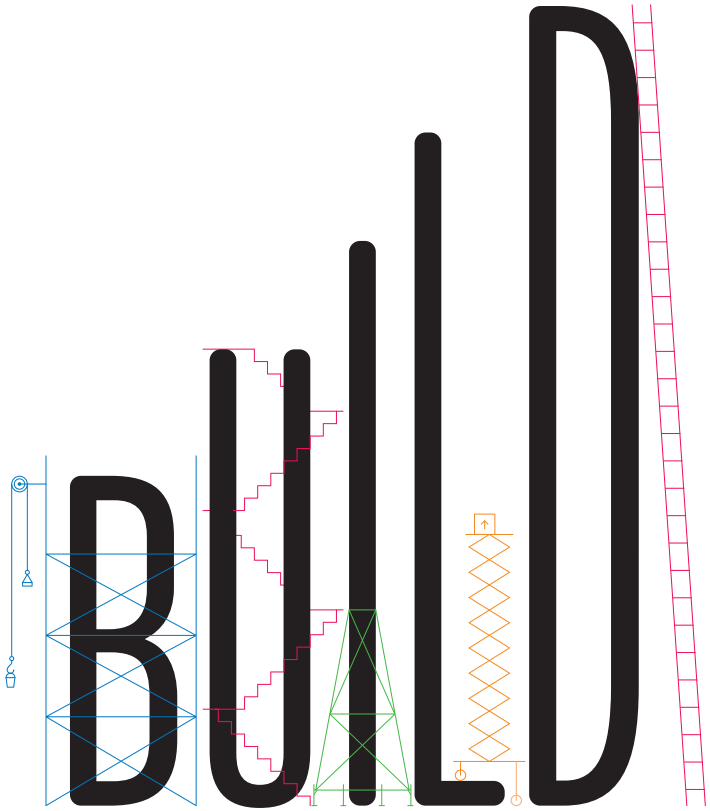
'Tony Fadell has made more cool stuff than almost anyone else in the history of Silicon Valley, and in Build *he tells us how.'*

Malcolm Gladwell



An Unorthodox Guide
to Making Things Worth Making

TONY FADELL

The *New York Times* Bestseller

PRAISE FOR *BUILD*

"Tony Fadell has made more cool stuff than almost anyone else in the history of Silicon Valley, and in *Build* he tells us how. This is the most fun—and the most fascinating—memoir of curiosity and invention that I've ever read."
—Malcolm Gladwell, host of the *Revisionist History* podcast and author, *Outliers* and *Talking to Strangers*

"Tony Fadell is one of the world's great experts in starting companies and creating insanely great products. He's distilled his wisdom in this book, providing wildly useful mentorship in a delightfully readable set of stories."
—Walter Isaacson, author and biographer of Steve Jobs, Albert Einstein and Leonardo DaVinci

"Tony Fadell distills his epic career into refreshingly candid, often contrarian advice that you can put into practice right away. Whether you're looking to build a great product, a creative team, a strong culture, or a meaningful career, Tony's guidance will get you thinking and rethinking."
—Adam Grant, author of *Think Again* and Host of the TED podcast *WorkLife*

"Tony Fadell is the legendary technologist, engineer and entrepreneur who's lived so many lives in the pressure-cooker of Silicon Valley bringing visionary ideas into existence, one after another. The chance to now share his insights, instincts and wisdom is essential reading and a precious gift for any inventor hungry to change the world."
—Thomas Heatherwick, Award Winning Designer & Founder Heatherwick Studio

"Based on hard won, real life lessons as an entrepreneur, Tony Fadell's *Build* delivers priceless advice for any young person who wants to build something great or change the world for the better. I wish I had this book when I was twenty-one."
—Ben Horowitz, Founding Partner, Andreessen Horowitz

"Tony has an uncanny ability to take his infinite wisdom and legacy of leadership, mentorship, innovation, and success and break it down into a practical, no-nonsense how-to guide on what it means to build something with meaning that will endure."
—Daniel Ek, founder and CEO, Spotify

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"You owe it to yourself to benefit from Tony's amazing journey and the advice he received from iconic mentors like Steve Jobs and Bill Campbell. Candid, often bold straight talk that will help you immensely on your journey."

—Bill Gurley, general partner, Benchmark

"Fadell leaves no stone unturned in the art and science of turning ideas into reality. This book is pure muscle for the next generation of product leaders and outfits us all with actionable tactics. Absorb it deeply and then get to work."

—Scott Belsky, founder, Behance and CPO, Adobe

"*Build* is a master class in learning from failure en route to success. Whether you're dreaming of starting your own business, or just curious about the inner workings of tech innovation, there's something here for everyone."

—David Epstein, author, *Range* and *The Sports Gene*

"Insightful. Funny. Instructive. Unvarnished. In a book brimming with energy and enthusiasm, Tony Fadell, builder of epoch-defining products, draws on his experience with failure and accomplishment to coach you through every stage of your career."

—Joanna Hoffman, former vice president of marketing, General Magic and member of the original Macintosh team

"*Build* is the new bible for anyone interested in creating successful products and companies. Fadell's frank account of an epic period in Silicon Valley is so engrossing, you won't realize how much you have learned until the finish."

—Randy Komisar, general partner, Kleiner Perkins and author, *The Monk and the Riddle*

"Tony Fadell takes the reader on a rollercoaster ride, revealing what it's really like to work in Silicon Valley and simultaneously providing a compelling instruction manual for anyone who wants to follow in his footsteps."

—John Markoff, author, *Machines of Loving Grace*

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"Great words of wisdom from one of the most insightful innovators of our time. Tony delivers advice for entrepreneurs at all stages of their career. A must-read."

—Niklas Zennström, founder and CEO, Atomico

"Tony's experience can be applied to any builder or creator anywhere in the world. The challenges are always the same, and Tony shares a number of insights on how to navigate them."

