Scaling Up

Growth Metrics for Software Companies

Charles Plant
September 2018

COMMUNITECH
IMPACT CENTRE
UNIVERSITY OF TORONTO
OPENVIEW
Canada

Contents

Executive Summary

A scaleup is defined as a company with an average annual growth of at least 20% over three consecutive years. The notion of ***growth*** is critical to achieving scale, and regardless of sector, entrepreneurs work hard to grow their businesses. But how do we measure success in scaling, and what is the secret to growth?

To answer these questions, we looked at thousands of software companies to uncover their secrets to driving growth. This report sets out important growth metrics, particularly for those selling Software as a Service (SaaS).

Why Growth?

The first section of this report is dedicated to tying ***growth*** to value creation in technology companies. We begin with the standard formula for valuation:

valuation = revenue x revenue multiple

Growth has a dual effect on this formula: firstly, higher growth rate results in higher revenue (one dimension of the formula). And secondly, the increased growth rate increases the revenue multiple (the other dimension in the formula).

Given this relationship between growth and valuation, any company wishing to compete as a world-class business must be growing wildly to generate superlative returns for a venture capitalist (VC). Because of the dependence of returns on growth. VCs consider a 10–20% growth per month in the seed stage and 60% per year in the expansion stage as a minimum to consider a business worthy of investment. In practice, many VCs will actually only consider companies with annual growth rates of 100% as prospective investments.

Market Size & Innovation Adoption(?)

In the second section, we present the results of our analysis, in which we looked at SaaS Unicorns and public companies to learn about the impact that market size has on growth. We found that the first requirement for growth is to be situated in a large market. It is virtually impossible to grow ***sufficiently*** or ***quickly*** in a small market. History shows that high-growth companies tend to be consumer-based, serving markets that are broadly based and horizontal—rather than vertical—in nature.

After market size, the next most important factor is the rate at which the market takes up and adopts new innovations. If a new company is selling a product or service that their target market has never purchased before, the rate of diffusion will be slow. Even in a large market, poor uptake will slow down the potential growth of the company.

Capital and People

The third section of this report deals with capital and people requirements in scaling. To determine how much capital and how many people are required to drive high growth, we looked at the results of thousands of public and private software companies.

Our results suggest that an average public software company needs $1.23 of capital for every dollar of revenue earned. Capital requirements are lower for growth rates below 20%, but when growth is higher than this, substantially more capital is required. For a company that is scaling successfully, the ratio of capital to revenue should be between 1:1 and 1.5:1.

The data also shows that the amount of capital required for human resources is at least $300k-$500k per employee for rapid-growth companies. The average revenue per employee is $330k.

Thus, a company attempting to scale up should expect to raise approximately $12.5 million of capital for every $10 million of revenue (1.25:1). This would fund 30 employees (at $400k of capital per employee) and produce $10 million of revenue (at $330k revenue per employee).

We must keep in mind that how and when you raise funds also matters. Firms that raised the highest amounts in their first year of seeking capital subsequently raised far more than firms who raised less capital in their first year. The relationship is particularly strong in the first five years of fundraising, showing that there is a definite advantage to raising ***more*** money the first time you raise it.

A fine balance must be struck in terms of timing. The data shows that waiting slightly longer to raise funds generally results in a larger first round and is better correlated to higher amounts raised in the long run. However, there does not appear to be any benefit in waiting more than 5 years to raise your first round.

Driving Growth

The last section of the report looks at factors that are correlated with high growth. To understand what drives growth, we partnered with Openview, a US-based VC that conducts an annual survey of SaaS companies.

We divided the companies in Openview's database into three stages of growth: validation stage (below $1 million in revenue), efficiency stage (approaching $5 million), and scaling stage (above $5 million). Based on the analysis, we can draw some conclusions about operational variables and their relationship to growth:

1. Growth declines, on average, as firms move from inception to scale. While average growth rates in the validation stage are 150%, they decline to 67% by the time firms are in the scaling stage.
2. In the validation stage, businesses favour employment in marketing and sales (M&S) over research and development (R&D), at a rate of 2:1. This declines to 1.15:1 by the scaling stage.
3. The higher the M&S employee composition, the higher the business growth. This correlation between employee composition and growth holds at all stages.
4. Significant funds are spent on M&S at all stages. But, while the ratio of R&D to M&S stands at 1.75:1 in the validation stage, that ratio flips to 1:1.45 by the time a firm reaches the scaling stage.
5. Higher spending on M&S is correlated with higher growth rates.
6. The higher the burn rate, the higher the growth rate at all stages.

Leveraging Growth Metrics

This report contains substantial data about what works in scaling up SaaS-based companies, but how should this be used to inform your business planning? We recommend you use the data as a starting point to examine how to scale your business. For instance, you know now that you need to target at least of 10%–20% growth per month in the early stages and 100% growth per year in later stages to create a world-class company. You can use the data as guidance to help you devise your initial plans and financial forecasts or to carry out the analysis needed during fundraising. We have also created an interactive tool to help you compare your firm's results or plans with other companies. Check it out on our website at:

Impactcentre.ca/software-metrics

Good luck scaling up. We hope these metrics are helpful to you.

Charles Plant
September 2018

Scaling Up

Fiix Software is a good example of an organization that is actively scaling its business. It's a cloud-based maintenance and asset management company that was founded in 2008 and has raised over $17 million. Marc Castel, its founder and CEO, tells an interesting story about the company's development, explaining that their most transformative endeavor was to take a very disciplined approach to measuring things.

The company had successfully raised equity funding, so there was tremendous pressure to scale. They made the same mistake that most companies do, and tried to scale prematurely; their costs were still high, and they were cash-flow negative from scaling. Their goal was to attract new customers and they had succeeded in driving customer growth, but the economics were all wrong. So, Marc took a step back, stopped trying to scale, and set about figuring out how to do it properly.

According to Marc, there are four pillars to scaling successfully. Aside from having a good market fit—which is a given and should be figured out in the Validation Stage—the four pillars are:

1. **Building Efficient Systems**

   You'll need marketing, sales, operations and administrative efficiency, as well as technical efficiency through such things as a multi-tenant code base.

2. **Predictable Systems**

   You'll need to measure everything. Fiix has over 600 metrics and even employs a quantitative analyst to identify opportunities for improvement.

3. **Repeatable Systems**

   The company needs repeatable system formulas for development and sales on a unit by unit basis, so that anything needed for growth can easily be replicated.

4. **Pillar Alignment**

   Finally, all pillars in the company need to be aligned, to produce the right set of outcomes.

Problems Scaling

Fiix learned from the problems of scaling prematurely. Startup Genome, in their 2011 report (***Startup Genome Compass***, Startup Genome, 2011), studied 3200 companies and found that 70% of companies that fail do so because they scale prematurely. Startup Genome's Key Findings regarding scaling up can be summarized as follows:

1. "Premature scaling is the most common reason for startups' performance to worsen. They tend to lose the battle early by getting ahead of themselves and prematurely scaling their team, their customer acquisition strategies, or over-building their products."

2. "Many investors invest two to three times more capital than necessary in startups during the discovery phase. They also overinvest in solo founders and founding teams."

3. "Startups that scale prematurely without technical co-founders are classified as ***inconsistent*** and those that scale properly are classified as ***consistent***, despite indicators that these teams have a much lower probability of success."

4. "Solo founders take 3.6 times longer to reach Scale Stage as compared to a two-person founding team. And they are 2.3 times less likely to pivot."

5. "Business-heavy founding teams are 6.2 times more likely to successfully scale with sales-driven startups than with product-driven startups."

6. "Technical-heavy founding teams are 3.3 times more likely to successfully scale with product-centric startups without network effects than with product-centric startups with network effects."

7. "Balanced teams—with one technical founder and one business founder—raise 30% more money, have 2.9 times more user growth, and are 19% less likely to scale prematurely than technical- or business-heavy founding teams."

8. "Founders that don't work full-time have 4 times less user growth and end up raising 24 times less money from investors."

9. "Startups need two to three times longer to validate their market than most founders expect. This underestimation creates the pressure to scale prematurely."

10. "Startups that haven't raised money overestimate their market size by 100 times and often misinterpret their market as new."

It's all a little depressing but the report does an excellent job of providing clear warnings of what needs to be done.

There is, however, another condition that creates problems for companies: stalled scaling. Stalled scaling occurs when a company doesn't have the financial or human resources to scale at all. This often happens simply because the company underestimates the resources needed to scale; it overestimates its potential profitability, which causes it to raise less money than it actually requires. In reality, scaling requires vast amounts of capital and causes substantial losses.

Communitech, an industry-led innovation centre that supports a community of more than 1,000 tech companies, asked us to conduct research into what drives success in SaaS-based companies. This report is the result of that research and it has been designed to help companies avoid both stalled and premature scaling. The research is divided into a number of sections and attempts to answer the following questions:

1. What are the economics of growth?
2. How big a market do you need?
3. How much capital do you need?
4. When should you raise money?
5. What are the key activities at each stage of growth?
6. What results should you expect at each stage of growth?
7. What personnel do you need at each stage?
8. How much should you spend on key activities?
9. How much money should you expect to lose or earn in each stage?

We've used data from hundreds of public software companies and thousands of private companies featured in CB Insights and Crunchbase. We have also partnered with OpenView, a US-based VC, to get private data on operations from hundreds of SaaS-based companies around the world.

We've analyzed that data to answer the questions asked by entrepreneurs every day. In addition, we have taken the OpenView Survey data and made it available online. If you want to see more granular data, or compare your company to others in the same stage of development, check out our benchmarking tool at:

http://www.impactcentre.ca/software-metrics/

We want to thank Communitech, the Government of Canada and OpenView for their help with this research and we hope you benefit from it. If you have specific questions, please don't hesitate to contact us:

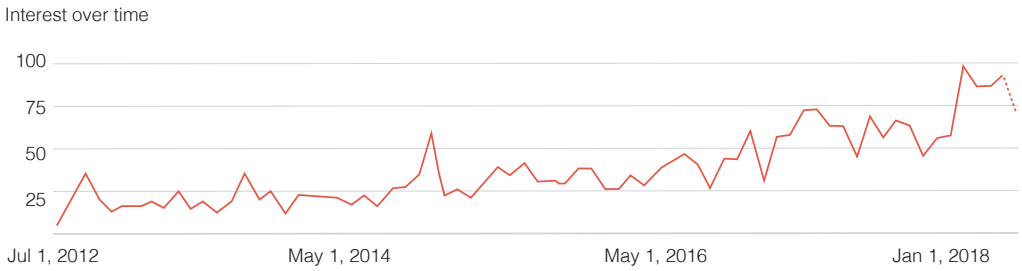
Charles Plant
cplant@imc.utoronto.ca

Why Growth

Interest by entrepreneurs in scaling up has increased dramatically over the last few years. Exhibit 1 shows how the term Scaleup has trended since 2012:

Exhibit 1

Scaleup as a Search Term



Source: Google Trends

A scaleup is a company with average annual growth of over 20% for the last three years. The essential component of scaling up then is growth. That begs the question then, what is the secret to growth? This report attempts to answer that question. In fact, what we are trying to do is to help you create an algorithm or formula for growth. We have looked at thousands of companies and in these reports, are boiling down a growth algorithm to its essential elements so you can create one for yourself.

