup> [www.cnet.com/news/facebooks-valuation-the-cheat-sheet/](http://www.cnet.com/news/facebooks-valuation-the-cheat-sheet/)

<sup>4</sup> [www.theguardian.com/technology/2011/jun/30/myspace-sold-35-million-news](http://www.theguardian.com/technology/2011/jun/30/myspace-sold-35-million-news)

<sup>5</sup> <https://adage.com/article/media/myspace-juice-left-publishers/303781>

<sup>6</sup> <https://newsroom.fb.com/company-info/>

predecessors, as well as ride the tailwind of a space already carved out in the “free-rider” effect. More specifically, these can be broken down into three distinct benefits:

1. **Product development and management:** Second movers save a lot of money on R&D (research and development), being able to work off of a product that has already been tested and optimized. Newcomers to an existing market can extrapolate the winning features and learn from failed launches or product gaps. Facebook, for example, modeled their platform after MySpace’s, even choosing the same colors (blue border, white background). However, the company learned from MySpace’s cluttered and unsightly wasteland of over-personalized pages, opting for a cleaner look for user profiles. And arguably more important, the platform listened to users where MySpace didn’t, offering users a product to support what already mattered to them instead of trying to give them new things to care about (i.e., a forum to post and interact with other users rather than specified sections for things like karaoke or classified ads).
2. **Market acceptance:** Second movers don’t have to expend resources on educating target users on the benefits of the product. Consumers are slow to change, so it can often be costly to convince them that a solution really works. The first mover has the responsibility of moving the market through the introduction stage of the product life cycle, while the second mover can go directly to growth and sales (Figure 1-1). When Facebook was first introduced, users were familiar with the idea of the social networking site—they knew how the product could help them and how to use it. In some cases, like Facebook’s, market acceptance can even mean that investors are more willing to invest in the enterprise, accelerating growth and inflating value.

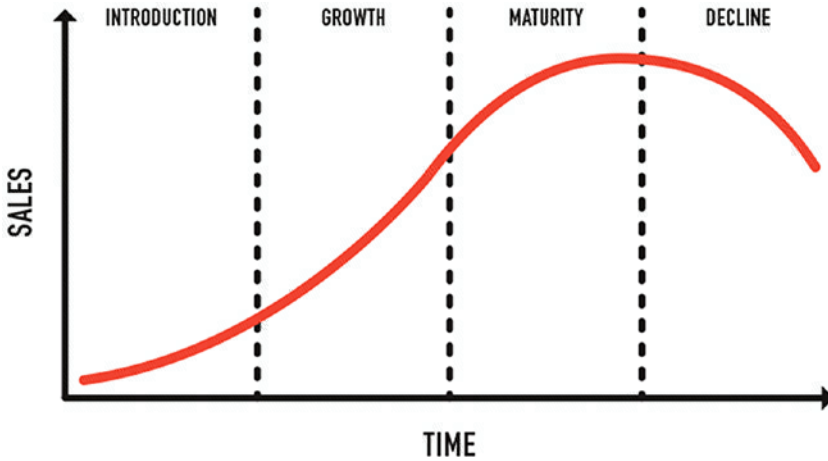


Figure 1-1. The Product Life Cycle

3. **Customer acquisition:** Second movers generally spend less on customer acquisition, because they don't have to spend the time and money testing multiple channels for sustainable acquisition. Instead, they can copy the channels already used to acquire new users like MySpace's feature for importing contacts or sending invites to the platform over email. Facebook took this concept and ran with it, not only allowing users to invite friends to join but also to do all kinds of engaged actions like liking pages or playing Farmville on the platform. Moreover, second movers can fine-tune the messaging of their predecessors. Facebook, for example, took MySpace's slogan, "A place for friends," and modified it to be more widely appealing. By claiming the platform "helps you connect and share with the people in your life," Facebook appealed not just to teenagers but to a wider-reaching audience.

Most importantly, the late mover gets to know that there *is* a market in the first place, without having to do any validation—the company first to market has already done all the heavy lifting. Some wildly successful companies, including Instagram, Kickstarter, Google, Nike, along with the aforementioned Airbnb, Apple, and Zappos, have enjoyed some or all of these benefits by following someone else to the market.

## What This Means for You

At the same time, there are some obvious advantages to being the first to a market, like no initial competition, the potential for patent, and customer loyalty/brand recognition. In addition, not all markets are equally conducive to second movers. Some of the factors that make a market more friendly to latecomers include low customer investment (making it easier to switch between brands), long expected lifetime for the market, a rapid innovation speed allowing followers to iterate and improve on their predecessors, and product fluidity encouraging followers to borrow product features from a pioneer. Together, these characteristics make a market ripe for entry to second movers. A great example of markets like this is the shared electric scooter economy comprised of companies like Lime and Bird.

It makes sense that the first to a market is disproportionately valued by innovators and investors since there's high upside in the opportunity to gobble up market shares. However, there's also considerable risk involved in introducing your product to customers who might not find it valuable or who might be resistant to mass adoption. Entrepreneurs shouldn't give up on an idea just because there's a product out there that does the same thing or something similar. Embrace the second mover advantage to hedge risk and accelerate growth, because you could be the next Facebook, iPhone, or Airbnb.