—Micky Malka, managing partner, Ribbit Capital

"Truly historic anecdotes, backstories, and straight-talk advice from a hall of fame entrepreneur who has seen and done it all. I thought I'd be too busy to read this book once. I read it twice. TWICE."

—Jim Lanzone, CEO of Yahoo

"This isn't your typical business book. It's a loud, passionate, mission-driven anthem about how to build, from one of the greatest product designers of all time. If you want to learn something about how to start a company, be a CEO, design world-changing products, or build anything great, this is it, right here."

—Steve Vassallo, general partner, Foundation Capital

"This is an insightful overview into Tony's extraordinary life at the junction of the biggest technological revolution of humankind. It is an amazing blueprint on how creative thinkers can negotiate their way to making ideas come to life in the world."

—Sir David Adjaye, OBE, architect

"*Build* is a journey into the amazing messiness of Tony's product brain that founders, product managers, designers and engineers will find inspiring to blast through cover to cover. An indispensable guide to come back to year after year."

—Hugo Barra, CEO, Detect

"Tony's compelling 'advice encyclopedia' includes tried-and-true rules of engagement that really work. Anyone who wants to be an entrepreneur—or understand the craft—should find this book to be an invaluable resource."

—Mary Meeker, cofounder, BOND

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"To build, to make, to design is the biggest adventure one can embark on. Tony Fadell's storytelling of how he built 21st-century product icons is not just a fascinating read, it is also a manual we can all learn from. Sometimes funny, often irreverent and always insightful, there is a kinetic energy to *Build* that mirrors Tony's drive to give us the future."

—Yves Béhar, founder and CEO, fuseproject

"I have never read a more genuine and honest set of stories and mentoring advice for aspiring tech entrepreneurs and young people in general."

—Sir Hermann Hauser KBE, founder, Acorn Computers and founder, ARM

"*Build* is like having Tony as a mentor on demand! I wish I had this book ten years ago. It's a great read, not just for entrepreneurs but anyone who wants to build something."

—Carl Pei, CEO and cofounder, Nothing

"You'll be able to spot founders who have read this or haven't. It's up to you, but it's the most impactful book I've read on how to scale and what to look out for."

—Phil Hutcheon, founder and CEO, DICE

"This is a genuine, pragmatic story of an entrepreneur. From early fails to massive success. A step-by-step approach and an inspiration for anyone who wants to build great things and needs the playbook."

—Pascal Gauthier, CEO, Ledger

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BUILD

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The *New York Times* Bestseller



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To Nana, Gramps, Mom, and Dad—my first mentors

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INTRODUCTION

Many of my experienced, trusted mentors have died.

I looked around a few years ago and the wise, (mostly) patient souls who I had peppered with a million questions, who dealt with my late-night phone calls, who helped me start companies and build products and run board meetings or just be a better person—they were gone. Some much too early.

Now I was the one getting peppered with questions. The same questions I had asked, over and over. Questions about startups, sure, but also more basic stuff: whether to quit a job or not, what career move should I make, how to know if my ideas are any good, how to think about design, how to deal with failure, when and how to start a business.

And weirdly, I had answers. I had advice. I learned it from amazing mentors and the incredible teams I've worked with over thirty years. I learned it at many tiny startups and giant companies, building products that hundreds of millions of people use every day.

So now, if you call me at midnight, panicked, asking how to keep a company's culture intact while it's growing or how not to screw up marketing, I can give you some insights, some tricks and tips, even some rules.

But I won't. Please don't call me at midnight. I've learned the value of a good night's sleep.

Just read this book.

It contains much of the advice I give out daily to new grads and CEOs, to execs and interns, to everyone trying to claw their way through the business world and build their career.

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This advice is unorthodox because it's old-school. The religion

of Silicon Valley is reinvention, disruption—blowing up old ways of thinking and proposing new ones. But certain things you can't blow up. Human nature doesn't change, regardless of what you're building, where you live, how old you are, how wealthy or not. And over the last thirty-plus years I've seen what humans need to reach their potential, to disrupt what needs disrupting, to forge their own unorthodox path.

So I'm here to write about a leadership style that I've seen win, time and time again. About how my mentors and Steve Jobs did it. About how I do it. About being a troublemaker, a shit-stirrer.

This isn't the only way to make something worth making, but it's my way. And it's not for everyone. I'm not going to be preaching progressive, modern organizational theory. I'm not going to tell you to work two days a week and retire early.

The world is full of mediocre, middle-of-the-road companies creating mediocre, middle-of-the-road crap, but I've spent my entire life chasing after the products and people that strive for excellence. I've been incredibly lucky to learn from the best—from bold, passionate people who made a dent in the world.

I believe everyone should have that chance.

That's why I wrote this book. Everybody trying to do something meaningful needs and deserves to have a mentor and coach—someone who's seen it and done it and can hopefully help you through the toughest moments in your career. A good mentor won't hand you the answers, but they will try to help you see your problem from a new perspective. They'll loan you some of their hard-fought advice so you can discover your own solution.

And it's not just tech entrepreneurs in Silicon Valley who deserve some help. This book is for anyone who wants to create something new, who is chasing excellence, who doesn't want to waste their precious time on this precious planet.

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I'm going to talk a lot about building a great product, but a prod-

uct doesn't have to be a piece of technology. It can be anything you make—a service. A store. It could be a new kind of recycling plant. And even if you're not ready to make anything yet, this advice is still meant for you. Sometimes the first step is just figuring out what you want to do. Getting a job you're excited about. Building the person you want to become or building a team that you can build anything with.

This book isn't trying to be a biography—I'm not dead yet. It's a mentor in a box. It's an advice encyclopedia.