We have used the software industry as our primarily example in this report as to combine two different industries such as software and health tech would create lots of differences and wouldn't be as clear an explanation. If you are from a different industry though, most of the concepts from these reports apply. You just need to adjust certain factors to your industry norms in order to create your own algorithm for growth.

An Example

To start, we need to explain Why Growth? To do that, let's look at two Canadian companies that were founded in 2004 and went public in the last couple of years. The first is Shopify, an e-commerce company, and the second is Real Matters, which provides services for the mortgage-lending and insurance industries.

Shopify went public in May of 2015 with a valuation of $1.27 billion. Over the previous year, their revenue had grown 104% to $105 million, making their valuation 12 times their revenue. As of June 12, 2018, their shares have grown from $17 at issue to $163, and they now have a market cap of $17.3 billion. Their revenue multiple in July was 25.7 times, based on 2017 sales of $673 million—up by 73% in the past year. (Although in the end of July their valuation was under attack due to

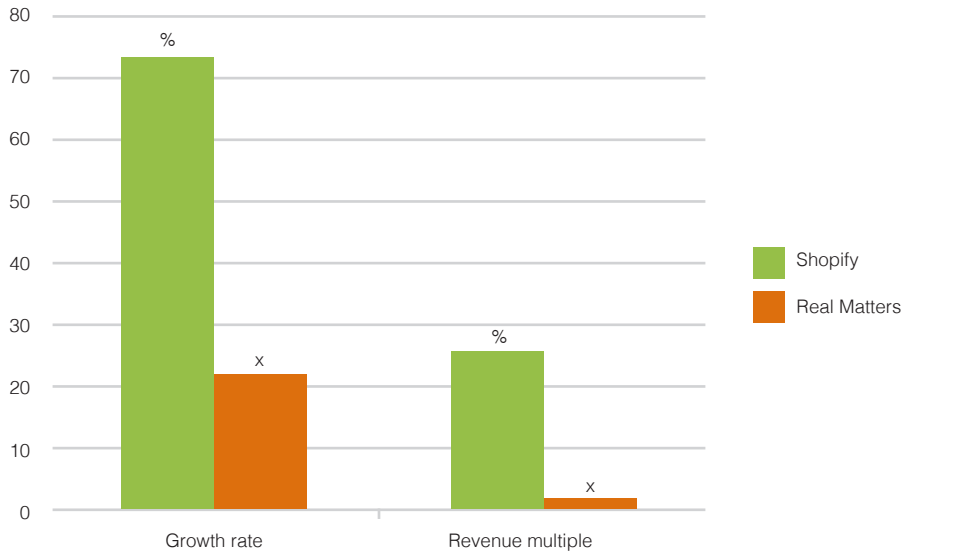
declining growth rates.)

Real Matters went public in April of 2017 with a valuation of $1.1 billion. Their 2016 revenue was up by 46% at $248 million, meaning their revenue multiple was 4.4 times. Since going public, their stock has dropped by 57% to give them a market cap of $462 million. With revenue of $302 million—up 22%—their revenue multiple is now only 1.53 times. Exhibit 2 shows the dramatic difference between the two companies:

Exhibit 2

Shopify and Real Matters

Source: Google Finance



So, what's the difference? Simple—it's the growth rate. Shopify is growing like gangbusters and Real Matters has good, but not stupendous, growth. And as a result, Shopify is rewarded with an eye-popping valuation.

Valuation of Companies

There are lots of theories about how companies are valued, but you can boil them down into a few distinct ones:

- Book Value – The value of assets minus liabilities
- Discounted Cash Flow – Discounting future cash flows into current dollars
- Profit Multiple – A multiple of the company's EBITDA (earnings)
- Revenue Multiple – A simple multiple of the company's revenue

A high-growth technology company doesn't have much in the way of assets or

liabilities to make book value relevant. They typically consume mountains of cash to fuel their rapid growth, so they don't generate enough profit to base a discounted cash flow or profit multiple valuation on. For these reasons, fast-growing technology companies are usually valued using a revenue multiple.

The faster a company's revenue grows, the higher its growth rate will be. The market loves growth, so the more it expects a company's growth to continue, the more it will bid-up a stock price. Take Facebook, for example. They are a virtual behemoth, with a market cap of $557 billion based on revenue of $40.6 billion and a growth rate of 47%. Their revenue multiple was 13.7 times. (Although their valuation declined 19% in July 2018 due to falling growth rates.) Meanwhile, Microsoft has a value of $775 billion from a revenue of $90 billion, up 5% over the last year. Their revenue multiple? A mere 8.6 times.

What's the difference between Facebook and Microsoft? You guessed it—it's their growth rate. Growth rate creates value in a technology company and it has a dual effect: firstly, higher growth rate results in higher revenue, which increases one dimension of the valuation formula. And secondly, the increased growth rate increases the revenue multiple, which is the other dimension in the formula:

Revenue x Revenue Multiple = Valuation

Growth rate increases revenue multiple

In terms of Shopify and Real Matters, the public stock markets are anticipating consistent future growth from Shopify so they accord the company a high revenue multiple. Real Matters, whose growth rate is substantially lower, is not expected to generate high growth so its revenue multiple is correspondingly lower.

Public Companies

One can look at public markets to see whether this relationship between growth rate and valuation holds up over a broad range of companies. Exhibit 3 shows the results of 180 public software companies whose revenue in 2016 was over $100 million

Exhibit 3

Public Software Company Revenue Multiples

Source: Google Finance

The graph clearly shows the relationship between the revenue multiple and the growth rate of these companies. In fact, the correlation coefficient is 0.58. If you look closely, you'll see Shopify, the dot at the top right with a revenue multiple of 20 times and a growth rate of 90%, the highest of all these companies.

Private Companies

Data for private companies is harder to come by, but Thomasz Tunguz of Redpoint Ventures has been keeping track, and in his blog of June 12, 2018, he showed the results for 14 private mergers. This chart summarizes his findings:

Exhibit 4

Private Software Company Revenue Multiples

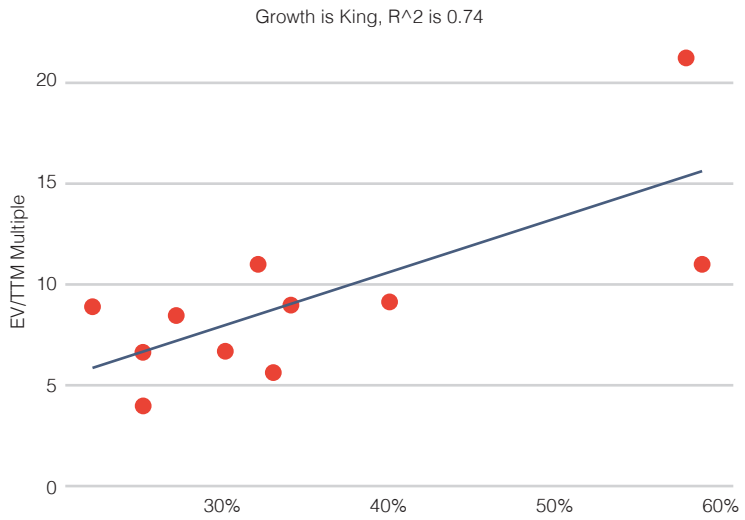
Transaction	Price	TTM Rev	Growth Rate	Gross Margin	Year of Sale	Enterprise Value	EV/ TTM
Microsoft/Github	7,500	300	50%		2018	7350	24.5
Salesforce/Mulesoft	6,500	297	58%	73%	2018	6296	21.2
Workday/Adaptiveinsights	1,550	107	30%	74%	2018	1520	14.2
SAP/Concur	8,300	546	32%	63%	2014	5988	11.0
SAP/SuccessFactors	3,764	328	59%	66%	2011	3599	11.0
Salesforce/Demandware	2,800	274	40%	71%	2016	2502	9.1
Oracle/Eloqua	957	96	34%	72%	2012	864	9.0
SAP/Callidus	2,400	253	22%	61%	2018	2247	8.9
SAP/Ariba	4,607	517	27%	66%	2012	4390	8.5
Microsoft/LinkedIn	26,500	3,615	30%	87%	2016	24385	6.8
Oracle/Responsys	1,770	194	25%	53%	2013	1291	6.7
Cisco/Broadsoft	2,288	362	10%	72%	2018	2137	5.9
Oracle/Taleo	1,921	315	33%	67%	2012	1805	5.7
IBM/Kenexa	1,397	333	25%	61%	2012	1332	4.0

Source: Thomasz Tunguz (tomtunguz.com)

His accompanying graph shows the same relationships seen in the public company analysis of Exhibit 3:

Exhibit 5

Revenue Multiples



Source: Thomasz Tunguz (tomtunguz.com)

He's even calculated the correlation coefficient, which, in the case of these private companies, is a healthy 0.68.

The Venture Capital Perspective

Venture capitalists invest in many companies, knowing that some will fail, some will be also-rans or sell in merger transactions, and a very few will go public with high valuations. Of course, the big objective is to either sell or go public at ridiculously high valuations, because VCs need those high-value companies to make up for the failures and also-rans. They also need high returns to meet their promises to limited partners, so that they'll be able to raise another fund.

Let's look at how growth rates and revenue multiples affect a venture capitalist's rate of return.

