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PAUL GRAHAM

HOW TO MAKE WEALTH

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If you wanted to get rich, how would you do it? I think your best bet would be to start or join a startup. That's been a reliable way to get rich for hundreds of years. The word "startup" dates from the 1960s, but what happens in one is very similar to the venture-backed trading voyages of the Middle Ages.

Startups usually involve technology, so much so that the phrase "high-tech startup" is almost redundant. A startup is a small company that takes on a hard technical problem.

Lots of people get rich knowing nothing more than that. You don't have to know physics to be a good pitcher. But I think it could give you an edge to understand the underlying principles. Why do startups have to be small? Will a startup inevitably stop being a startup as it grows larger? And why do they so often work on developing new technology? Why are there so many startups selling new drugs or computer software, and none selling corn oil or laundry detergent?

The Proposition

Economically, you can think of a startup as a way to compress your whole working life into a few years. Instead of working at a low intensity for forty years, you work as hard as you possibly can for four. This pays especially well in technology, where you earn a premium for working fast.

Here is a brief sketch of the economic proposition. If you're a good hacker in your mid twenties, you can get a job paying about \$80,000 per year. So on average such a hacker must be able to do at least \$80,000 worth of work per year for the company just to break even. You could probably work twice as many hours as a corporate employee, and if you focus you can probably get three times as much done in an hour. [1] You should get another multiple of two, at least, by eliminating the drag of the pointy-haired middle manager who would be your boss in a big company. Then there is one more multiple: how much smarter are you than your job description expects you to be? Suppose another multiple of three. Combine all these multipliers, and I'm claiming you could be 36 times more productive than you're expected to be in a random corporate job. [2] If a fairly good hacker is worth \$80,000 a year at a big company, then a smart hacker working very hard without any corporate bullshit to slow him down should be able to do work worth about \$3 million a year.

Like all back-of-the-envelope calculations, this one has a lot of wiggle room. I wouldn't try to defend the actual numbers. But I stand by the structure of the calculation. I'm not claiming the multiplier is precisely 36, but it is certainly more than 10, and probably rarely as high as 100.

If \$3 million a year seems high, remember that we're talking about the limit case: the case where you not only have zero leisure time but indeed work so hard that you endanger your health.

Startups are not magic. They don't change the laws of wealth creation. They just represent a point at the far end of the curve. There is a conservation law at work here: if you want to make a million dollars, you have to endure a million dollars' worth of pain. For example, one way to make a million dollars would be to work for the Post Office your whole life, and save every penny of your salary. Imagine the stress of working for the Post Office for fifty years. In a startup you compress all this stress into three or four years. You do tend to get a certain bulk discount if you buy the economy-size pain, but you can't evade the fundamental conservation law. If starting a startup were easy, everyone would do it.

Millions, not Billions

If \$3 million a year seems high to some people, it will seem low to others. Three *million*? How do I get to be a billionaire, like Bill Gates?

So let's get Bill Gates out of the way right now. It's not a good idea to use famous rich people as examples, because the press only write about the very richest, and these tend to be outliers. Bill Gates is a smart, determined, and hardworking man, but you need more than that to make as much money as he has. You also need to be very lucky.

There is a large random factor in the success of any company. So the guys you end up reading about in the papers are the ones who are very smart, totally dedicated, *and* win the lottery. Certainly Bill is smart and dedicated, but Microsoft also happens to have been the beneficiary of one of the most spectacular blunders in the history of business: the licensing deal for DOS. No doubt Bill did everything he could to steer IBM into making that blunder, and he has done an excellent job of exploiting it, but if there had been one person with a brain on IBM's side, Microsoft's future would have been very different. Microsoft at that stage had little leverage over IBM. They were effectively a component supplier. If IBM had required an exclusive license, as they should have, Microsoft would still have signed the deal. It would still have meant a lot of money for them, and IBM could easily have gotten an operating system elsewhere.

Instead IBM ended up using all its power in the market to give Microsoft control of the PC standard. From that point, all Microsoft had to do was execute. They never had to bet the company on a

bold decision. All they had to do was play hardball with licensees and copy more innovative products reasonably promptly.

If IBM hadn't made this mistake, Microsoft would still have been a successful company, but it could not have grown so big so fast. Bill Gates would be rich, but he'd be somewhere near the bottom of the Forbes 400 with the other guys his age.

There are a lot of ways to get rich, and this essay is about only one of them. This essay is about how to make money by creating wealth and getting paid for it. There are plenty of other ways to get money, including chance, speculation, marriage, inheritance, theft, extortion, fraud, monopoly, graft, lobbying, counterfeiting, and prospecting. Most of the greatest fortunes have probably involved several of these.