If you're old enough to remember a time before Wikipedia, you might recall the joy of the literal wall of encyclopedias on your bookshelf or your grandparents' study or deep inside the bowels of the library. You'd go to it if you had a specific question, but once in a while you'd also just open it up and start reading. *A* for Aardvark. You'd follow along and see where you ended up, reading straight through or hopping around, discovering little snapshots of the world.

That's how you should think of this book.

- You can read it straight through from beginning to end.
- You can poke around to find the advice and stories that are most interesting or useful in your current career crisis. Because there's always a crisis—either personally, organizationally, or competitively.
- You can follow the "See also" links sprinkled throughout the book just like you'd click through on Wikipedia. Dig deeper into any topic and see where it takes you.

Most business books have one basic thesis that they spend three hundred pages expanding on. If you're looking for a range of good advice on various topics, you might need to read forty books, skimming endlessly to find the occasional nugget of useful information. So for this book I just collected the nuggets. Each chapter has advice and stories informed by the jobs, mentors, coaches, managers, and peers I've had and the countless mistakes I've made.

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Since this is my advice based on my experience, this book roughly follows my career. We go from my first job out of college and end up where I am now. Every step, every failure, taught me something. Life didn't begin with the iPod.

But this book isn't about me. Because *I* didn't make anything. I was just one of the people on the teams that made the iPod, iPhone, the Nest Learning Thermostat, and Nest Protect. I was there, but I was never there alone. This book is about what I've learned—typically the hard way.

And to understand the things I've learned, you should probably know a bit about me. So here goes:

1969

The usual start: I was born. And by preschool, we started moving. My dad was a salesman for Levi's and we were always on the road, seeking the next denim gold mine. I went to twelve schools in fifteen years.

1978–1979

Startup #1: Eggs. I sold them door-to-door in third grade. I stand by that company—it was a solid business. I bought eggs cheap from a farmer, then my little brother and I piled them in our blue wagon and pulled it down the neighborhood streets each morning. It gave me pocket money that my parents couldn't tell me how to spend—my first taste of true freedom.

Had I stuck with it, who knows what heights I could have attained.

1980

Found my life's work. It was the summer of fifth grade. A good time to discover your calling. I took a programming class when "programming" meant filling in bubbles with a number 2 pencil on little cards and getting results on a paper printout. There wasn't even a monitor.

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It was the most magical thing I had ever seen.

1981

1st love. An Apple][+. Eight bits, a real, gorgeous twelve-inch glowing green monitor, a beautiful brown keyboard.

I had to have that incredible, incredibly expensive machine. My grandfather made me a deal that he'd match whatever money I earned working as a golf caddy, so I worked my ass off until I could afford it.

I cherished that computer. It was my all-abiding passion and my lifeline. By twelve, I'd given up trying to maintain traditional friendships. I knew I'd just move again the next year, so the only way to hold on to friends was through my Apple. There was no internet, no email, but there were 300-baud modems and digital bulletin boards—BBSes in the parlance of the time. I'd find my fellow geeks in whatever school I was in, then we'd keep in touch through our Apples. We taught ourselves to program and hacked the phone companies to get free long-distance calls and bypass the $1–$2/minute fees.

1986

Startup #2: Quality Computers. A friend I connected with over 300-baud started Quality Computers in senior year of high school. I joined him soon after. We were a mail-order company reselling third-party Apple][hardware, DRAM chips, and software from his basement. And we wrote our own software, too—the upgrades and expansion boards we sold were complex to install and harder to use, so we wrote software to simplify everything for mere mortals.

It turned into a real business—an 800 number, warehouses, ads in magazines, employees. A decade later my friend sold it for a couple million. But I was long gone. Selling stuff was okay. Making it was better.

1989

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Startup #3: ASIC Enterprises. ASIC stood for Applications Specific Integrated Circuit. I didn't have a ton of branding experience when

I was twenty. But I had a lot of love. In the late eighties my beloved Apple][was struggling. It needed to be faster. So a friend and I decided we were going to save Apple. We built a new, faster processor—the 65816. I did not, in fact, know how to build a processor. I took my first processor design class in college a semester after we started. But we built those chips and they worked eight times faster than what was available—a blazing 33MHz—and even sold some to Apple before they stopped designing new Apple][s.

1990

Startup #4: Constructive Instruments. I teamed up with my professor at the University of Michigan to make a multimedia editor for kids. I threw myself into it, was constantly working or on call. I had a beeper in the days when beepers were exclusively for doctors and drug dealers. The other college kids often asked what was wrong with Fadell—why wasn't he partying and drinking instead of being stuck in a basement, alone with a computer?

By the time I graduated, Constructive Instruments had a few employees. We had an office. A product. Sales partnerships. I was twenty-one years old and CEO. I was also winging it so hard I'm surprised I didn't take off.

1991

Diagnostics Software Engineer at General Magic. I needed to learn how to run a real startup. So I decided to learn from the greats. I got a job at one of the most secretive, exciting companies in Silicon Valley. It was packed to the rafters with geniuses, the opportunity of a lifetime.

We were going to make the most amazing personal communications and entertainment device in history. I drank every last drop of the Kool-Aid and poured my life into that company. We were going to change the world. We couldn't lose.

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1994

Lead Software and Hardware Engineer at General Magic. We lost.

1995

CTO at Philips. I started talking to Philips, one of General Magic's partners, about what went wrong. I pitched them my idea: we shift the audience, use existing software and hardware, simplify simplify simplify.

So Philips hired me to make pocket PCs for businesspeople on the go. I became a twenty-five-year-old chief technology officer. It was my second gig out of college.

1997–1998

Launched the Philips Velo and Nino. They were a critical success!

1997–1998

We couldn't sell enough.

1998

Philips Strategy and Ventures Group. I shifted over to the VC side of Philips. Began learning what I could about that world. But the pocket PC bug was still in my brain. Maybe I just hadn't gotten the audience right. Maybe we didn't need to make a PC for businesspeople. Maybe we needed to make a music player for everybody.