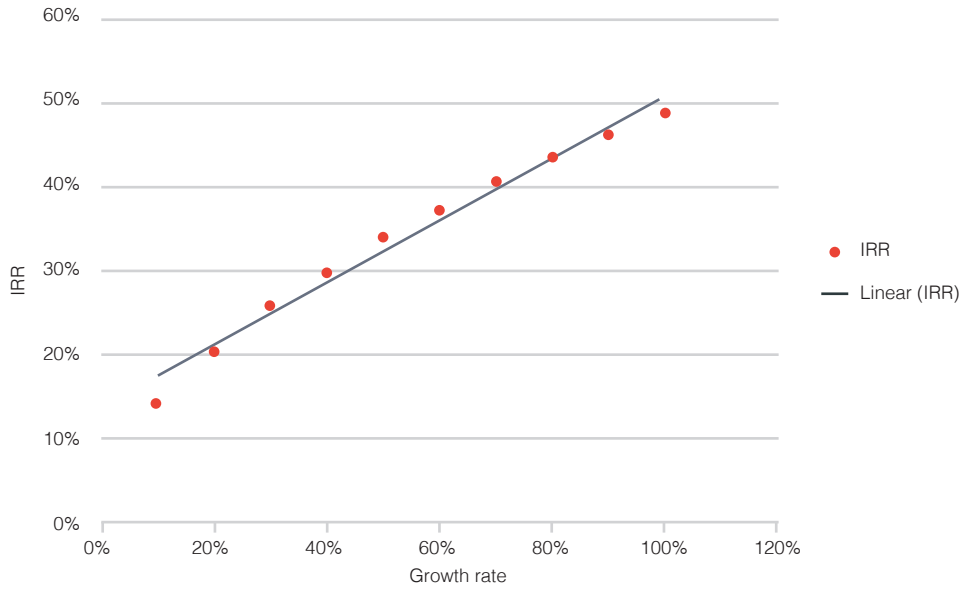
We'll imagine a hypothetical company which raises $15 million in two rounds of venture capital and drives revenue to $10 million (which is about industry average for capital efficiency, but we'll get into that later). By acquiring 25% of the company in each of two rounds, the VCs now have 44% of the company when it sells. If they put their $15 million in participating preferred shares with a single liquidation preference and an 8% coupon (these being standard terms for VC investments), they'll earn a positive return in all growth scenarios.

Internal Rate of Return

VCs measure results through the internal rate of return or IRR, which shows their average rate of return by year. Exhibit 6 shows the effect of growth rate on IRR using Thomasz Tunguz's numbers for the relationship between growth rate and revenue multiple.

Exhibit 6

The Effect of Growth Rate on IRR



In our scenario, with a growth rate of 100%, our imaginary VC will earn a 50% IRR. With growth rates in the 34% range—as in the Tunguz example—the IRR will be around 28%.

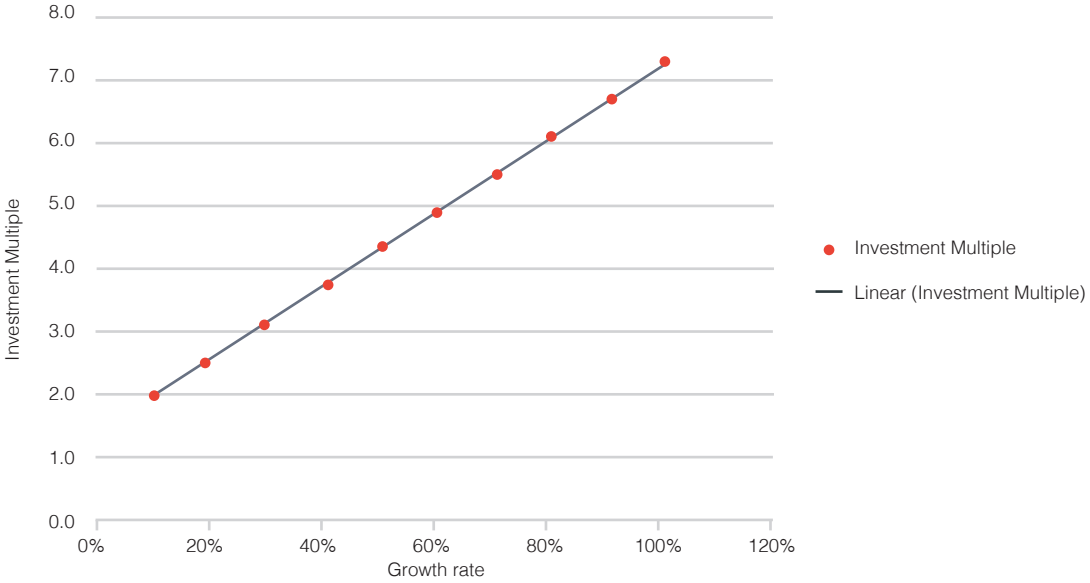
10-Baggers

Let's look at this another way. People often speak of VCs wanting to earn a ***10-bagger***. A 10-bagger is an investment that returns 10 times its purchase price. Similarly, an outlay of $15 million that returns $60 million is called a 4-bagger, but people don't like talking about those so much.

With this in mind, let's look at the effect of growth rates on the investment multiple:

Exhibit 7

The Effect of Growth on the Investment Multiple



We can see that a company growing at 100% per year will just about give us a 7-bagger. Now, this may seem to be a great return, but let's remember that this is the return for only ***one*** company and a successful VC has to spread her risk by investing in ***multiple*** companies.

So, let's say that she's invested $15 million in each of ten companies. Two of them are 7-baggers, four of them return the investment amount, and four others fail totally. In this case, $150 million turns into $240 million over five years. If you do the math, you'll find that the IRR is only 10% over the whole period. And 10% isn't enough to get anybody excited.

This is why growth is so important to venture capitalists. Your company has to be growing wildly to generate enough of a return to make up for the duds. As a result,

venture capitalists really only look at companies that are growing at 10% to 20% a month in the seed stage, and at 60% a year in the expansion stage. In reality, many VCs will say that they only look at companies with growth of 100% a year.

Active Rate of Return

You may be surprised by VCs' actual rates of return. The following chart shows, by vintage year, the rates of returns earned by a sample of VC funds. The median return over this period is only 11%. This data was provided by Pitchbook in their report *Pitchbook Benchmarks* (Q3, 2017).

Exhibit 8

Venture Capital Rates of Return

Vintage Year	Pooled IRR	Number of Funds	Top Decile	Top Quartile	Median IRR	Bottom Quartile	Bottom Decile
2008	10%	55	27%	17%	8%	1%	-14%
2009	11%	22	19%	16%	7%	4%	-4%
2010	17%	25	47%	28%	12%	5%	0%
2011	16%	20	28%	22%	16%	6%	-3%
2012	19%	19	29%	23%	17%	11%	0%
2013	24%	21	38%	20%	17%	9%	5%
2014	13%	35	18%	14%	9%	2%	0%
2015	15%	34	24%	11%	3%	-8%	-15%
Average	**16%**		**29%**	**19%**	**11%**	**4%**	**-4%**

Source: Pitchbook Benchmarks Q3 2017

Github was one deal that significantly added to the returns of its investors. Github was founded in 2008 and the founders earned enough revenue in the first years that they didn't need venture capital funding. They first raised money in 2012, four years after founding, when they got $100 million from Andreessen Horowitz and SV Angels, based on a $750 million valuation. In 2015 they raised a further $250 million (when sales were only $15 million) at a $2 billion valuation. There may be structural issues, such as liquidation preferences, that would change the ownership percentage, but the math says that the VCs owned about 25% to 30% of the total company.

When Github was sold to Microsoft, revenue was $300 million, giving a 25 times revenue multiple. The sales growth from 2015 to 2018 was an average of 265% a year, so it's not surprising that they got a 25-times multiple on revenue as a private company. The investors earned a 72% IRR or a 20-bagger. That ***is*** worth getting excited about.

The Entrepreneur's Perspective

To discover the actual growth rates of companies, we were able to obtain access to data from Openview Partner's annual SaaS survey from 2018. Openview is a venture capital firm that provides expansion-stage funding to software companies. They have raised about $1 billion in six funds since 2006 and have made more than 80 investments. This survey contains data from over 400 SaaS companies, and while it's not a statistically valid sample of SaaS companies, it is indicative of the types of results experienced. The following chart shows the distribution of growth rates for these companies:

Exhibit 9

SaaS Company Growth rates %

	All	Under $1M	$1M - $5M	Over $5M
Average	104.9	148.6	109.8	66.7
Median	60.0	76.0	73.0	44.0
Top Half	185.9	270.1	186.3	112.5
Bottom Half	22.8	16.4	32.0	21.5
Top Quartile	287.6	448.5	273.2	160.1
2nd Quartile	86.1	103.0	102.1	64.9
3Rd Quartile	37.1	33.3	47.6	32.6
4th Quartile	7.7	-3.7	16.4	10.2

Source: Openview Survey 2018

This Exhibit clearly shows how hard it is to maintain the outstanding growth rates that venture capitalists are interested in. It's possible for companies with revenue of under $1 million to have very strong growth, and such companies in this sample experienced a median growth rate of 76%. However, as a company ages, its growth rates decline, and when revenue exceeds $5 million, the median growth rate drops to 44%. Of these firms, fewer than half would be of interest to a VC, due to low growth rates.

Expected Growth Rates

While VCs are looking for growth rates above 60%, entrepreneurs' expectations about growth are often wildly optimistic. We took a closer look at the issue of unrealistic projections by examining the financial forecasts of 88 companies that had been seeking venture capital, strategic capital, or an opportunity to be acquired.

From this initial group, we eliminated 53 companies whose forecasts could be seen as content marketing. In the end, we selected 35 companies whose forecasts were

accompanied by fully-developed business plans and sufficient data to determine their expected level of growth, capital consumption, and profitability.

All of these companies were based in Canada, mostly in the information technology sector; they had all sought capital within the last ten years. Of course, this is not a statistically representative sample of the community and is intended to demonstrate only that the situation warrants further discussion and examination.

Exhibit 10 details the profile of the 35 companies that were selected for our study.

Exhibit 10

Revenue and capital profiles of 35 companies

Average current revenue	$ 1, 498,000
Number of firms with no revenue	14
Average current capital raised	$2,491,000
Number of firms with no capital	10
Average capital required now	$2,771,000
Average additional capital required in the forecast	$3,760,000
Number of firms identifying a need for additional capital	5

Although there was variation in the accuracy of the forecasted revenue, the average compound growth rate expected from the first forecast year—irrespective of the term of the projections—was 160%. These forecasts may certainly be considered aggressive, and while there is nothing wrong with being aggressive, this level of growth would outpace all but the very best unicorns . . . and almost all of the companies in the Openview study.

In fact, our report ***Failure to Scale*** (February, 2017) showed that the average growth rate of the top 50 unicorns (excluding some super-performers) is 99% per annum, and the growth rate of the next 50 is approximately 63% per annum. A good Canadian example of super-growth is Blackberry, which grew, according to its former CEO, at a rate of approximately 100% per year for many years.

Expected Revenue Growth Patterns

Exhibit 11 shows the expected revenue trajectory of the 35 firms in our study.