The advantage of creating wealth, as a way to get rich, is not just that it's more legitimate (many of the other methods are now illegal) but that it's more *straightforward*. You just have to do something people want.

Money Is Not Wealth

If you want to create wealth, it will help to understand what it is. Wealth is not the same thing as money. [3] Wealth is as old as human history. Far older, in fact; ants have wealth. Money is a comparatively recent invention.

Wealth is the fundamental thing. Wealth is stuff we want: food, clothes, houses, cars, gadgets, travel to interesting places, and so on. You can have wealth without having money. If you had a magic machine that could on command make you a car or cook you dinner or do your laundry, or do anything else you wanted, you wouldn't need money. Whereas if you were in the middle of Antarctica, where there is nothing to buy, it wouldn't matter how much money you had.

Wealth is what you want, not money. But if wealth is the important thing, why does everyone talk about making money? It is a kind of shorthand: money is a way of moving wealth, and in practice they are usually interchangeable. But they are not the same thing, and unless you plan to get rich by counterfeiting, talking about *making money* can make it harder to understand how to make money.

Money is a side effect of specialization. In a specialized society, most of the things you need, you can't make for yourself. If you want a potato or a pencil or a place to live, you have to get it from someone else.

How do you get the person who grows the potatoes to give you some? By giving him something he wants in return. But you can't get very far by trading things directly with the people who need them. If you make violins, and none of the local farmers wants one, how will you eat?

The solution societies find, as they get more specialized, is to

make the trade into a two-step process. Instead of trading violins directly for potatoes, you trade violins for, say, silver, which you can then trade again for anything else you need. The intermediate stuff-- the *medium of exchange*-- can be anything that's rare and portable. Historically metals have been the most common, but recently we've been using a medium of exchange, called the *dollar*, that doesn't physically exist. It works as a medium of exchange, however, because its rarity is guaranteed by the U.S. Government.

The advantage of a medium of exchange is that it makes trade work. The disadvantage is that it tends to obscure what trade really means. People think that what a business does is make money. But money is just the intermediate stage-- just a shorthand-- for whatever people want. What most businesses really do is make wealth. They do something people want. [4]

The Pie Fallacy

A surprising number of people retain from childhood the idea that there is a fixed amount of wealth in the world. There is, in any normal family, a fixed amount of *money* at any moment. But that's not the same thing.

When wealth is talked about in this context, it is often described as a pie. "You can't make the pie larger," say politicians. When you're talking about the amount of money in one family's bank account, or the amount available to a government from one year's tax revenue, this is true. If one person gets more, someone else has to get less.

I can remember believing, as a child, that if a few rich people had all the money, it left less for everyone else. Many people seem to continue to believe something like this well into adulthood. This fallacy is usually there in the background when you hear someone talking about how x percent of the population have y percent of the wealth. If you plan to start a startup, then whether you realize it or not, you're planning to disprove the Pie Fallacy.

What leads people astray here is the abstraction of money. Money is not wealth. It's just something we use to move wealth around. So although there may be, in certain specific moments (like your family, this month) a fixed amount of money available to trade with other people for things you want, there is not a fixed amount of wealth in the world. *You can make more wealth*. Wealth has been getting created and destroyed (but on balance, created) for all of human history.

Suppose you own a beat-up old car. Instead of sitting on your butt next summer, you could spend the time restoring your car to pristine condition. In doing so you create wealth. The world is-- and you specifically are-- one pristine old car the richer. And not just in some metaphorical way. If you sell your car, you'll get more for it.

In restoring your old car you have made yourself richer. You haven't made anyone else poorer. So there is obviously not a

fixed pie. And in fact, when you look at it this way, you wonder why anyone would think there was. [5]

Kids know, without knowing they know, that they can create wealth. If you need to give someone a present and don't have any money, you make one. But kids are so bad at making things that they consider home-made presents to be a distinct, inferior, sort of thing to store-bought ones-- a mere expression of the proverbial thought that counts. And indeed, the lumpy ashtrays we made for our parents did not have much of a resale market.

Craftsmen

The people most likely to grasp that wealth can be created are the ones who are good at making things, the craftsmen. Their hand-made objects become store-bought ones. But with the rise of industrialization there are fewer and fewer craftsmen. One of the biggest remaining groups is computer programmers.

A programmer can sit down in front of a computer and *create wealth*. A good piece of software is, in itself, a valuable thing. There is no manufacturing to confuse the issue. Those characters you type are a complete, finished product. If someone sat down and wrote a web browser that didn't suck (a fine idea, by the way), the world would be that much richer. [5b]

Everyone in a company works together to create wealth, in the sense of making more things people want. Many of the employees (e.g. the people in the mailroom or the personnel department) work at one remove from the actual making of stuff. Not the programmers. They literally think the product, one line at a time. And so it's clearer to programmers that wealth is something that's made, rather than being distributed, like slices of a pie, by some imaginary Daddy.