1999

RealNetworks. I was going to make a digital music player with the right team, the right tech, the right vision.

1999, six weeks later

I quit. I stepped through the doors and realized the mistake I'd made almost instantly. Real bad juju.

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1999

Startup #5: Fuse Systems. Screw it. I'll do it myself.

2000

The dot-com bubble burst. Funding dried up overnight. I did eighty VC pitches. All of them failed. I was desperate to keep my company going.

2001

Apple called. At first I was just hoping to make enough money consulting to keep Fuse open. Then I joined Apple and brought my team with me.

2001, ten months later

We launched the first iPod. It was a critical success!

2001–2006

VP iPod division. After eighteen generations of iPods, we finally got the kinks figured out.

2007–2010

SVP iPod division and iPhone. Then we created the iPhone. My team built the hardware and the foundational software to run and manufacture the phone. Then we launched two more versions. Then I quit.

2010

Took a break. Focused on my family. Got out of the country. Got exactly as far away from work and Silicon Valley as I needed to be.

2010

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Startup #6: Nest Labs. Matt Rogers and I started Nest in a garage in Palo Alto. We were going to revolutionize the least sexy product in

history: the thermostat. You should have seen people's faces when we told them what our super-secret new startup was going to build.

2011

Launched the Nest Learning Thermostat. It was a critical success! And holy shit. People bought it.

2013

Launched the Nest Protect smoke and carbon monoxide alarm. We were beginning to create an ecosystem—a thoughtful home that could take care of itself and the people inside it.

2014

Google bought Nest for $3.2 billion. Our hardware, Google's software and infrastructure: it was going to be an amazing marriage.

2015–2016

Google created Alphabet. I quit. Nest got kicked out of Google and into Alphabet, which then demanded we drastically change our plans. Then they decided to sell Nest. Not the marriage we signed up for. I walked away in utter frustration.

2010–now

Build Collective. After leaving Google Nest, I focused on some of the advising and investing I'd been doing since 2010. Now we mentor and support around two hundred startups full-time.

My life has swung wildly between success and failure, incredible career highs immediately followed by bitter disappointment. And with each failure I chose to start from scratch, take all that I'd learned and do something completely new, become someone completely new.

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The latest version of me is a mentor, coach, investor, and, weirdly

now, an author. But being an author only happened because the stars aligned when Dina Lovinsky, a brilliant writer who I worked (and sparred) with for a decade, was available to help and ready to call me on my crap. Young, brash, bold, Dina was there from the earliest days of Nest, watched everything happen firsthand, and learned how to write like I would write, if I could write.

You should probably know now—I'm a terrible writer. I can write software, sure, but write a book? That ain't me. Armed with only a spreadsheet of random lessons learned, I had no idea how to get the first word on the page. But then again, I also had no idea how to build a computer processor, or a music player, or a smartphone, or a thermostat, and those seem to have worked out okay.

The advice in this book is by no means complete, but it's a start. I'm still learning, revising my thoughts each day. Just like everyone else. This book contains some of what I've learned so far.

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Part

1

BUILD YOURSELF

I tried to build the iPhone twice.

Everybody knows about the second time. The time we succeeded. Few people know about the first.

In 1989, an Apple employee and intellectual visionary named Marc Porat drew this:

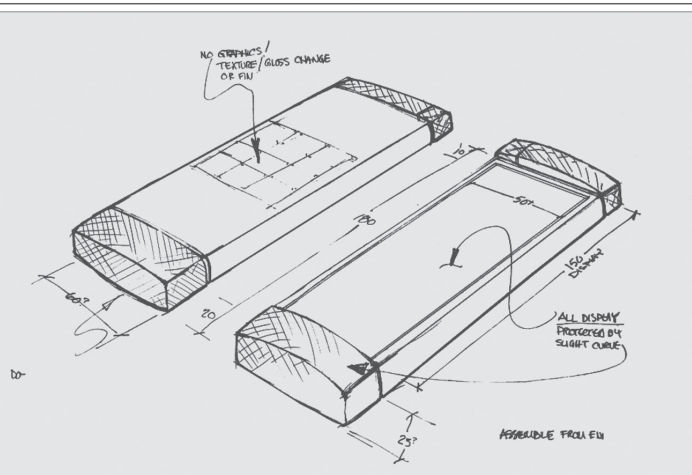


Fig. 1.0.1

Marc's 1989 sketch of the Pocket Crystal in his big red notebook. On the next page he wrote, "This is a very personal object. It must be beautiful. It must offer the kind of personal satisfaction that a fine piece of jewelry brings. It will have a perceived value even when it's not being used. It should offer the comfort of a touchstone, the tactile satisfaction of a seashell, the enchantment of a crystal."

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The Pocket Crystal was a beautiful touchscreen mobile computer that combined a cell phone and fax machine, that let you play games and watch movies and buy plane tickets from anywhere.

This insanely prophetic vision was made more completely nuts by the fact that this was—I repeat—1989. The Web didn't exist, mobile gaming meant carrying a Nintendo console to your friend's house, and almost nobody owned—or even really understood the need for—a cell phone. There were pay phones everywhere, everyone's got a pager—why lug around a giant plastic brick with you?

But Marc and two other geniuses and ex-Apple wizards, Bill Atkinson and Andy Hertzfeld, started a company to build the future. They called it General Magic.* I read about it in the "Mac The Knife" rumors section of (the now long-dead) *MacWeek Magazine* right around the time I realized that I had no real idea how to run my startup.