Exhibit 11
Growth Profiles of 35 Companies

Year	Average Forecast Revenue ($ million)	Average Growth Rate	Weighted Average Growth Rate
Current Actual	$1,412		
Forecast Year 1	3,574	225%	153%
Forecast Year 2	9,729	272%	172%
Forecast Year 3	20,757	146%	113%
Forecast Year 4	32,002	85%	54%
Forecast Year 5	56,860	69%	78%

- **Pre-Revenue Firms**

  Our first examination was of pre-revenue firms, with the objective of determining the expected first-year revenue of those companies with little or no revenue history. The average anticipated first-year revenue was $1.5 million. This is an aggressive forecast, as it would reflect better results than any of the 48 companies of this size in the Openview survey. In fact, this pattern is observed with firms in our forecasting sample who were revenue positive in the year they were raising funds. Only the firms with multiple years of revenue history were able to record more than $1 million of revenue.

- **First Year of Forecast**

  We next looked at the forecasts of the 19 firms in the study that had recorded revenue. For the purposes of analysis, we removed three abnormally high outliers. The remaining 16 firms expected 225% growth in the next year, an optimistic, but potentially achievable, figure. What's most interesting is the range of expected growth rates—some firms expected no growth in their first year, while others expected over 1000% growth.

- **Second Year of Forecast**

  In their second year of revenue forecasting, firms expected weighted average growth of 172% and non-weighted average growth of 272%. This shows us that the firms with more than $335,000 of revenue in their fund-raising year expected a growth rate of 117% in their second year of the forecast; however, the firms with less revenue (or zero income) expected a significantly higher growth rate of 418%.

This demonstrates that actual revenue is a good teacher; firms that manage to figure out how to drive revenue are more realistic in their expectations of revenue growth.

- **Last Year of Forecast**

  A problem with these forecasts is in the clear pattern of declining growth in later years of the forecast. As can be seen in Exhibit 10, weighted average growth rates in the fourth year of the forecast (a year for which 22 firms produced projections) declined to 54%. If these firms are to become unicorns, they need to ensure that growth rates in the fourth and subsequent years significantly exceed this level.

  If these forecasts were to play out in reality, the declining growth rates in later years would be accompanied by declining revenue multiples in valuation (and a lower expected price if the firm were sold). Thus, VCs would get lower rates of return, reducing their interest in investing. To an experienced eye, it appears that these firms seem to expect a dramatic growth in the first few years but may not be able to support high valuations in subsequent years. To avoid this issue, the last years used in the projections should have minimum optimistic growth rates of 120%.

The patterns of growth seen in these forecasts suggest that firms may not understand the link between growth rates and their investors' returns.

What this means to entrepreneurs

If your objective is to create a high-growth company, then venture capital financing is right for you. However, if you don't think your company can grow at 60%–100% a year (or more), then you shouldn't be looking for VC money. Find angels, or others whose growth objectives are aligned with yours, and get them to finance you.

The first part of the formula for creating a successful scaleup is Growth. You need to target growth of 10%–20% per month in the early stages and be able to achieve 100% growth per year to create a world-class company.

Knowing this is one thing, but ***how*** to do it is another, and the following sections of this report will try to explain that.

Market Size

So far we have concluded that the first part of the formula for creating a successful scaleup is growth. To develop a world-class company, you need to target growth of 10%–20% per month in the early stages, and be able to achieve 100% growth per year thereafter. Knowing this is one thing, but ***how to*** do it is another, so we'll concentrate on that in this section.

The first requirement for creating a high-growth company is to be in a large market—it just isn't possible to grow sufficiently in a small market. Nor is it worth growing ***quickly*** in a small market. Which leaves us with the obvious question: what is a large market?

It's often said that a rising tide floats all boats, and it certainly helps to be in a growing market. Apple managed that a few years ago, and everyone knows the story: started in 1976, incorporated in 1977, public in 1980. In three years, their sales went from $774,000 to $118 million. When they went public, their valuation at the end of the first day of trading was $1.8 billion, 15 times their revenue. It was such an aggressive stock issue that the state of Massachusetts banned the listing, as the book value of the company was too low compared to the valuation, the earnings multiple was too high, and the stock ownership was too concentrated.

Apple was launched on a rising tide, at the beginning of a major technological wave, but each major wave of technology has given rise to one or more super-unicorns:

Exhibit 12
Technology Waves and Winners

Technology	Winners
Batch Computing	IBM
Online computing	Hewlett- Packard, Digital Equipment
Personal computing	Microsoft, Intel, Apple
Internet	Google, Cisco
eCommerce	Amazon, eBay
Mobile computing	Apple
Social	Facebook, YouTube

Apple wouldn't have known from the outset that there was a large market. They were simply in the right place at the right time, but they did correctly identify the potential market for consumer-level computers and they developed a product specifically to meet that need.

World Class Businesses

One way of determining what makes a large market is to look at successful companies and the markets they serve. World-class companies are globally competitive and boast a leadership position in their respective markets. They sell superior products or services, attract quality talent and investments in public markets, and they hold a sizeable portion of the market share. Exhibit 13 shows the world's leading R&D spenders and assignees of US patents.

Exhibit 13

Leading International Corporate R&D Spenders and Patent Assignees

Company	2016 R&D Spending (US$ billion)	2016 US Number of Patents Granted
Volkswagen	13.2	98
Samsung	12.7	9,638
Amazon	12.5	1,160
Alphabet	12.3	3,326
Intel	12.1	2,281
Microsoft	12.0	2,733
Roche	10.0	308
Novartis	9.5	246
Johnson & Johnson	9.0	575
Toyota	8.8	1,997
Apple (split estimated)	8.1	2,135
Pfizer	7.7	73
General Motors	7.5	61
Merck	6.7	373
Ford	6.7	1,365
Daimler	6.6	160
Cisco	6.2	980
AstraZeneca	6.0	46
Bristol Myers Squibb	5.9	101
Oracle	5.8	697

Source: The Statistics Portal, US Patent Office

The list is comprised of businesses operating in a number of industries; they are almost evenly divided between pharmaceuticals, automotive, electronics, and software segments (Exhibit 14). It's clear that the nature of the technology being developed doesn't affect market size.

Exhibit 14

Leading International Corporate R&D Spenders and US Patent Assignees by Industry

Industry	Number
Pharmaceutical	7
Automotive	5
Electronics and hardware	4
Software	4

However, another way of looking at this list is by the type of customers served, i.e. consumers only, businesses only, or a combination of the two (Exhibit 15). While the only company on the list exclusively serving other businesses is Oracle, the firms serving consumers only are pharmaceutical companies. The other leading R&D spenders (including automotive) have products that serve both sectors, though many are better known for providing services to consumer-based clients.

Exhibit 15

Leading International Corporate R&D Spenders by Target Customer

Customer Segment	Number
Consumers only	6
Corporate only	1
Combination (consumers and corporate)	13

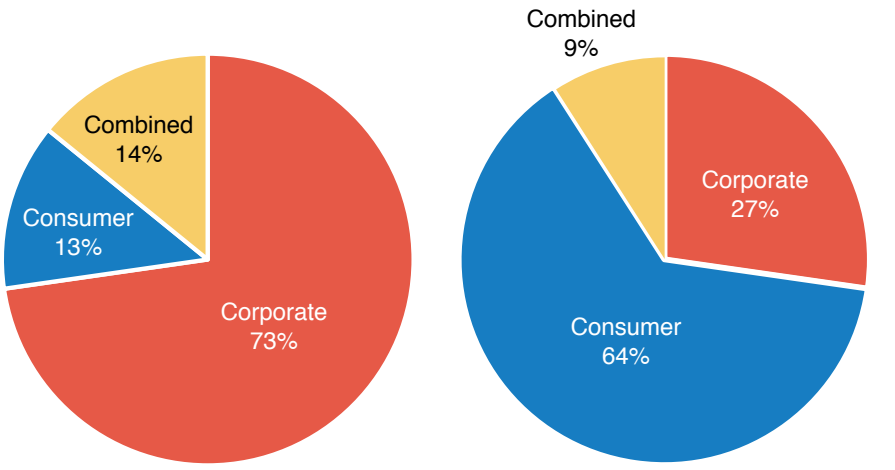
This is the first indication that large markets are more likely to be consumer-based than not.

Let's take a closer look at customer strategies in the global software industry as an example.

Software Businesses

The software industry can be broken down into those serving combined markets or those serving either consumers or enterprises. Exhibit 5 shows the composition of markets served by public software companies headquartered in the US and China.

Exhibit 16



Source: Google Finance

Exhibit 16 shows a dramatic difference between Chinese-based and US-based companies. US-based public companies tend to be more focused on corporate clients, and one reason for this difference is the age of the companies. The US companies in this study are much older than their Chinese counterparts, which were founded—and have gone public—more recently.

If we look at the history of the commercialization of software, we can see the reason for this difference. The first large users of software were companies, so the US list reflects this early corporate adoption of technology. The more recent proliferation of smartphones has driven consumer adoption of technology, and this is reflected in the younger Chinese companies.

Top Performers

Another perspective on company performance comes from examining those firms with the highest returns for venture capitalists. Exhibit 17 shows a list of businesses compiled by CB Insights in November 2017. As you can see, WhatsApp had only one investor, Sequoia Capital, who invested $60 million for a return of $3 billion. A substantial number of these businesses serve combined or consumer markets, with only a small fraction (19%) exclusively targeting corporations.

Exhibit 17

Companies with the Highest Venture Capital Returns

Company	Consumer	Corporate	SMB
WhatsApp	X		
Facebook	X	X	X
Groupon	X		X
Cerent		X	
Snap	X		
King Digital Entertainment	X		
UCWeb	X		
Alibaba	X		
JD.com	X		
Delivery Hero	X		
Zayo		X	
Mobileye		X	
Semiconductor Manufacturing International (SMIC)	X	X	X
Meitu	X		
Google	X	X	X
Twitter	X	X	X
Zynga	X		
Lending Club	X		X
Genentech	X		
Stemcentrx	X		
Workday		X	X

Source: CB Insights

The concentration of consumer-based companies on the Top 21 list reflects the pattern we saw with public companies. Recent VC deals are more oriented towards consumer investments which drive higher returns. This more closely matches the experience of public Chinese companies.

Unicorns

In our survey, we've also explored the customer segments targeted by privately-held unicorns. Exhibit 18 shows the top 10 unicorns, again from CB Insights (as of February 6, 2018).