It's also obvious to programmers that there are huge variations in the rate at which wealth is created. At Viaweb we had one programmer who was a sort of monster of productivity. I remember watching what he did one long day and estimating that he had added several hundred thousand dollars to the market value of the company. A great programmer, on a roll, could create a million dollars worth of wealth in a couple weeks. A mediocre programmer over the same period will generate zero or even negative wealth (e.g. by introducing bugs).

This is why so many of the best programmers are libertarians. In our world, you sink or swim, and there are no excuses. When those far removed from the creation of wealth-- undergraduates, reporters, politicians-- hear that the richest 5% of the people have half the total wealth, they tend to think *injustice!* An experienced programmer would be more likely to think *is that all?* The top 5% of programmers probably write 99% of the good software.

Wealth can be created without being sold. Scientists, till recently at least, effectively donated the wealth they created. We are all richer for knowing about penicillin, because we're less likely to die

from infections. Wealth is whatever people want, and not dying is certainly something we want. Hackers often donate their work by writing open source software that anyone can use for free. I am much the richer for the operating system FreeBSD, which I'm running on the computer I'm using now, and so is Yahoo, which runs it on all their servers.

What a Job Is

In industrialized countries, people belong to one institution or another at least until their twenties. After all those years you get used to the idea of belonging to a group of people who all get up in the morning, go to some set of buildings, and do things that they do not, ordinarily, enjoy doing. Belonging to such a group becomes part of your identity: name, age, role, institution. If you have to introduce yourself, or someone else describes you, it will be as something like, John Smith, age 10, a student at such and such elementary school, or John Smith, age 20, a student at such and such college.

When John Smith finishes school he is expected to get a job. And what getting a job seems to mean is joining another institution. Superficially it's a lot like college. You pick the companies you want to work for and apply to join them. If one likes you, you become a member of this new group. You get up in the morning and go to a new set of buildings, and do things that you do not, ordinarily, enjoy doing. There are a few differences: life is not as much fun, and you get paid, instead of paying, as you did in college. But the similarities feel greater than the differences. John Smith is now John Smith, 22, a software developer at such and such corporation.

In fact John Smith's life has changed more than he realizes. Socially, a company looks much like college, but the deeper you go into the underlying reality, the more different it gets.

What a company does, and has to do if it wants to continue to exist, is earn money. And the way most companies make money is by creating wealth. Companies can be so specialized that this similarity is concealed, but it is not only manufacturing companies that create wealth. A big component of wealth is location. Remember that magic machine that could make you cars and cook you dinner and so on? It would not be so useful if it delivered your dinner to a random location in central Asia. If wealth means what people want, companies that move things also create wealth. Ditto for many other kinds of companies that don't make anything physical. Nearly all companies exist to do something people want.

And that's what you do, as well, when you go to work for a company. But here there is another layer that tends to obscure the underlying reality. In a company, the work you do is averaged together with a lot of other people's. You may not even be aware you're doing something people want. Your contribution may be indirect. But the company as a whole must be giving people something they want, or they won't make any money. And if they are paying you x dollars a year, then on average you must be

contributing at least x dollars a year worth of work, or the company will be spending more than it makes, and will go out of business.

Someone graduating from college thinks, and is told, that he needs to get a job, as if the important thing were becoming a member of an institution. A more direct way to put it would be: you need to start doing something people want. You don't need to join a company to do that. All a company is is a group of people working together to do something people want. It's doing something people want that matters, not joining the group. [6]

For most people the best plan probably is to go to work for some existing company. But it is a good idea to understand what's happening when you do this. A job means doing something people want, averaged together with everyone else in that company.

Working Harder

That averaging gets to be a problem. I think the single biggest problem afflicting large companies is the difficulty of assigning a value to each person's work. For the most part they punt. In a big company you get paid a fairly predictable salary for working fairly hard. You're expected not to be obviously incompetent or lazy, but you're not expected to devote your whole life to your work.

It turns out, though, that there are economies of scale in how much of your life you devote to your work. In the right kind of business, someone who really devoted himself to work could generate ten or even a hundred times as much wealth as an average employee. A programmer, for example, instead of chugging along maintaining and updating an existing piece of software, could write a whole new piece of software, and with it create a new source of revenue.

Companies are not set up to reward people who want to do this. You can't go to your boss and say, I'd like to start working ten times as hard, so will you please pay me ten times as much? For one thing, the official fiction is that you are already working as hard as you can. But a more serious problem is that the company has no way of measuring the value of your work.