I'd started a few computer-related companies in high school and college, but I'd been focused on Constructive Instruments since my junior year at the University of Michigan. I founded it with one of my professors—the cherubic, "oy vey"-ing Elliot Soloway. Elliot was dedicated to educational technology and together we built a multimedia editor for kids. And we got pretty far—a product, employees, an office. But I was still going to the library to look up the difference between an S-corporation and a C. I was green, green, green. And I had no one to ask—there were no entrepreneurial meetups back then, no Y Combinators. Google wouldn't exist for seven years.

General Magic was my chance to learn everything I could possibly want to know. To work with my heroes—the geniuses who made the

* If you'd like to know more about this company, witness failure at the deepest level, and see that it's not the end of the world, then I'd recommend watching the *General Magic Movie* (www.generalmagicthemovie.com). You might recognize me in it; just don't ask me about the hair.

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Apple][, the Lisa, the Macintosh. It was my first real job and my first real chance to change the world like Andy and Bill had.

When I talk to people fresh out of college or early in their careers, that's what they're looking for. An opportunity to make an impact and set themselves on a path to make something great.

But all the stuff they don't and can't teach you in college—how to thrive in the workplace, how to create something amazing, how to deal with managers and eventually become one—it all slaps you in the face the second you step off campus. No matter how much you learn in school, you still need to get the equivalent of a PhD in navigating the rest of the world and building something meaningful. You have to try and fail and learn by doing.

And that means pretty much every young graduate, entrepreneur, and dreamer asks me the same questions:

"What kind of job should I try to get?"

"What kinds of companies should I work for?"

"How do I build a network?"

There's often an assumption that if you find the right job when you're young, you can guarantee some level of success. That your first job out of college connects in a straight line to your second and your third, that at each stage of your career you'll use your inevitable wins to propel yourself upward.

That's what I thought too. I was 100 percent sure General Magic was going to make one of the most impactful devices in history. I poured everything into it. We all did. The team worked literally nonstop for years—we even gave out awards for sleeping in the office for consecutive nights.

Then General Magic imploded. After years of work, tens of millions invested, newspapers shouting that we were destined to beat Microsoft, we sold three to four thousand devices. Maybe five thousand. And that was mostly to family and friends.

The company failed. I failed.

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And I spent the next ten years getting kicked in the stomach by Silicon Valley before I made something people actually wanted.

In the process I learned a lot of hard, painful, wonderful, stupid, useful lessons. So for anyone starting their career, or starting a new career, here's what you need to know.

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Chapter
1.1

ADULTHOOD

Adulthood is commonly thought of as the time when learning is over and living begins. Yes! I've graduated! I'm done! But learning never ends. School has not prepared you to be successful for the rest of your life. Adulthood is your opportunity to screw up continually until you learn how to screw up a little bit less.

Traditional schooling trains people to think incorrectly about failure. You're taught a subject, you take a test, and if you fail, that's it. You're done. But once you're out of school, there is no book, no test, no grade. And if you fail, you learn. In fact, in most cases, it's the only way to learn—especially if you're creating something the world has never seen before.

So when you're looking at the array of potential careers before you, the correct place to start is this: "What do I want to learn?"

Not "How much money do I want to make?"

Not "What title do I want to have?"

Not "What company has enough name recognition that my mom can brutally crush the other moms when they boast about their kids?"

The best way to find a job you'll love and a career that will eventually make you successful is to follow what you're naturally interested in, then take risks when choosing where to work. Follow your curiosity rather than a business school playbook about how to make money. Assume that for much of your twenties your choices will not work out and the companies you join or start will likely fail.

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Early adulthood is about watching your dreams go up in flames and learning as much as you can from the ashes. Do, fail, learn. The rest will follow.

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I arrived in a cheap, ill-fitting midwestern suit for my interview at General Magic. Everyone was sitting on the floor. They looked up at me, utterly bewildered. Their faces read, "Who is this kid?" They told me to sit down and take off my tie and jacket for Christ's sake.

Mistake #1.

Luckily it was a small one. I became employee #29 in 1991. I was a kid, twenty-one years old, and I gratefully took a job as a diagnostics software engineer. I was going to build software and hardware tools to check other people's designs—the lowest person on the totem pole. But I didn't care. I knew I just needed to get in the door to prove myself and move up.

A month before that, I'd been CEO of my own company. We were tiny—a startup of three, sometimes four people—and were inching along. But it felt more like treading water. And treading water felt like drowning. Either you're growing or you're done. There is no stasis.

So I went where I could grow. The title and the money weren't important. The people were. The mission was. The opportunity was all that mattered.

I remember packing up my stuff to drive to California from Michigan, my belly full of butterflies, four hundred dollars to my name, and my parents trying to understand what the hell was going on.

They wanted me to succeed. They wanted me to be happy. But I truly seemed to be screwing everything up and had been for years. I loved computers, but I'd gotten thrown out of my first computer class in seventh grade nearly every day. I was always telling the teacher

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he was wrong, always insisting I knew better, never shutting up. I made the poor man cry until they dragged me out of that class and made me learn French instead.

Then I skipped my very first week of college at the University of Michigan to go to Apple Fest in San Francisco and work a booth for my startup. I told my parents after I landed back in Detroit. They were beside themselves. But I'd learned early on to ask for forgiveness, not permission. And I remember the revelation of sitting in my dorm, still digesting the dinner I'd eaten at the wharf in San Francisco, realizing I could be part of two worlds at once. That it wasn't even that hard.

And now I was quitting the company that I had founded, that I had worked day and night to build, that had always seemed like an incredible risk but which was just starting to pay off. And I was going to go—where? General Magic? What the hell was General Magic? If I was going to get a regular job, why not at IBM? Why not Apple? Why not do something stable? Why couldn't I choose a path they could understand?

I wish I'd known this quote then—maybe it would have helped:

> "The only failure in your twenties is inaction. The rest is trial and error."
>
> —Anonymous

I needed to learn. And the best way to do that was to surround myself with people who knew exactly how hard it was to make something great—who had the scars to prove it. And if it turned out to be the wrong move, well, making a mistake is the best way to not make that mistake again. Do, fail, learn.