Exhibit 18

Top 10 Unicorns

Company	Consumer	Corporate	SMB
Uber	X		
Didi Chuxing	X		
Xiaomi	X	X	X
China Internet Plus Holding (Meituan Dianping)	X		
Airbnb	X		
SpaceX		X	
Palantir Technologies		X	
WeWork			X
Lu.com	X		X
Pinterest	X	X	X

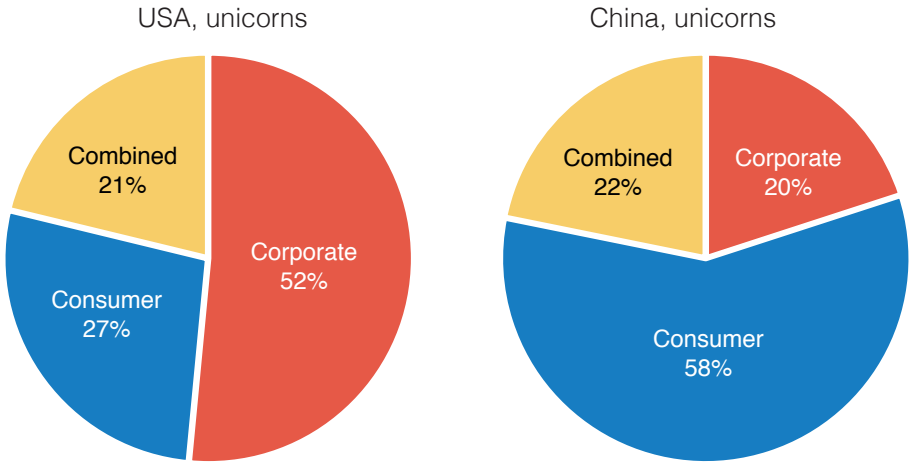
Source: CB Insights

A breakdown by customer segment shows the slightly different approach of US and Chinese unicorns (Exhibit 19): while 80% of Chinese unicorns serve consumer markets, 52% of US unicorns exclusively serve businesses, with the remaining 48% serving consumers or a combination of consumers and businesses.

Thus, in the world of software, a very large percentage of the leading companies serve consumer markets, or markets that sell to both consumers and enterprises.

Exhibit 19

US and Chinese Unicorns by Customer Segment



Source: CB Insights

Yet another way of looking at this is to examine the fastest-growing unicorns. Exhibit 20 shows 15 unicorns that were fastest to reach a valuation of $1 billion.

Exhibit 20

Fastest Growing Unicorns

Unicorn	Years to $1 Billion	Consumer	Corporate	SMB
Desktop Metal	1.79		X	
Essential Products	1.93	X		
Letgo	2.05	X		
Katerra	2.24		X	X
Illumio	2.28		X	
Nikola Motor Company	2.48	X		
Zoox	2.50	X		
Opendoor	2.75	X		
Grail (Biotech)	2.89	X		
Airbnb	2.98	X		
Instacart	2.99	X		
Mercari	3.17	X		
Samsara	3.22	X		
Tempus	3.22	X		
Human Longevity	3.26	X		

Source: CB Insights

And, as with high-return companies and unicorns, most of these fastest $1 billion-valuation companies were in consumer markets.

Large Corporate Markets

After consumer markets, the next largest group of potential buyers exist in corporate markets. In 2010 there were 18,500 businesses in the US with over 500 employees. While this may not seem like a large number of potential customers, their buying power is massive, due to the scale at which they operate. They tend to dominate the purchase of new technology, as they need to compete effectively, and operate efficiently, at large scales. A constant demand for profit improvement means that they tend to be large consumers of innovation.

The dollar value of purchases is also large, enabling companies that are scaling to target them efficiently and earn an excellent return. But these buyers do not form the basis for as much growth as consumer markets. Even though the dollar value per customer is higher in large enterprise markets, consumers outnumber large enterprises by 17,000 times.

SMB Markets

We can see from the Exhibits above that there are very few companies that serve small and medium-sized businesses exclusively. You might think that small businesses are a better market than large corporations as there are so many of them—in 2010 there were 27.9 million small businesses in the US.

But, when we look closer, we see that 78% of small businesses have only one employee and behave more like individuals than enterprises in their purchasing habits. SMB buyers tend not to be the most innovative buyers (which is why many of them stay SMBs and don't grow into large corporate buyers). This, coupled with the expense of reaching them, means that SMB markets don't provide the platform for high growth that consumer or corporate markets do.

Horizontal versus Vertical

If you take a close look at the lists of companies we've presented so far here, you'll note something fairly obvious: there are very few niche-oriented companies present. High-growth companies serve markets that are broadly based; they are horizontal in nature, not vertical.

Take Facebook, Amazon, Apple, Google, and Microsoft, for example. They all serve horizontal markets and not single niches ***within*** markets. Look too at Uber and Airbnb, and you'll notice that they serve entire markets, not niches. Even the fewer examples of companies serving corporate markets, such as Oracle, or those serving SMBs, such as Workday, target horizontal, not vertical, markets.

Figuring Out Market Size

Every pitch we have ever seen makes some claim about market size. Usually, the pitch includes something like, “Frost and Sullivan says that the market for ***XX*** is $1.8 billion.” This is likely to raise several initial thoughts:

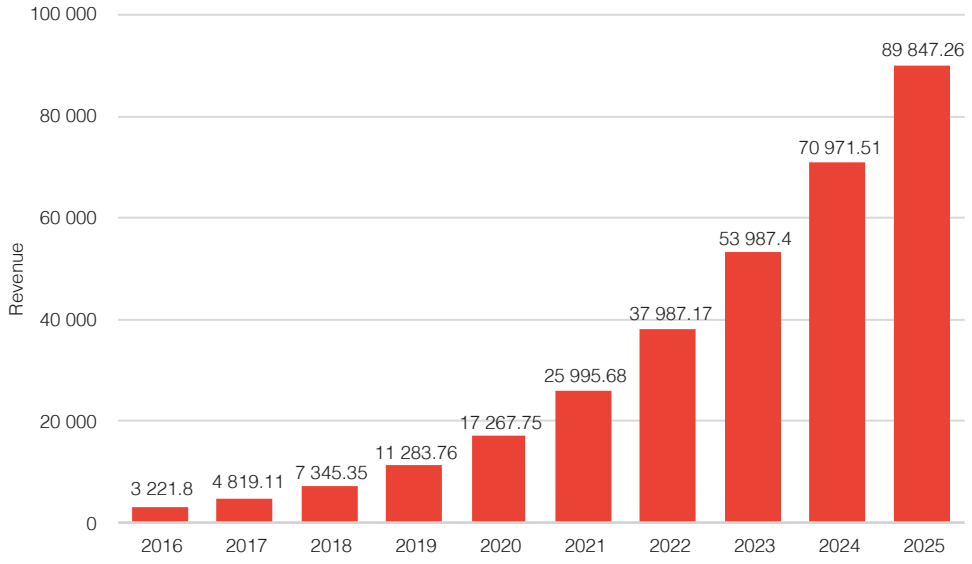
- If the market is already that big, are you too late to the party?
- If it really is that big, how will you ever gain a leadership position?
- Is this a general market or a specific one for exactly what you are trying to sell?
- If you are selling something brand new, how can the market already be that large?

As an example, let’s look at the available data for the artificial intelligence software market. Statista says that worldwide revenue from this market is currently $7 billion.

Exhibit 21

Worldwide AI Revenue

Revenues from the artificial intelligence (AI) market worldwide: 2016-2025
(in million U.S. dollars)

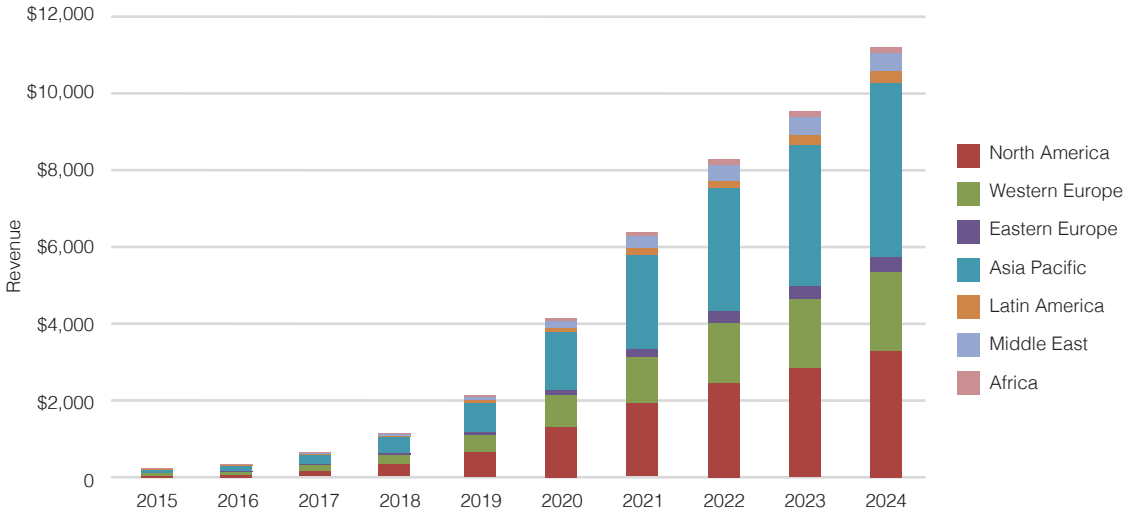


Source: Statista

Meanwhile, Tractica says that the current market is about $750 million.