Salesmen are an exception. It's easy to measure how much revenue they generate, and they're usually paid a percentage of it. If a salesman wants to work harder, he can just start doing it, and he will automatically get paid proportionally more.

There is one other job besides sales where big companies can hire first-rate people: in the top management jobs. And for the same reason: their performance can be measured. The top managers are held responsible for the performance of the entire company. Because an ordinary employee's performance can't usually be measured, he is not expected to do more than put in a solid effort. Whereas top management, like salespeople, have to actually come up with the numbers. The CEO of a company that tanks cannot plead that he put in a solid effort. If the company

does badly, he's done badly.

A company that could pay all its employees so straightforwardly would be enormously successful. Many employees would work harder if they could get paid for it. More importantly, such a company would attract people who wanted to work especially hard. It would crush its competitors.

Unfortunately, companies can't pay everyone like salesmen. Salesmen work alone. Most employees' work is tangled together. Suppose a company makes some kind of consumer gadget. The engineers build a reliable gadget with all kinds of new features; the industrial designers design a beautiful case for it; and then the marketing people convince everyone that it's something they've got to have. How do you know how much of the gadget's sales are due to each group's efforts? Or, for that matter, how much is due to the creators of past gadgets that gave the company a reputation for quality? There's no way to untangle all their contributions. Even if you could read the minds of the consumers, you'd find these factors were all blurred together.

If you want to go faster, it's a problem to have your work tangled together with a large number of other people's. In a large group, your performance is not separately measurable-- and the rest of the group slows you down.

Measurement and Leverage

To get rich you need to get yourself in a situation with two things, measurement and leverage. You need to be in a position where your performance can be measured, or there is no way to get paid more by doing more. And you have to have leverage, in the sense that the decisions you make have a big effect.

Measurement alone is not enough. An example of a job with measurement but not leverage is doing piecework in a sweatshop. Your performance is measured and you get paid accordingly, but you have no scope for decisions. The only decision you get to make is how fast you work, and that can probably only increase your earnings by a factor of two or three.

An example of a job with both measurement and leverage would be lead actor in a movie. Your performance can be measured in the gross of the movie. And you have leverage in the sense that your performance can make or break it.

CEOs also have both measurement and leverage. They're measured, in that the performance of the company is their performance. And they have leverage in that their decisions set the whole company moving in one direction or another.

I think everyone who gets rich by their own efforts will be found to be in a situation with measurement and leverage. Everyone I can think of does: CEOs, movie stars, hedge fund managers, professional athletes. A good hint to the presence of leverage is the possibility of failure. Upside must be balanced by downside, so if there is big potential for gain there must also be a terrifying

possibility of loss. CEOs, stars, fund managers, and athletes all live with the sword hanging over their heads; the moment they start to suck, they're out. If you're in a job that feels safe, you are not going to get rich, because if there is no danger there is almost certainly no leverage.

But you don't have to become a CEO or a movie star to be in a situation with measurement and leverage. All you need to do is be part of a small group working on a hard problem.

Smallness = Measurement

If you can't measure the value of the work done by individual employees, you can get close. You can measure the value of the work done by small groups.

One level at which you can accurately measure the revenue generated by employees is at the level of the whole company. When the company is small, you are thereby fairly close to measuring the contributions of individual employees. A viable startup might only have ten employees, which puts you within a factor of ten of measuring individual effort.

Starting or joining a startup is thus as close as most people can get to saying to one's boss, I want to work ten times as hard, so please pay me ten times as much. There are two differences: you're not saying it to your boss, but directly to the customers (for whom your boss is only a proxy after all), and you're not doing it individually, but along with a small group of other ambitious people.

It will, ordinarily, be a group. Except in a few unusual kinds of work, like acting or writing books, you can't be a company of one person. And the people you work with had better be good, because it's their work that yours is going to be averaged with.

A big company is like a giant galley driven by a thousand rowers. Two things keep the speed of the galley down. One is that individual rowers don't see any result from working harder. The other is that, in a group of a thousand people, the average rower is likely to be pretty average.

If you took ten people at random out of the big galley and put them in a boat by themselves, they could probably go faster. They would have both carrot and stick to motivate them. An energetic rower would be encouraged by the thought that he could have a visible effect on the speed of the boat. And if someone was lazy, the others would be more likely to notice and complain.

But the real advantage of the ten-man boat shows when you take the ten *best* rowers out of the big galley and put them in a boat together. They will have all the extra motivation that comes from being in a small group. But more importantly, by selecting that small a group you can get the best rowers. Each one will be in the top 1%. It's a much better deal for them to average their work together with a small group of their peers than to average it with

everyone.