The critical thing is to have a goal. To strive for something big and hard and important to you. Then every step you take toward that goal, even if it's a stumble, moves you forward.

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And you can't skip a step—you can't just have the answers handed to you and detour around the hard stuff. Humans learn through productive struggle, by trying it themselves and screwing up and doing it differently next time. In early adulthood you have to learn to embrace that—to know that the risks might not pan out but to take them anyway. You can get guidance and advice, you can choose a path by following someone else's example, but you won't really learn until you start walking down that path yourself and seeing where it takes you.

I give a speech at high schools sometimes—at graduations where a bunch of eighteen-year-old kids are heading out into the world, alone, for the first time.

I tell them that they probably make 25 percent of their decisions. If that.

From the moment you're born until you move out of your parents' house, almost all your choices are made, shaped, or influenced by your parents.

And I'm not just talking about the obvious decisions—which classes to take, which sports to play. I mean the millions of hidden decisions you'll discover when you leave home and start doing things for yourself:

What type of toothpaste do you use?

What kind of toilet paper?

Where do you put the silverware?

How do you arrange your clothes?

What religion do you follow?

All these subtle things that you never made a decision about growing up are already implanted in your brain.

Most kids don't consciously examine any of these choices. They mimic their parents. And when you're a kid, that's usually fine. It's necessary.

But you're not a kid anymore.

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And after you move out of your parents' house, there's a window—a brief, shining, incredible window—where your decisions are yours alone. You're not beholden to anyone—not a spouse, not kids, not parents. You're free. Free to choose whatever you'd like.

That is the time to be bold.

Where are you going to live?

Where are you going to work?

Who are you going to be?

Your parents will always have suggestions for you—feel free to take them or ignore them. Their judgment is colored by what they want for you (the best, of course, only the best). You'll need to find other people—other mentors—to give you useful advice. A teacher or cousin or an aunt or the older kid of a close family friend. Just because you're on your own doesn't mean you have to be alone with your decisions.

Because this is it. This is your window. This is your time to take risks.

When you're in your thirties and forties, the window begins to close for most people. Your decisions can no longer be entirely your own. That's okay, too—great even—but it's different. The people who depend on you will shape and influence your choices. Even if you don't have a family to support, you'll still accumulate just a little more each year—friends, assets, social standing—that you won't want to risk.

But when you're early in your career—and early in your life—the worst that can happen if you take big risks is probably moving back with your parents. And that is not shameful. Throwing yourself out there and having everything blow up in your face is the world's best way to learn fast and figure out what you want to do next.

You might screw up. Your company might fail. You might have so many butterflies in your stomach you'll be worried you got food poisoning. And that's okay. It's exactly what should be happening. If

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you don't feel those butterflies then you're not doing it right. You have to push yourself up the mountain, even if it means you might fall off a cliff.

I learned more from my first colossal failure than I ever did from my first success.

General Magic was an experiment. Not just in what we were making—and we were making something wholly, ridiculously, almost unbelievably new—but also in how to structure a company. The team was so impressive, packed with genius after genius, that there was no regard for "management." No defined process. We just kind of . . . made stuff. Whatever our leaders thought would be cool.

And every piece had to be hand-built, from scratch. It was like giving one hundred artisans a pile of sheet metal, plastic, and glass and telling them to build a car. One of my projects was to figure out how to connect various gadgets into our device, so I built the precursor to the USB port. Then I was assigned to build an infrared network to work between devices (like how a remote connects to a TV)—so I reinvented all seven layers of a protocol stack. Amazingly, I made it work. The other engineers were excited and created a word game on top of it. The game became a hit around the office. I was ecstatic, over the moon. But eventually a more experienced engineer got around to looking at what I'd coded and, baffled, asked why I'd built a network protocol that way. I answered that I didn't know I was building a network protocol.

Mistake #2.

But even though I could have just read a book and saved myself days of work—man, did it feel good. I'd made something the world had never seen before, something useful, and I made it my way.

It was crazy. But it was fun. Especially in the beginning when everybody was focused on fun. There was no dress code. No rules for the office. It was so different from what I was used to in the Midwest. General Magic was probably one of the first Silicon Valley

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companies that truly embodied the idea that playing at work was worthwhile—that a joyful workplace could make a joyful product.

And we probably took the joy a little far. Once we were in the office in the middle of the night, working late as usual, and I grabbed the three-person slingshot (doesn't everyone have a slingshot in their office?). Two accomplices and I loaded it with slime, fired, and punched a giant hole through a large third-story window. I was terrified I'd get fired.

Everyone just laughed.

That was Mistake #3.

For four years, I threw myself into General Magic. I learned and screwed up and worked and worked and worked. Ninety, 100, 120 hours a week. I never liked coffee, so I survived primarily off Diet Coke. A dozen a day (for the record, I haven't touched the poison since).

(I don't recommend working that much, by the way. You should never kill yourself for your job, and no job should ever expect that of you. But if you want to prove yourself, to learn as much as you can and do as much as you can, you need to put in the time. Stay late. Come in early. Work over the weekend and holidays sometimes. Don't expect a vacation every couple of months. Let the scales tip a little on your work/life balance—let your passion for what you're building drive you.)

For years I ran full tilt in whatever direction people pointed me in—and we were going in every direction at once. My heroes would say take that hill, and by God, I would make it my Everest and do whatever it took to impress them. I was 100 percent sure we were going to make the most world-changing device in history. We all were.