Exhibit 22

Worldwide Revenue of Insights Driven Businesses
Artificial Intelligence Revenue by Region, World Market: 2015-2024
(in million U.S. dollars)



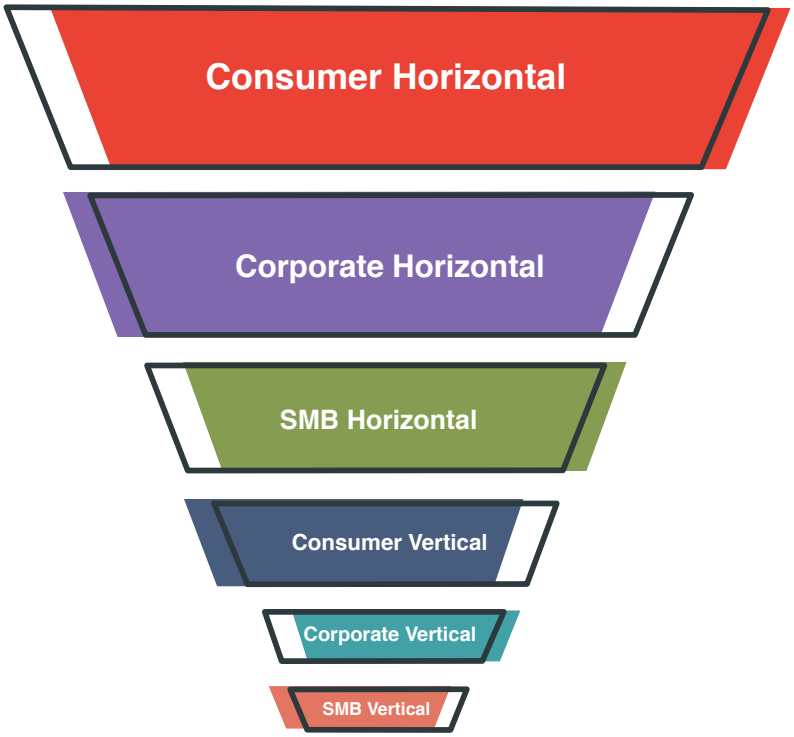
Source: Tractica

How can the market size in each report differ by a factor of ten?
The reason is simple, in that each report defines the market slightly differently. And each defines the market differently from the market that exists for what you are selling. The type of data you get from secondary research is useful to understand trends and issues, but not to estimate market size. The only way to truly figure out how big your market will be is to do primary research. Define your target market very precisely and then thoroughly research it.

However, it is possible, in a general sense, to create a framework that can be used to analyze and evaluate the potential size of markets. In the following framework, horizontal markets are generally bigger than vertical markets, and consumer markets are bigger than corporate ones—which in turn are bigger than SMB markets.

Exhibit 23

Relative Market Sizes



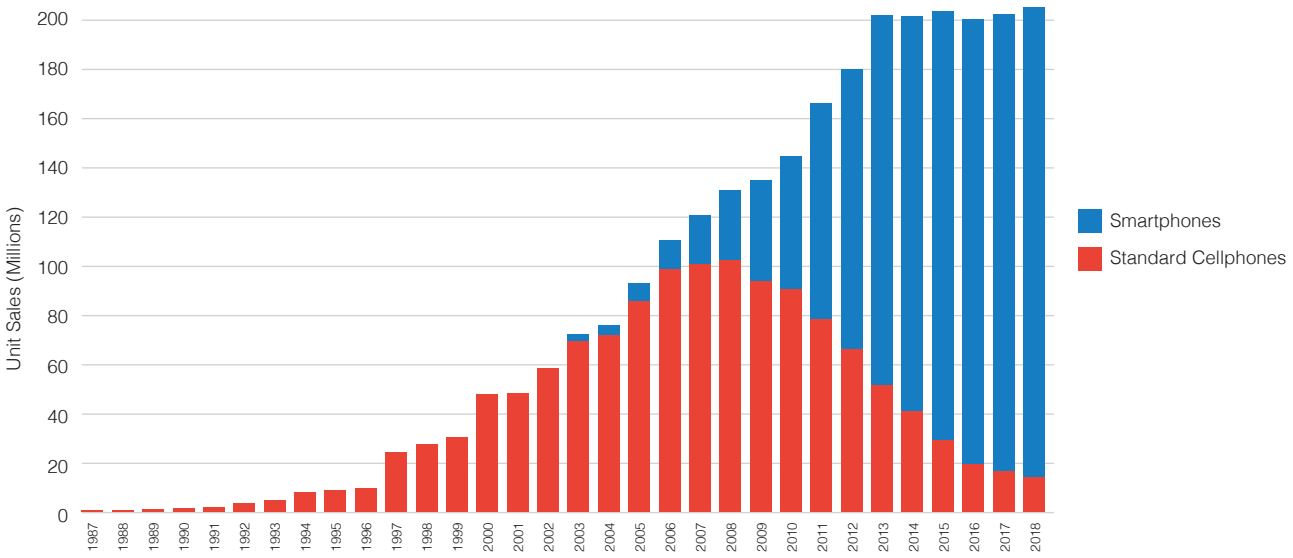
Diffusion of Innovation

After market size, the next most important factor is the rate at which the market takes up and adopts new innovation. Cell phones and smartphones illustrate the point nicely.

Mobile phones were introduced to the US in 1987 and growth in the market was good. But the market was small until 1997, at which time it took off. The market hit its peak 26 years after introduction, with annual shipments totaling 200 million units. With the introduction of the iPhone in 2008, the market growth switched from cell phones to smartphones. While it took 21 years for shipments of cell phones to reach 100 million a year, it took only eight and a half years for smartphones to reach a similar level of sales. The smartphone had twice the rate of diffusion in the marketplace.

Exhibit 24

Cell phone vs Smartphone Sales: US



Source: Consumer Technology Association

The smartphone had a faster rate of acceptance in the marketplace because, for many people, it was a repeat purchase. Eighty million buyers already had a cell phone, so for them, the purchase of a smartphone was merely an upgrade. New buyers in the market could compare both offerings and as time went on, more and more of them chose smartphones over cell phones. However, it's worth noting that 10 million cell phones are still sold annually to the market laggards.

If a new company is selling something their target market has never purchased before, the rate of diffusion will be slow. The market may well be huge, but the rate of uptake will slow down the potential growth of the company. The key to determining whether the rate of diffusion will be fast or slow is the existence of a customer's budget. If you are trying to sell to a customer with a budget, and your product or service is significantly better, faster or cheaper than the competition, you'll experience faster market uptake and faster growth.

Take a look at the top five US-based unicorns (as of June 2018) to see an example of this phenomenon:

- Uber is selling a taxi-like service that consumers are already buying in droves. They are a replacement technology that does not require the adoption of radically new modes of behavior.
- Similarly, for some travelers, Airbnb is a better alternative to staying in hotels.
- SpaceX has been able to experience such rapid growth because the US

government already had a budget, and lots of experience in purchasing rockets and other space-related equipment.
- Palantir is a data-mining company that specializes in big data and analytics. Their customers already have budgets and existing suppliers, from whom they can switch.
- WeWork offers work spaces, something that's already in most companies' budgets.

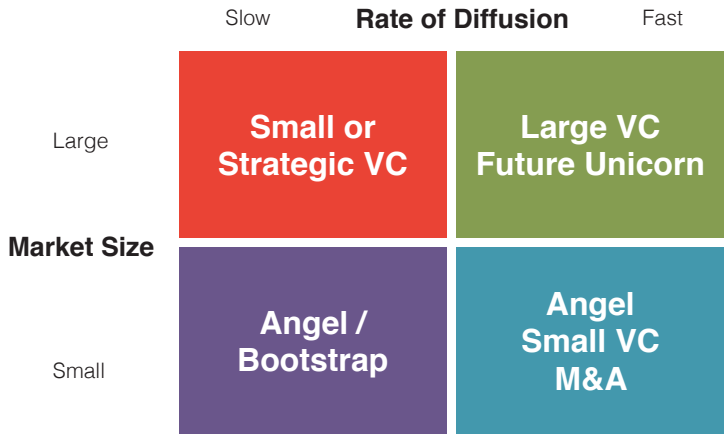
In all five cases, customers already had a budget and were spending money on the products that each of these new companies was selling. These companies did not have to convince potential customers to reduce their spending elsewhere in order to purchase their product or service. This accelerated adoption in the market and increased the potential growth rate of each company.

Market Options

The choice of target market, and its growth rate, has implications on your financing strategy and, of course, on your long-term potential, including exit. The research presented here is designed to help you come up with an algorithm for growth. Part of that algorithm will involve the acquisition (or not) of capital. Based upon your expected growth rate—as influenced by market size and diffusion of innovation—you have four choices in terms of long-term financing and potential exit. The following Exhibit shows these choices, and the situation that may fit each best.

Exhibit 25

Finance and Exit Options



- At the bottom end, if you are in a small market with an entirely new product, it is unlikely that you will generate high levels of growth. Since you will generate some growth, the best choice in this situation is to bootstrap the company or get financing from angels. In the long run, it is unlikely that the business will go public, but it could be sold as a solid, profitable company.

- If you are in a large market with a slow rate of diffusion, then it will take a while for you to reach full market saturation. These types of business are good candidates for investment from smaller venture capitalists or strategic investors; and due to the large market size and slow but positive growth, they are excellent candidates for going public.
- Small markets that are quick to adopt your new technology are great opportunities for financing by smaller VCs, and for later exit to larger players through a merger.
- If you have a truly great opportunity in a huge market with the potential for fast uptake (like Airbnb or Uber), then you have a chance to create the next unicorn and your best choice for financing is a large VC.

However, this begs the question: how can you tell whether a market is ready for your product? The best way today is to do some basic research of the target market to figure out their propensity for purchasing. This can be time consuming and potentially costly, but a very quick method is to use Google's search-traffic data.

Before we leave this concept, let's return to Apple. When they started selling personal computers, they were selling to people who had never purchased a computer before. You might reasonably think that they would have had a harder job selling to people and companies who had to reallocate spending away from something else to buy a computer. Why then were they so successful? Even though the rate of diffusion was arguably slow, the market was so huge (being potentially every adult and school-age person in the world) that the market size made up for the slow rate of adoption.

Why Size Matters

You might say that the growth rate of a company will be the same in a small market as a large market, so why should it matter that the market is large? The answer, unfortunately, comes down to economies of scale. The biggest factor in fueling your growth is capital. And capital is available primarily from venture capitalists. They tend to invest in similar-sized rounds wherever they are. So, let's say that a seed round is $1.5 million, and an A round is $5 million. What matters to a VC, as we saw in the last section, is their internal rate of return (IRR). This rate is influenced by your company's valuation, and time. The faster you can get to $1 million, or $5 million, of revenue, the higher their return.

Because they can't invest $150,000 in a seed round and $500,000 in an A round due to their economies of scale, it is important that you can reach revenue targets in a timeframe that earns them a return. A larger market will enable you to use their money to grow fast enough to generate this return. This applies at all ends of the VC spectrum. Angels will invest in smaller market opportunities, smaller VCs in slightly larger opportunities, and the huge VC firms with billion-dollar funds will invest in larger amounts per round, in companies with higher growth potential.

A related factor is that of public markets. While companies are tending to go public later than ever, there are still many companies that access public markets. Here too, size matters. The potential of a big market will bring in bigger players, who will finance in larger amounts, which will fuel greater growth. We'll take a closer look at this concept in the next part of this study.

Peak Market

A second factor is what we refer to as "Peak Market". Peak Market occurs when the market is, for all intents and purposes, fully saturated. This applies to the current mobile phone market; sales have been steady at 200 million units a year for several years. Once you get close to Peak Market, growth rates decline and valuations fall. In small markets it's easier to determine Peak Market, and valuation is more readily affected.