**Takeaways:** Being the second company to enter or a general follower to an emerging market can oftentimes be cost-effective and less risky than being the first.

### Questions

1. Are there times in your life as an individual when it's been helpful to copy or follow someone else? Are there times when it's been better to be the first to do something?
2. If you're looking to start a company, is the market you'd like to enter more conducive to first movers or second movers?
3. If you're looking to start a company, has there been someone else that has already attempted the same or a similar solution? If so, did it succeed and/or why did it? Did it fail and why did it? How can you use this knowledge to strengthen your plan and/or pivot?

# Election Meddling

## How One Man Changed an Election

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In a vast world, we're often confronted with the reality that any individual action or set of actions we take is insignificant in the grand scheme of things. This idea affects decisions we make on a daily basis. At times, it hands us the courage to proceed without shame, like the many cases of *What difference does it make if I throw this wrapper on the ground?* At other times, it gives us pause and impresses upon us inaction. *Why does it matter that I drive an SUV gas-guzzler when millions of other Americans do? Why should I speak out for what is right when my voice is one in a billion?* Our inaction in the face of transgression is what enables the tragedy of the commons—the tragic depletion and destruction of a resource because individuals act independently, according to self-interest, and in contradiction to the common good. The feeling of insignificance nourishes evil and kills dreams; it causes environmental damage and widespread poverty. Indeed, this is the very basis of voter apathy. Contrary to all this, one man was able to expose the fallacy behind the thought by single-handedly influencing the outcome of the hotly contested 2017 special Senate election in Alabama. This is David Goldstein's story.

## Goldstein's Experiment

David Goldstein set out to shift the tide toward Democratic candidate Doug Jones who was running against Republican Roy Moore—a tall task given that the last Democratic win in a US Senate race in the state was in 1992. Inspired by Cambridge Analytica—the London-based company that leveraged questionable data mining/analysis tactics and targeted marketing to aid Donald Trump's 2016 presidential campaign<sup>1</sup>—Goldstein wanted to see if he could replicate their digital strategy in effectiveness with limited resources. In addition, he wanted to see if he could do so while remaining in compliance with legal and ethical guidelines. And to do that, he wanted to run a real-world experiment, as a proof of concept, with \$85,000 in funding from individual donors. By comparison, the average cost of winning a Senate seat in 2016 was \$10.6 million, according to the Center for Responsive Politics, a nonprofit, nonpartisan research group.<sup>2</sup> And that's just spending by the campaign itself—adding in external spending (outlays by party committees, etc.) nearly doubles that figure.

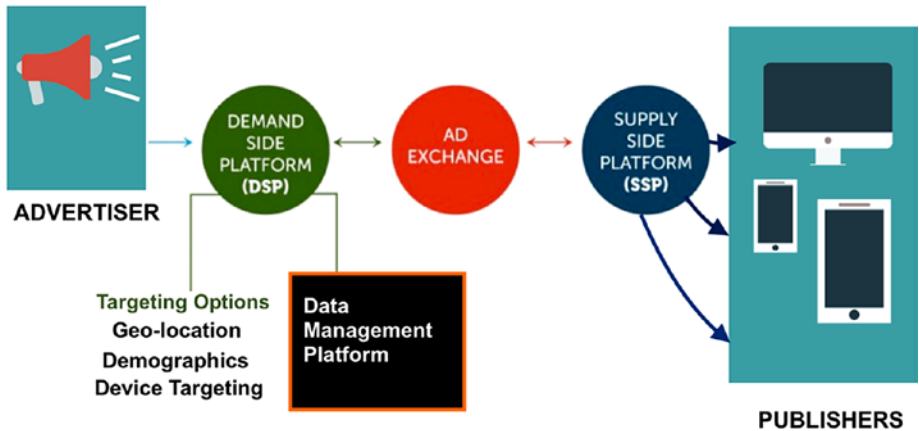
The crux of Goldstein's plan was a demand-side platform (DSP), software that allows for the management of advertising across many real-time bidding networks like Google Ads or Facebook Ads. DSPs typically allow marketers to bid in real time on ads, track posted ads, and optimize for cost and effectiveness, all in one interface. Goldstein paired the DSP with supply-side platforms (SSPs), network-specific tools like Facebook Connect, to enable programmatic advertising, the application of complex algorithms to automate the process of purchasing and posting successful ads to social media platforms and news sites at scale (see Figure 2-1).