That's the real point of startups. Ideally, you are getting together with a group of other people who also want to work a lot harder, and get paid a lot more, than they would in a big company. And because startups tend to get founded by self-selecting groups of ambitious people who already know one another (at least by reputation), the level of measurement is more precise than you get from smallness alone. A startup is not merely ten people, but ten people like you.

Steve Jobs once said that the success or failure of a startup depends on the first ten employees. I agree. If anything, it's more like the first five. Being small is not, in itself, what makes startups kick butt, but rather that small groups can be select. You don't want small in the sense of a village, but small in the sense of an all-star team.

The larger a group, the closer its average member will be to the average for the population as a whole. So all other things being equal, a very able person in a big company is probably getting a bad deal, because his performance is dragged down by the overall lower performance of the others. Of course, all other things often are not equal: the able person may not care about money, or may prefer the stability of a large company. But a very able person who does care about money will ordinarily do better to go off and work with a small group of peers.

Technology = Leverage

Startups offer anyone a way to be in a situation with measurement and leverage. They allow measurement because they're small, and they offer leverage because they make money by inventing new technology.

What is technology? It's *technique*. It's the way we all do things. And when you discover a new way to do things, its value is multiplied by all the people who use it. It is the proverbial fishing rod, rather than the fish. That's the difference between a startup and a restaurant or a barber shop. You fry eggs or cut hair one customer at a time. Whereas if you solve a technical problem that a lot of people care about, you help everyone who uses your solution. That's leverage.

If you look at history, it seems that most people who got rich by creating wealth did it by developing new technology. You just can't fry eggs or cut hair fast enough. What made the Florentines rich in 1200 was the discovery of new techniques for making the high-tech product of the time, fine woven cloth. What made the Dutch rich in 1600 was the discovery of shipbuilding and navigation techniques that enabled them to dominate the seas of the Far East.

Fortunately there is a natural fit between smallness and solving hard problems. The leading edge of technology moves fast. Technology that's valuable today could be worthless in a couple years. Small companies are more at home in this world, because

they don't have layers of bureaucracy to slow them down. Also, technical advances tend to come from unorthodox approaches, and small companies are less constrained by convention.

Big companies can develop technology. They just can't do it quickly. Their size makes them slow and prevents them from rewarding employees for the extraordinary effort required. So in practice big companies only get to develop technology in fields where large capital requirements prevent startups from competing with them, like microprocessors, power plants, or passenger aircraft. And even in those fields they depend heavily on startups for components and ideas.

It's obvious that biotech or software startups exist to solve hard technical problems, but I think it will also be found to be true in businesses that don't seem to be about technology. McDonald's, for example, grew big by designing a system, the McDonald's franchise, that could then be reproduced at will all over the face of the earth. A McDonald's franchise is controlled by rules so precise that it is practically a piece of software. Write once, run everywhere. Ditto for Wal-Mart. Sam Walton got rich not by being a retailer, but by designing a new kind of store.

Use difficulty as a guide not just in selecting the overall aim of your company, but also at decision points along the way. At Viaweb one of our rules of thumb was *run upstairs*. Suppose you are a little, nimble guy being chased by a big, fat, bully. You open a door and find yourself in a staircase. Do you go up or down? I say up. The bully can probably run downstairs as fast as you can. Going upstairs his bulk will be more of a disadvantage. Running upstairs is hard for you but even harder for him.

What this meant in practice was that we deliberately sought hard problems. If there were two features we could add to our software, both equally valuable in proportion to their difficulty, we'd always take the harder one. Not just because it was more valuable, but *because it was harder*. We delighted in forcing bigger, slower competitors to follow us over difficult ground. Like guerillas, startups prefer the difficult terrain of the mountains, where the troops of the central government can't follow. I can remember times when we were just exhausted after wrestling all day with some horrible technical problem. And I'd be delighted, because something that was hard for us would be impossible for our competitors.

This is not just a good way to run a startup. It's what a startup is. Venture capitalists know about this and have a phrase for it: *barriers to entry*. If you go to a VC with a new idea and ask him to invest in it, one of the first things he'll ask is, how hard would this be for someone else to develop? That is, how much difficult ground have you put between yourself and potential pursuers? [7] And you had better have a convincing explanation of why your technology would be hard to duplicate. Otherwise as soon as some big company becomes aware of it, they'll make their own, and with their brand name, capital, and distribution clout, they'll take away your market overnight. You'd be like guerillas caught in the open field by regular army forces.