Then the launch got delayed. Again. And again. And again. We had no shortage of money or press or all the sky-high expectations to go with it, so the product just kept growing. Never quite good enough or done enough. Our competitors started popping out of the

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woodwork. We were creating a private network system run by major telecom companies like AT&T just as the internet began to go mainstream, open to everyone. Our processor didn't have enough oomph to support the ambitious user experience (UX) that Andy and Bill dreamed up nor the graphics and icons that Susan Kare designed. Susan is a brilliant artist who created the original visual language for the Mac, and she made an entire beautiful world for the Magic Link. But then every time you tapped on the screen, the damn thing would freeze. User testers were frustrated by the waiting, the bugs, never knowing if they'd done something wrong or the device had just stopped working. The list of issues would get longer each day.

Mistake #4 through mistake #4000.

When we finally shipped in 1994, we hadn't made the Pocket Crystal. We made the Sony Magic Link.



Fig 1.1.1

The Magic Link retailed for $800, weighed almost 1.5 pounds, and was a hefty 7.7 x 5.6 inches. It had a phone, a touchscreen, email, downloadable apps, games, a way to buy Major League baseball tickets, and revolutionary technology woven throughout. Kind of like the iPhone.

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It was deeply flawed and strangely suspended between the past and the future—it had both animated emojis and a little printer for faxes. But it was still absolutely, flat-out, ahead-of-its-time amazing. A first step into a different world, where everyone could carry a computer anywhere. All the work, the lack of sleep, the toll on my body, the toll on my parents—it was going to be worth it. I was incredibly proud of it. I was so thrilled with what our team had created. I still am.

And then nobody bought it.

After spending all those days and nights in the office, I woke up and couldn't get out of bed. I felt it in my chest. Everything we had done ended in failure. Everything.

And I ultimately knew why.

By the time General Magic was unraveling around me, I wasn't just a lowly diagnostics engineer anymore. I'd worked on silicon, hardware, and software architecture and design. When things started to go awry, I'd ventured out and started talking to people in sales and marketing, began learning about psychographics and branding, finally grasped the importance of managers, of process, of limits. After four years, I realized there was a whole world of thinking that was needed before a line of code should be written. And that thinking was fascinating. That thinking was what I wanted to do.

The enormous gut punch of our failure, of my failure, of everything I'd worked for falling apart—it made the path in front of me strangely clear: General Magic was making incredible technology but wasn't making a product that would solve real people's problems. But I thought I could.

That's what you're looking for when you're young, when you think you know everything then suddenly realize you have no idea what you're doing: a place where you can work as hard as you can to learn as much as you can from people who can make something great. So even if the experience kicks your ass, the force of that kick will propel you into a new stage of your life. And you'll figure out what to do next.

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Chapter
1.2

GET A JOB

If you're going to throw your time, energy, and youth at a company, try to join one that's not just making a better mousetrap. Find a business that's starting a revolution. A company that's likely to make a substantial change in the status quo has the following characteristics:

1. It's creating a product or service that's wholly new or combines existing technology in a novel way that the competition can't make or even understand.

2. This product solves a problem—a real pain point—that a lot of customers experience daily. There should be an existing large market.

3. The novel technology can deliver on the company vision—not just within the product but also the infrastructure, platforms, and systems that support it.

4. Leadership is not dogmatic about what the solution looks like and is willing to adapt to their customers' needs.

5. It's thinking about a problem or a customer need in a way you've never heard before, but which makes perfect sense once you hear it.

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Cool technology isn't enough. A great team isn't enough. Plenty of funding isn't enough. Too many people throw themselves blindly at

hot trends, anticipating a gold rush, and end up falling off a cliff. Look at the body count of virtual reality (VR)—dead startups as far as the eye can see and billions of dollars burned up over the past thirty years.

"If you make it, they will come" doesn't always work. If the technology isn't ready, they won't come for sure. But even if you've got the tech, then you still have to time it right. The world has to be ready to want it. Customers need to see that your product solves a real problem they have today—not one that they may have in some distant future.

I think of this as the General Magic problem. We were trying to build an iPhone years before it was a glimmer in Steve Jobs's eye.

And you know what utterly beat us? Palm. Because Palm PDAs let you put the phone numbers you kept on scraps of paper or on your desktop computer into a device that you could carry with you. That's it. That simple. You couldn't jam a Rolodex into your pocket or purse, so Palm was the right solution for the time. It made sense. It had a reason to exist.

General Magic did not. We started from the technology—focusing on what we could create, what would impress the geniuses at our company—not the reason why real, nontechnical people would need it. So the Magic Link solved problems that regular people wouldn't recognize for more than a decade. And because nobody else was building technology for nonexistent problems, the networks, processors, and input mechanisms our products depended on weren't good enough. We had to make everything ourselves. Magic CAP, a revolutionary object-oriented operating system. TeleScript, a new client server programming language. We created servers with online applications and stores. And ultimately, even though it fell short of the vision, we built something really incredible. For us geeks.

For everyone else, it was kind of neat. Maybe. If they even understood what it was. A luxury toy for rich people or nerds or very rich nerds. A plaything.

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If you're not solving a real problem, you can't start a revolution.

A glaring example is Google Glass or Magic Leap—all the money and PR in the world can't change the fact that augmented reality (AR) glasses are a technology in search of a problem to solve. There's just no reason for the general public to buy them. Not yet. Nobody can quite imagine walking into a party or the office with these weird ugly glasses on their face, creepily filming everyone around them. And even if there's a brilliant vision for the future of AR glasses, the technology can't deliver it yet and the social stigma will take a long time to dissolve. I'm convinced it'll happen, but they're still years away.

On the other hand, take Uber. The founders started with a customer problem—a problem they experienced in their daily lives—then applied technology. The problem was simple: finding a cab in Paris was next to impossible and hiring private drivers was expensive and took forever. In the days before smartphones, the solution might have been to simply start a new kind of taxi or limo business. But the company's timing was perfect—the sudden ubiquity of smartphones provided Uber with a platform and put customers into the right mindset to accept their solution. If I can order a toaster with an app on my phone, why shouldn't I hail a car? That combination of a real problem, the right timing, and innovative technology allowed Uber to shift the paradigm—to create something that traditional cab companies couldn't even dream of, never mind compete with.