For several years the Canadian tech community has been waiting for Hootsuite and D2L to go public. Neither has raised equity capital since 2014, although Hootsuite has raised debt in the last several months; however, their employee growth is only 16% over the last two years. D2L's employee base has declined by 4% in the same period. It is possible that both may have reached Peak Market, in which case growth prospects—and thus financing options—will become limited.

The First Part of an Algorithm for Growth

So, the first part of creating an algorithm for growth is to find a large target market that will be fast to adopt your innovation. The second part of the formula, and the one we'll tackle next, is how much capital you should raise to fuel that growth and how many people you will need.

Capital Requirements

If you're trying to scale up a software company, you need to have a great value proposition, good competitive differentiation, and a target market ready and willing to purchase what you have developed. If you also have a big market—as we discussed in the last section of this report—then you have the potential to grow quickly.

However, to foster that rapid growth, you're going to need money and people.

How Much Capital Do You Need

We've previously shown how Github raised $350 million and sold for $2 billion recently. This pales in comparison with Google (or Alphabet, as they are known in corporate terms). They raised $40 billion and accumulated profits of $113 billion for $153 billion of capital; this supported revenue of $110 billion. These numbers may surprise some entrepreneurs, as the level of capital is much higher than that of revenue. And this is the first point that needs to be driven home.

If you're an entrepreneur looking to scale-up, the first question you must answer is, "How much capital will I need to fuel my growth?" A good way of figuring that out is to look at the experience of public companies. Exhibit 26 shows the capital requirements of 244 public North American software companies with revenue over $100 million. It may surprise you to learn that the average public software company needs $1.23 of capital for every dollar of revenue.

Exhibit 26
Public Software Companies – Ratio of Capital to Revenue
All numbers are in $US

	Revenue $M	Ratio of Capital to Revenue
Average	2,593,540	1.23
Median	437,215	0.95
Top Half	4,921,892	1.55
Bottom Half	226,703	0.91
1st Quartile	8,954,602	1.75
2nd Quartile	823,072	1.34
3rd Quartile	305,461	0.92
4th Quartile	146,633	0.89

Source: Google Finance

For these purposes, capital is defined as shareholders' equity, plus retained earnings, plus long-term liabilities. As you can see, the amount of capital required increases as a company gets larger—thus a scaling company requires increased capital. In most cases, the larger companies are more profitable than the smaller ones and consequently accumulate retained earnings, which fuels their capital. As Exhibit 27 shows, companies with positive retained earnings require substantially less capital than companies who have accumulated losses.

Exhibit 27

Public Software Companies – Ratio of Capital to Revenue

	Ratio of Capital to Revenue
Positive Retained Earnings	
Average	0.97
Median	0.65
Negative Retained Earnings	
Average	2.44
Median	1.73

Source: Google Finance

We also need to take into account how growth rate affects the requirement for capital. Exhibit 28 shows that differences in capital requirements are minimal for growth rates below 20%, but when growth is higher than this, substantially more capital is required.

Exhibit 28

Public Software Companies – Ratio of Capital to Revenue

	Revenue Growth Rate	Ratio of Capital to Revenue
Average	20%	1.23
Median	12%	0.95
Top Half	38%	1.24
Bottom Half	1%	1.22
1st Quartile	60%	1.39
2nd Quartile	17%	1.08
3rd Quartile	7%	1.28
4th Quartile	-5%	1.16

Source: Google Finance

It's clear that when you get a high-growth situation—which, by its very nature, requires substantial expenditure—significant capital is required.

Entrepreneurs' Expectations

No matter the experience of public companies, entrepreneurs are often highly optimistic about their capital needs. We took a closer look at the issue of entrepreneurs' expectations by examining the financial forecasts of 35 companies that had been seeking venture capital, strategic capital, or an acquisition opportunity. These companies were previously profiled in Part I of this report.

Of these 35 firms, the average amount of requested funding was $2.7 million. Five of the firms also indicated the need for follow-on funding, which was, on average, $3.8 million. The weighted average capital required was $3.5 million, with the expectation that this would be sufficient to increase revenue from a current average of $1.4 million to a projected average of $20.7 million in three years.

However, according to the public company statistics detailed above, the amount of capital required to support revenue of $20.7 million would be in the range of $20 million to $40 million. For example, Shopify's 2016 annual statements show $495 million of invested capital and $389 million of revenue—a ratio of 127%.

If the firms in this study were planning to increase revenue from $1.4 million to $20.7 million in three years, realistically they'd need to raise at least $20 million . . . and perhaps as much as $30 million. Interestingly enough, the proof is in the amount that they had actually raised to date, and in the amount of revenue they had recorded. On a weighted average basis, they'd raised $2.5 million and had recorded revenue of $1.4 million, a ratio of 178%. This shows that their collective experience is completely in line with the public market results, while their forecasts are not.

Expected Profits

One of the reasons for these low capital expectations was the high level of expected profitability. The 35 firms in the study expected a gross margin of 71% and EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) of 34% in the last year of their forecasts; this is where the economics of growth appear to be not well understood. While it may be possible to grow a firm at a 160% CAGR (Compound Annual Growth Rate) for several years, it is virtually impossible to do so with an EBITDA of 34%.

Exhibit 29 shows the distribution of the expected EBIDTA for the 35 firms in our study. The ability to accurately forecast profitability does not appear to be dependent on the ability to earn revenue.

Exhibit 29

EBITDA, Growth, and Revenue

EBITDA (% of Revenue)	Number of Companies	Average Expected Growth Rate	Average Current Revenue $M
Up to 10%	5	86%	1,608
10% to 20%	4	50%	4,154
20% to 30%	4	311%	536
30% to 40%	9	85%	1,638
40% to 50%	4	134%	1,475
Above 50%	9	88%	219

Additionally, in the last year of the forecasts (regardless of whether it is the second, third, fourth or fifth year forecasted), the average growth rate of the firms is 113%.

Achieving an EBITDA of 34% while growing at a rate of 113% is nearly impossible in reality. When a firm is growing at such a rate, it consumes vast amounts of cash to fuel its momentum (i.e., it loses considerable amounts of money). Based on the projected growth rates of the firms in our study, there should be only one or two firms expecting positive EBITDA.

In fact, a comparison with the financial statements of public companies suggests that this is not an achievable forecast. Exhibit 30 summarizes profitability and revenue growth rates for our sample of public North American companies. Although the figures show the net income and not EBITDA, they are comparable in magnitude.

Exhibit 30

Public Software Companies – Ratio of Profit to Revenue

	Ratio of EBITDA to Revenue	Revenue Growth Rates
Average	-3%	20%
Median	1%	12%
Top Half	12%	15%
Bottom Half	-18%	26%
1st Quartile	19%	13%
2nd Quartile	4%	13%
3rd Quartile	-5%	15%
4th Quartile	-32%	37%

Source: Google Finance

Entrepreneurs' forecasts show natural exuberance but also a lack of knowledge about the economics of growth in young companies. However, this is a problem that is easily rectified, and with a better knowledge of the levers of growth, they may be able to generate better outcomes and improve their ability to scale successfully.

For each scaling company, the amount of capital required will be different, but the ratio should probably be between 1:1 and 1.5:1 of capital to revenue.

People Requirements

Now that you've raised the money to fuel your growth, you'll need to hire a bunch of new people, which begs the question, "How much capital do I need per person?" We examined this question from a number of different angles.

Firstly, we looked at how much capital is required to support employees at public companies. Exhibit 31 shows our findings.

Exhibit 31

Public Software Companies – Capital per Employee

	Revenue $K	Capital per employee $K
Average	2,593,540	403
Median	437,215	252
Top Half	4,921,892	536
Bottom Half	226,703	270
1st Quartile	8,954,602	664
2nd Quartile	823,072	413
3rd Quartile	305,461	259
4th Quartile	146,633	281
Correlation		0.56

Source: Google Finance

Exhibit 31 shows a great difference between larger and smaller companies. There is a very strong relationship between capital and employees, with a correlation coefficient of 0.56.

Just as with capital requirements, we can see what impact growth and profitability have on capital per employee. Exhibit 32 shows this for companies with positive versus negative retained earnings.

Exhibit 32

Public Software Companies – Capital per Employee

	Capital per Employee $K
Positive Retained Earnings	
Average	496.93
Median	294.80
Negative Retained Earnings	
Average	330.27
Median	221.52

Source: Google Finance

In terms of growth, Exhibit 33 does not show as much difference in capital per employee for high growth firms.

Exhibit 33

Public Software Companies – Capital per Employee

	Revenue $K	Capital per employee $K
Average	20%	403
Median	12%	252
Top Half	38%	403
Bottom Half	1%	405
1st Quartile	60%	422
2nd Quartile	17%	382
3rd Quartile	7%	447
4th Quartile	-5%	359

Source: Google Finance

We can also look at unicorns to see what levels of capital they employ. These companies represent the fastest-growing technology companies in the world and we looked at 99 of them based in the US. After eliminating outliers, we saw that capital levels are significantly in excess of those for slower-growing public companies. The correlations between capital and employees is also strong for unicorns, with a coefficient of 0.46.

Exhibit 34

US Based Unicorns – Capital per Employee

	Capital per Employee $K
Average	884.79
Median	567.21
Correlation	0.46

Source: CB Insights and LinkedIn

Finally, as a comparison, we can look at the capital levels of North American-based private software companies. Our inclusion criteria were: that the company was incorporated in 2008; that it had received in excess of $1 million of capital, according to Crunchbase; and that it had not been sold, closed or had gone public. This gave us 230 companies. Exhibit 35 shows the composition of this sample.

Exhibit 35

Private North American Software Companies—Capital and Employment

	Capital $K	Employees
Average	49,468	158
Median	20,701	63
Correlation		0.75

Source: Crunchbase and LinkedIn

These organizations had average capital of $49 million and an average of 158 employees. There is a high degree of correlation between these two numbers, as increased capital brings increased employment.

Exhibit 36

Private North American Software Companies– Capital per Employee

	Capital $K
Average	403.95
Median	279.79
Correlation	0.26

Source: CB Insights and LinkedIn

In the private sector, the correlation of capital to employees is not as strong as in public companies or unicorns, as some of these private companies will be growing rapidly while others will be slower-growing, flat-lined or even declining.

However, we can conclude that the amount of capital required per employee is in the range of $300- $500 thousand per employee—or even higher—for rapid growth companies.

Before we leave this subject, let's test our findings by looking at revenue per employee. This, and capital per employee, are particularly good indicators for forecasting revenue. Exhibit 37 shows the details for our sample of public companies.