One way to put up barriers to entry is through patents. But patents may not provide much protection. Competitors commonly find ways to work around a patent. And if they can't, they may simply violate it and invite you to sue them. A big company is not afraid to be sued; it's an everyday thing for them. They'll make sure that suing them is expensive and takes a long time. Ever heard of Philo Farnsworth? He invented television. The reason you've never heard of him is that his company was not the one to make money from it. [8] The company that did was RCA, and Farnsworth's reward for his efforts was a decade of patent litigation.

Here, as so often, the best defense is a good offense. If you can develop technology that's simply too hard for competitors to duplicate, you don't need to rely on other defenses. Start by picking a hard problem, and then at every decision point, take the harder choice. [9]

The Catch(es)

If it were simply a matter of working harder than an ordinary employee and getting paid proportionately, it would obviously be a good deal to start a startup. Up to a point it would be more fun. I don't think many people like the slow pace of big companies, the interminable meetings, the water-cooler conversations, the clueless middle managers, and so on.

Unfortunately there are a couple catches. One is that you can't choose the point on the curve that you want to inhabit. You can't decide, for example, that you'd like to work just two or three times as hard, and get paid that much more. When you're running a startup, your competitors decide how hard you work. And they pretty much all make the same decision: as hard as you possibly can.

The other catch is that the payoff is only on average proportionate to your productivity. There is, as I said before, a large random multiplier in the success of any company. So in practice the deal is not that you're 30 times as productive and get paid 30 times as much. It is that you're 30 times as productive, and get paid between zero and a thousand times as much. If the mean is 30x, the median is probably zero. Most startups tank, and not just the dogfood portals we all heard about during the Internet Bubble. It's common for a startup to be developing a genuinely good product, take slightly too long to do it, run out of money, and have to shut down.

A startup is like a mosquito. A bear can absorb a hit and a crab is armored against one, but a mosquito is designed for one thing: to score. No energy is wasted on defense. The defense of mosquitos, as a species, is that there are a lot of them, but this is little consolation to the individual mosquito.

Startups, like mosquitos, tend to be an all-or-nothing proposition. And you don't generally know which of the two you're going to get till the last minute. Viaweb came close to tanking several

times. Our trajectory was like a sine wave. Fortunately we got bought at the top of the cycle, but it was damned close. While we were visiting Yahoo in California to talk about selling the company to them, we had to borrow a conference room to reassure an investor who was about to back out of a new round of funding that we needed to stay alive.

The all-or-nothing aspect of startups was not something we wanted. Viaweb's hackers were all extremely risk-averse. If there had been some way just to work super hard and get paid for it, without having a lottery mixed in, we would have been delighted. We would have much preferred a 100% chance of \$1 million to a 20% chance of \$10 million, even though theoretically the second is worth twice as much. Unfortunately, there is not currently any space in the business world where you can get the first deal.

The closest you can get is by selling your startup in the early stages, giving up upside (and risk) for a smaller but guaranteed payoff. We had a chance to do this, and stupidly, as we then thought, let it slip by. After that we became comically eager to sell. For the next year or so, if anyone expressed the slightest curiosity about Viaweb we would try to sell them the company. But there were no takers, so we had to keep going.

It would have been a bargain to buy us at an early stage, but companies doing acquisitions are not looking for bargains. A company big enough to acquire startups will be big enough to be fairly conservative, and within the company the people in charge of acquisitions will be among the more conservative, because they are likely to be business school types who joined the company late. They would rather overpay for a safe choice. So it is easier to sell an established startup, even at a large premium, than an early-stage one.

Get Users

I think it's a good idea to get bought, if you can. Running a business is different from growing one. It is just as well to let a big company take over once you reach cruising altitude. It's also financially wiser, because selling allows you to diversify. What would you think of a financial advisor who put all his client's assets into one volatile stock?

How do you get bought? Mostly by doing the same things you'd do if you didn't intend to sell the company. Being profitable, for example. But getting bought is also an art in its own right, and one that we spent a lot of time trying to master.

Potential buyers will always delay if they can. The hard part about getting bought is getting them to act. For most people, the most powerful motivator is not the hope of gain, but the fear of loss. For potential acquirers, the most powerful motivator is the prospect that one of their competitors will buy you. This, as we found, causes CEOs to take red-eyes. The second biggest is the worry that, if they don't buy you now, you'll continue to grow rapidly and will cost more to acquire later, or even become a competitor.

In both cases, what it all comes down to is users. You'd think that a company about to buy you would do a lot of research and decide for themselves how valuable your technology was. Not at all. What they go by is the number of users you have.

In effect, acquirers assume the customers know who has the best technology. And this is not as stupid as it sounds. Users are the only real proof that you've created wealth. Wealth is what people want, and if people aren't using your software, maybe it's not just because you're bad at marketing. Maybe it's because you haven't made what they want.