And this isn't just a Silicon Valley phenomenon. Revolutionary companies are popping up in every industry—in agriculture, drug discovery and creation, finance and insurance—in every part of the world. Seemingly impossible problems that a decade ago would have cost billions to solve, requiring massive investments from giant firms, can now be figured out with a smartphone app, a small sensor, and the internet. And that means there are thousands of people all over

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the world finding opportunities to change the way people work and live and think.

Take whatever job you can at one of those companies. Don't worry too much about the title—focus on the work. If you get a foot in the door at a growing company, you'll find opportunities to grow, too.

Just whatever you do, don't become a "management consultant" at a behemoth like McKinsey or Bain or one of the other eight consultancies that dominate the industry. They all have thousands upon thousands of employees and work almost exclusively with Fortune 5000 companies. These corporations, typically led by tentative, risk-averse CEOs, call in the management consultants to do a massive audit, find the flaws, and present leadership with a new plan that will magically "fix" everything. What a fairy tale—don't get me started.

But to many new grads, it sounds perfect: you get paid incredibly well to travel around the world, work with powerful companies and executives, and learn exactly how to make a business successful. It's an alluring promise.

Parts of it are even true. Yes, you get a nice paycheck. And yes, you get plenty of practice pitching important clients. But you don't learn how to build or run a company. Not really.

Steve Jobs once said of management consulting, "You do get a broad cut at companies but it's very thin. It's like a picture of a banana: you might get a very accurate picture but it's only two dimensions, and without the experience of actually doing it you never get three dimensional. So you might have a lot of pictures on your walls, you can show it off to your friends—I've worked in bananas, I've worked in peaches, I've worked in grapes—but you never really taste it."

If you do choose to go that route and find yourself at one of the Big Four or the other top six firms, then that is of course your choice. Just know before you go what you want to learn and the experiences

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you need for your next chapter. Don't get stuck. Management consulting should never be your endpoint—it should be a way station, a brief pause on your journey to actually doing something. Making something.

To do great things, to really learn, you can't shout suggestions from the rooftop then move on while someone else does the work. You have to get your hands dirty. You have to care about every step, lovingly craft every detail. You have to be there when it falls apart so you can put it back together.

You have to actually do the job. You have to love the job.

But what happens if you fall in love with the wrong thing? If you find a product or company that's too early—the supporting infrastructure isn't there, the customers don't exist, the leadership has a crazy vision and won't budge.

What if you're deeply passionate about quantum computing or synthetic biology or fusion energy or space exploration even though there's no sign that any of those industries will bear fruit anytime soon?

Then screw it. Go for it. If you love it, don't worry about all my advice, don't worry about the timing.

I spent the dot-com bubble building handheld devices. After General Magic started floundering, the obvious solution was to jump ship to Yahoo or eBay and join the internet gold rush. That's what everyone told me to do. "Are you crazy, why go to Philips?! The internet is where all the money is! No one needs more consumer computing devices."

But I went to Philips anyway. I knew there was room for something amazing between desktop computers and cell phones. I saw it, felt it, when I was at General Magic. So I built a team to make devices at Philips and then started my own company to make digital music players. I stuck with it because I loved it—loved building the whole system from the bottom up, the atoms and electrons, the hardware

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and software and networks and design. And by the time Apple called me to make the iPod, I knew exactly how to do it.

If you're passionate about something—something that could be solving a huge problem one day—then stick with it.

Look around and find the community of people who are passionate about it, too. If there's nobody else on Earth thinking about it, then you may truly be too early or going in the wrong direction. But if you can find even a handful of like-minded people, even if it's just a tiny community of geeks building technology nobody has any idea how to turn into a real business, then keep going. Get in on the ground floor, make friends, and find mentors and connections that will bear fruit when the world spins just enough to make what you're making make sense. You may not be at the same company as when you started, the vision may be different, the product may be different, and the technology will have changed. You may have to fail and fail and learn and learn and evolve and understand and grow.

But one day, if you are truly solving a real problem, when the world is ready to want it, you'll already be there.

What you do matters. Where you work matters. Most importantly, who you work with and learn from matters. Too many people see work as a means to an end, as a way to make enough money to stop working. But getting a job is your opportunity to make a dent in the world. To put your focus and energy and your precious, precious time toward something meaningful. You don't have to be an executive right away, you don't have to get a job at the most amazing, world-changing company right out of college, but you should have a goal. You should know where you want to go, who you want to work with, what you want to learn, who you want to become. And from there, hopefully you'll start to understand how to build what you want to build.

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Chapter
1.3

HEROES

Students seek out the best professors on the best projects when getting their master's or PhD, but when they look for jobs, they focus on money, perks, and titles. However, the only thing that can make a job truly amazing or a complete waste of time is the people. Focus on understanding your field and use that knowledge to create connections with the best of the best, people you truly respect. Your heroes. Those (typically humble) rock stars will lead you to the career you want.

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If there are gods of software design and coding, they are Bill Atkinson and Andy Hertzfeld. Their faces were in the magazines I'd read religiously cover to cover since grade school. I'd used everything they'd ever built—the revolutionary Mac, MacPaint, Hypercard, the Lisa.

They were my heroes. When I met them, I felt like I was meeting the president. The Beatles. Led Zeppelin. My palms were sweating when I shook their hands; I could barely catch my breath. But after time passed and I blinked the stars out of my eyes, I realized they were approachable, easy to talk to—a rare trait in the world of geniuses. And I could talk to them for hours. About coding, about design and UX, about a million things I was curious about. I even

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