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<sup>1</sup>[www.reuters.com/article/us-facebook-cambridge-analytica-factbox/factbox-who-is-cambridge-analytica-and-what-did-it-do-idUSKBN1GW07F](http://www.reuters.com/article/us-facebook-cambridge-analytica-factbox/factbox-who-is-cambridge-analytica-and-what-did-it-do-idUSKBN1GW07F)

<sup>2</sup>[www.opensecrets.org/news/2016/11/the-price-of-winning-just-got-higher-especially-in-the-senate/](http://www.opensecrets.org/news/2016/11/the-price-of-winning-just-got-higher-especially-in-the-senate/)





**Figure 2-1.** A DSP and SSP Pairing

In Goldstein’s experiment, he split up the voter population into four groups targeted by separate campaigns (according to his own blog post explaining the experiment):<sup>3</sup>

1. **Conservative GOP voters:** These voters who clicked on the ads were taken to a site that showed them articles written by conservative or religious figures arguing against Roy Moore—since Goldstein believed that conservative and evangelical were underexposed to people with similar beliefs to them opposing Moore.
2. **Moderate GOP voters:** The moderate Republican voters were shown a different site that encouraged them to write in a different, more moderate Republican candidate (in opposition to the staunchly conservative Moore).
3. **Democrat voters:** Registered Democrats who clicked on the ads were taken to a site that asked them to commit to voting and where they could find where to vote. The site also displayed content published on other web sites about how Democrats were close to victory in Alabama depending on turnout.
4. **Unregistered but likely Democrat voters:** Finally, unregistered Democrats who clicked on ads were taken to register to vote online.

<sup>3</sup>[https://medium.com/@david.goldstein\\_4168/https-medium-com-tovolabs-proof-of-digital-persuasion-in-alabama-senate-race-85a517481371](https://medium.com/@david.goldstein_4168/https-medium-com-tovolabs-proof-of-digital-persuasion-in-alabama-senate-race-85a517481371)

To Goldstein, a large part of the experiment was proving that he could achieve similar potency in his ad campaign to that of companies like Cambridge Analytica but without having to rely on false information in his published content—so he made sure that the content he was displaying to Democrats and Republicans alike was reliably true. Instead of altering the actual content, he wanted to make sure he was altering the flow of information to voters.

## Impact

To determine the impact of the experiment, Goldstein selected three senate districts that could be matched against three other districts controlling for demographics, past voter history, and media consumption. Those in the control group, people in the first three districts, were not shown the ads, per targeting restriction that he could apply in the DSP. In contrast, he was able to get significant penetration in the test group, displaying a digital ad at least once to about 50% of the target demographics in those states. Although the click-through rate (CTR) was below average at 0.25% (the benchmark CTR for advocacy ads on Google Adwords is 1.6%)<sup>4</sup>, Goldstein still observed 11,000 unique engagements on the curated experiment sites.<sup>5</sup> Breaking down the results even further, Goldstein saw even more direct evidence of his impact on the election. He witnessed a decrease in voter turnout among Republicans in the 3 experimental districts when compared to the control group: a 2.5% decrease for moderate GOP voters and a 4.5% decrease for conservative GOP voters. Conversely, he saw a 3.9% increase in voter turnout among registered Democrats in the same districts when compared to the control group.

Of course, verifying the accuracy of Goldstein's observations of his experiment's effect on the election is nearly impossible, but what's objectively true is that Doug Jones won the election, becoming the first Democrat in 25 years to win a US Senate seat in Alabama. While Goldstein's singular vote probably would not have changed the election results, Goldstein was arguably successful at changing the course of history by leveraging ads tech tools—all with a fraction of the resources typically consumed in a successful Senate campaign.

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<sup>4</sup>[www.wordstream.com/average-ctr](http://www.wordstream.com/average-ctr)

<sup>5</sup>[https://medium.com/@david.goldstein\\_4168/https-medium-com-tovolabs-proof-of-digital-persuasion-in-alabama-senate-race-85a517481371](https://medium.com/@david.goldstein_4168/https-medium-com-tovolabs-proof-of-digital-persuasion-in-alabama-senate-race-85a517481371)

## Technology's Role

We should emphasize the role technology played in this story, both augmenting the influence of Goldstein's actions and automating the execution of his agenda. Moreover, technology allowed him to run the experiment completely remotely, from New York City, where he was living at the time. His narrative is inspiring in the implication that our actions and words can be significant. In this new age dominated by viral content and information exchange across invisible networks, our voices can be amplified a million times over from any geographic location given the right Internet tools, allowing us to exercise more power than ever before in actuating change. However, this also means that technology allows individuals to cause harm at a greater scale—think data breaches or cyber attacks or deepfake revenge porn. So while Goldstein's story is an inspirational one, we must remember that the same strategy has been and can still be used to push nefarious agendas like ISIS propaganda or Russian interference into US elections.

**Takeaways:** Individuals should no longer frame the significance of our actions in the context of a tech-less world, since we can leverage technology for scalable impact. From a manager's standpoint, empower your employees with the tools to do more—but also with checks to prevent large-scale wrongdoing—and you'll see that small teams can provide considerable output.

### Questions

1. What are some ways in which you currently use technology to amplify your voice or increase impact?
2. What are some situations in our individual lives where we might hesitate because our own impact seems inconsequential? And how can technology enhance our impact?
3. How can society, institutions, or individuals make sure ad technology is not used for "bad" purposes? What qualifies a purpose as "bad"—criminal, unethical, something else?