Venture capitalists have a list of danger signs to watch out for. Near the top is the company run by techno-weenies who are obsessed with solving interesting technical problems, instead of making users happy. In a startup, you're not just trying to solve problems. You're trying to solve problems *that users care about*.

So I think you should make users the test, just as acquirers do. Treat a startup as an optimization problem in which performance is measured by number of users. As anyone who has tried to optimize software knows, the key is measurement. When you try to guess where your program is slow, and what would make it faster, you almost always guess wrong.

Number of users may not be the perfect test, but it will be very close. It's what acquirers care about. It's what revenues depend on. It's what makes competitors unhappy. It's what impresses reporters, and potential new users. Certainly it's a better test than your a priori notions of what problems are important to solve, no matter how technically adept you are.

Among other things, treating a startup as an optimization problem will help you avoid another pitfall that VCs worry about, and rightly-- taking a long time to develop a product. Now we can recognize this as something hackers already know to avoid: premature optimization. Get a version 1.0 out there as soon as you can. Until you have some users to measure, you're optimizing based on guesses.

The ball you need to keep your eye on here is the underlying principle that wealth is what people want. If you plan to get rich by creating wealth, you have to know what people want. So few businesses really pay attention to making customers happy. How often do you walk into a store, or call a company on the phone, with a feeling of dread in the back of your mind? When you hear "your call is important to us, please stay on the line," do you think, oh good, now everything will be all right?

A restaurant can afford to serve the occasional burnt dinner. But in technology, you cook one thing and that's what everyone eats. So any difference between what people want and what you deliver is multiplied. You please or annoy customers wholesale. The closer you can get to what they want, the more wealth you generate.

Wealth and Power

Making wealth is not the only way to get rich. For most of human history it has not even been the most common. Until a few centuries ago, the main sources of wealth were mines, slaves and serfs, land, and cattle, and the only ways to acquire these rapidly were by inheritance, marriage, conquest, or confiscation. Naturally wealth had a bad reputation.

Two things changed. The first was the rule of law. For most of the world's history, if you did somehow accumulate a fortune, the ruler or his henchmen would find a way to steal it. But in medieval Europe something new happened. A new class of merchants and manufacturers began to collect in towns. [10] Together they were able to withstand the local feudal lord. So for the first time in our history, the bullies stopped stealing the nerds' lunch money. This was naturally a great incentive, and possibly indeed the main cause of the second big change, industrialization.

A great deal has been written about the causes of the Industrial Revolution. But surely a necessary, if not sufficient, condition was that people who made fortunes be able to enjoy them in peace. [11] One piece of evidence is what happened to countries that tried to return to the old model, like the Soviet Union, and to a lesser extent Britain under the labor governments of the 1960s and early 1970s. Take away the incentive of wealth, and technical innovation grinds to a halt.

Remember what a startup is, economically: a way of saying, I want to work faster. Instead of accumulating money slowly by being paid a regular wage for fifty years, I want to get it over with as soon as possible. So governments that forbid you to accumulate wealth are in effect decreeing that you work slowly. They're willing to let you earn \$3 million over fifty years, but they're not willing to let you work so hard that you can do it in two. They are like the corporate boss that you can't go to and say, I want to work ten times as hard, so please pay me ten times as much. Except this is not a boss you can escape by starting your own company.

The problem with working slowly is not just that technical innovation happens slowly. It's that it tends not to happen at all. It's only when you're deliberately looking for hard problems, as a way to use speed to the greatest advantage, that you take on this kind of project. Developing new technology is a pain in the ass. It is, as Edison said, one percent inspiration and ninety-nine percent perspiration. Without the incentive of wealth, no one wants to do it. Engineers will work on sexy projects like fighter planes and moon rockets for ordinary salaries, but more mundane technologies like light bulbs or semiconductors have to be developed by entrepreneurs.

Startups are not just something that happened in Silicon Valley in the last couple decades. Since it became possible to get rich by creating wealth, everyone who has done it has used essentially the same recipe: measurement and leverage, where measurement comes from working with a small group, and

leverage from developing new techniques. The recipe was the same in Florence in 1200 as it is in Santa Clara today.

Understanding this may help to answer an important question: why Europe grew so powerful. Was it something about the geography of Europe? Was it that Europeans are somehow racially superior? Was it their religion? The answer (or at least the proximate cause) may be that the Europeans rode on the crest of a powerful new idea: allowing those who made a lot of money to keep it.

Once you're allowed to do that, people who want to get rich can do it by generating wealth instead of stealing it. The resulting technological growth translates not only into wealth but into military power. The theory that led to the stealth plane was developed by a Soviet mathematician. But because the Soviet Union didn't have a computer industry, it remained for them a theory; they didn't have hardware capable of executing the calculations fast enough to design an actual airplane.

In that respect the Cold War teaches the same lesson as World War II and, for that matter, most wars in recent history. Don't let a ruling class of warriors and politicians squash the entrepreneurs. The same recipe that makes individuals rich makes countries powerful. Let the nerds keep their lunch money, and you rule the world.

Notes

[1] One valuable thing you tend to get only in startups is *uninterruptability*. Different kinds of work have different time quanta. Someone proofreading a manuscript could probably be interrupted every fifteen minutes with little loss of productivity. But the time quantum for hacking is very long: it might take an hour just to load a problem into your head. So the cost of having someone from personnel call you about a form you forgot to fill out can be huge.

This is why hackers give you such a baleful stare as they turn from their screen to answer your question. Inside their heads a giant house of cards is tottering.

The mere possibility of being interrupted deters hackers from starting hard projects. This is why they tend to work late at night, and why it's next to impossible to write great software in a cubicle (except late at night).

One great advantage of startups is that they don't yet have any of the people who interrupt you. There is no personnel department, and thus no form nor anyone to call you about it.

[2] Faced with the idea that people working for startups might be 20 or 30 times as productive as those working for large companies, executives at large companies will naturally wonder, how could I get the people working for me to do that? The answer

is simple: pay them to.

Internally most companies are run like Communist states. If you believe in free markets, why not turn your company into one?

Hypothesis: A company will be maximally profitable when each employee is paid in proportion to the wealth they generate.

[3] Until recently even governments sometimes didn't grasp the distinction between money and wealth. Adam Smith (*Wealth of Nations*, v:i) mentions several that tried to preserve their "wealth" by forbidding the export of gold or silver. But having more of the medium of exchange would not make a country richer; if you have more money chasing the same amount of material wealth, the only result is higher prices.

[4] There are many senses of the word "wealth," not all of them material. I'm not trying to make a deep philosophical point here about which is the true kind. I'm writing about one specific, rather technical sense of the word "wealth." What people will give you money for. This is an interesting sort of wealth to study, because it is the kind that prevents you from starving. And what people will give you money for depends on them, not you.

When you're starting a business, it's easy to slide into thinking that customers want what you do. During the Internet Bubble I talked to a woman who, because she liked the outdoors, was starting an "outdoor portal." You know what kind of business you should start if you like the outdoors? One to recover data from crashed hard disks.

What's the connection? None at all. Which is precisely my point. If you want to create wealth (in the narrow technical sense of not starving) then you should be especially skeptical about any plan that centers on things you like doing. That is where your idea of what's valuable is least likely to coincide with other people's.

[5] In the average car restoration you probably do make everyone else microscopically poorer, by doing a small amount of damage to the environment. While environmental costs should be taken into account, they don't make wealth a zero-sum game. For example, if you repair a machine that's broken because a part has come unscrewed, you create wealth with no environmental cost.

[5b] This essay was written before Firefox.

[6] Many people feel confused and depressed in their early twenties. Life seemed so much more fun in college. Well, of course it was. Don't be fooled by the surface similarities. You've gone from guest to servant. It's possible to have fun in this new world. Among other things, you now get to go behind the doors that say "authorized personnel only." But the change is a shock at first, and all the worse if you're not consciously aware of it.

[7] When VCs asked us how long it would take another startup to duplicate our software, we used to reply that they probably

wouldn't be able to at all. I think this made us seem naive, or liars.

[8] Few technologies have one clear inventor. So as a rule, if you know the "inventor" of something (the telephone, the assembly line, the airplane, the light bulb, the transistor) it is because their company made money from it, and the company's PR people worked hard to spread the story. If you don't know who invented something (the automobile, the television, the computer, the jet engine, the laser), it's because other companies made all the money.

[9] This is a good plan for life in general. If you have two choices, choose the harder. If you're trying to decide whether to go out running or sit home and watch TV, go running. Probably the reason this trick works so well is that when you have two choices and one is harder, the only reason you're even considering the other is laziness. You know in the back of your mind what's the right thing to do, and this trick merely forces you to acknowledge it.

[10] It is probably no accident that the middle class first appeared in northern Italy and the low countries, where there were no strong central governments. These two regions were the richest of their time and became the twin centers from which Renaissance civilization radiated. If they no longer play that role, it is because other places, like the United States, have been truer to the principles they discovered.

[11] It may indeed be a sufficient condition. But if so, why didn't the Industrial Revolution happen earlier? Two possible (and not incompatible) answers: (a) It did. The Industrial Revolution was one in a series. (b) Because in medieval towns, monopolies and guild regulations initially slowed the development of new means of production.



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