Exhibit 37

Public Software Companies – Revenue per Employee

	Revenue $K	Capital per employee $K
Average	2,593,540	330
Median	437,215	249
Top Half	4,921,892	378
Bottom Half	226,703	281
1st Quartile	8,954,602	449
2nd Quartile	823,072	309
3rd Quartile	305,461	287
4th Quartile	146,633	275
Correlation		0.69

Source: Google Finance

As we can see, larger companies tend to be much more efficient at driving revenue. This is a very strong relationship, with a correlation of 0.69 between the number of employees and the amount of revenue recorded.

On the other hand, Exhibit 38 shows the relationship between growth and revenue per employee, which is not as strong.

Exhibit 38

Public Software Companies – Revenue per Employee

	Revenue Growth Rate	Ratio of Capital to Revenue
Average	20%	330
Median	12%	249
Top Half	38%	326
Bottom Half	1%	333
1st Quartile	60%	313
2nd Quartile	17%	339
3rd Quartile	7%	369
4th Quartile	-5%	295

Source: Google Finance

Despite the weaker relationship, we can still use these numbers to set expectations for growth. A company attempting to scale-up should expect to raise approximately $12.5 million of capital for every $10 million of revenue (1.25:1). This would fund 30 employees ($400k of capital per employee) and produce $10 million of revenue ($330k revenue per employee). Every firm is, of course, slightly different and each should build and test a set of assumptions based on its own business model. However, these guidelines can be useful in an initial evaluation of expectations.

Raising Capital

Given an understanding of the funding required to fuel growth, we can turn to funding rounds: their size, number, and how soon to raise capital. In determining these factors, we looked again at all software companies worldwide which had raised more than $1 million and were founded in 2008 (as detailed on Crunchbase). We recorded the amount of capital they received in their first year of raising funds, and then looked for patterns that would indicate success.

How much should you raise in your first round?

To answer this question, we stratified the results from 640 companies into 4 quartiles, depending on how much they had raised that year. Exhibit 39 shows the results from that analysis.

Exhibit 39

Private Software Companies – Funds raised in 1st Funding Year

	First Year Raised $	First 5 Years Raised $	Total Raised $
Average	4,559,743	16,514,425	28,522,106
Top Half	8,144,108	25,246,478	40,268,636
Bottom Half	975,378	7,782,371	16,775,576
1st Quartile	12,965,100	35,766,415	56,210,995
2nd Quartile	3,323,117	14,726,541	24,326,276
3rd Quartile	1,438,035	9,781,669	19,676,589
4th Quartile	512,721	5,783,073	13,874,563
Correlation		0.61	0.25

Source: Crunchbase

These results are very clear: those firms that raised the highest amounts in their first year subsequently raised far more than firms who raised less capital in their first year. The relationship is particularly strong in the first five years of fundraising, showing that there is a definite advantage to raising ***more*** money the first time you raise it. This relationship is still true over the long run, though not as strong.

The logic behind this is self-evident when you look at the effect of capital on revenue. As we saw in the last section, the more capital you raise, the more employees you can hire and the more revenue you can drive. Raising more money in your first round enables you to grow faster (given a large market) and the faster

you grow, the more likely you'll be to attract investment in your next round, thus initiating an accelerated growth curve.

When should you raise your first round?

In order to determine when you should raise your first round, we looked at the amounts raised by companies each year, from their founding in 2008. Exhibit 40 shows the amount raised in each of the first six years as an initial round of fundraising.

Exhibit 40

Private Software Companies – Funds raised by first year of raise

Amounts Raised $	2008	2009	2010	2011	2012	2013
Count	140	162	118	85	77	58
Average $ raised	3,161,188	4,145,465	4,287,887	5,775,799	6,477,954	5,317,033
Top Half	5,639,477	7,493,179	7,381,763	10,266,413	11,555,480	9,379,085
Bottom Half	682,900	797,751	1,087,326	1,389,617	1,266,809	1,254,982
1st Quartile	8,766,936	12,220,797	11,577,342	15,296,866	18,899,816	14,449,857
2nd Quartile	2,512,018	2,880,869	3,186,183	2,617,980	4,578,360	3,946,114
3rd Quartile	1,182,425	1,269,738	1,504,980	2,075,284	1,781,331	1,641,880
4th Quartile	405,386	337,275	669,671	735,117	803,739	893,876
Correlation to Total	0.20	0.19	0.29	0.33	0.72	0.77

Source: Crunchbase

This data shows that waiting longer to raise funds generally results in a larger first round and is better correlated to higher amounts raised in the long run. However, there doesn't appear to be any benefit in waiting more than 5 years to raise your first round.

The logic here is sound. If you wait longer, it's more likely that you'll figure out exactly who your customer is, what their needs are (and how you can beat the competition in meeting them), and how you can reach the market efficiently. Spending more time in figuring out your business will result in a larger first round, and thus greater growth.

As an entrepreneur, you shouldn't worry about being seen as slow—from a venture capitalist's perspective, the amount of time it took you to get to your first fundraising has no bearing on the return ***they*** get, only on your own return. In the first round, all the VC cares about is how fast you'll be able to grow, and the more you have that figured out, the better off you and the VC will be.

How often should you raise funding?

This is a simple question to answer: we could not find any relationship between the number of rounds raised and the eventual success of a firm.

Implications for exits

We also examined exits through mergers or IPOs and analyzed how these were affected by the total funding received. Exhibit 41 ranks firms by the total level of funding and removes any amounts raised through an IPO.

Exhibit 41

Private Software Companies – Exits

	Total Raised $	M&A #	IPO #
Count	640	161	16
Top Half	53,542,532	77	15
Bottom Half	3,501,680	84	1
1st Quartile	92,813,650	36	10
2nd Quartile	14,271,413	41	5
3rd Quartile	5,229,282	49	0
4th Quartile	1,774,077	35	1

Source: Crunchbase

It is clear that the best-funded firms went on to a successful exit through an IPO. This is completely in line with prior data, which shows that raising more money results in higher revenue. As all these firms started in the same year, higher revenue meant faster growth, and thus more opportunity for an IPO.

In terms of mergers, the picture is not as clear. There is no relationship between the total amounts raised and whether a firm was able to exit through a merger, though this makes sense; firms exit for many reasons, including product potential for buyers, rapid growth, or even because they run out of money and a merger is possible.

One note of caution is that many researchers consider a firm to be successful if it exits through a merger. This is not always the case, as the exit may be as a result of failure.

At what valuation?

As an interesting note, we have included some data on valuation. In the first part of this report, we established that the objective of a VC-backed firm is to create a high valuation and the way to do this is to grow quickly. Theoretically, the higher the growth, the higher the valuation should be for private firms. We were unable to test this using the data we had available, but we were able to examine data on the valuation of unicorns as this is collected and made public by CB Insights.

Exhibit 42
Unicorn Valuation

	Valuation $M	Total Raised $M	Valuation Multiple	Value per Employee $M
Average	3,728	669	5.89	4.17
Median	1,500	288	5.23	2.54
Top Half	6,260	1,037	6.65	5.17
Bottom Half	1,087	285	5.10	3.13
1st Quartile	10,368	1,683	6.59	6.94
2nd Quartile	1,795	334	6.71	3.25
3rd Quartile	1,166	292	5.26	3.40
4th Quartile	1,000	276	4.93	2.84

Source: CB Insights

The "valuation multiple" is simply the value of the company divided by the total amount raised. It's a simple way to think about valuation. For example, when a company is pricing a round, it typically figures out how much of the company it will give away in return for the money raised. So, if it gives away 25% of the company, the valuation multiple on that round is 4 times. The total valuation multiple is the total value divided by the total amount raised.

Exhibit 42 shows that the more a company is worth, the higher will be its valuation multiple. This follows logically from the premise that the faster you grow, the more you raise and the higher your valuation multiple will be. The faster-growing unicorns achieve a valuation multiple of 6.6 times, and the slower-growing ones see a valuation multiple of 5.1 times. For a firm of equivalent age with slower growth—but still of interest to a VC—a more typical valuation multiple might be 3 to 4 times total capital raised.

Another way to look at this is as value per employee. The last column of Exhibit 42 shows the value of a firm per employee and it indicates that the higher the valuation (and, in all probability, the higher the growth), the higher the valuation will be on a per employee level. Like the larger unicorns, very rapidly growing firms might achieve a valuation as high as $5 million per employee.

Financial Velocity

The concept of "financial velocity" enables companies to think easily and quickly about growth. If you have a large market, ready and willing to purchase what you have to sell, then your growth is limited only by the capital you can use to fuel that growth. Of course, if your market isn't large or ready to accept your product, then you can easily overspend in trying to grow.

Essentially then, financial velocity measures the speed at which you acquire and consume capital in order to fuel your growth. It is measured over time, and it's simply the amount of capital your company has raised divided by the number of years it has been in existence:

Financial Velocity = capital raised / years in existence

It's a simple and elegant concept. Achieving a high financial velocity means you're raising more and more money as time goes on. If you don't raise money—or raise too little—in any given year, your velocity will decrease. And unless you have concocted some kind of magic financial elixir, a lower velocity will probably mean lower growth and lower valuation.

Financial velocity is also useful in comparing firms founded in different years. It is possible for a firm to have a high velocity in its first year if it raises a significant amount of funding. And in each year of its existence, it must raise more and more money to maintain that high velocity.

Exhibit 43 shows the financial velocity of the leading US-based unicorns.

Exhibit 43
Unicorn Financial Velocity

Company	Valuation $B	Founded	Raised $B	Financial Velocity
Uber	68.0	2009	21,700	2,170.0
Airbnb	29.3	2008	4,400	400.0
SpaceX	21.5	2002	1,900	111.8
WeWork	20.0	2010	1,700	188.9
Palantir Technologies	20.0	2004	1,836	122.4
Pinterest	12.3	2010	1,320	146.7
Lyft	11.5	2012	1,850	264.3
Infor	10.0	2002	2,630	154.7
Stripe	9.2	2010	690	76.7
Vice Media	5.7	1994	770	30.8

Source: CB Insights and Crunchbase

Exhibit 44 shows the financial velocity of the leading 10 firms from the 230 North American firms in our study that were founded in 2008 and had not been sold by the time of this report.

Exhibit 44
2008 Cohort Financial Velocity

Company	Financial Velocity	Status	Employees
Cloudera	94.64	IPO	1,832
2U Inc.	38.81	IPO	1,645
Mozido	27.92	Early Stage Venture	59
Hootsuite	27.34	Late Stage Venture	1,384
Health Catalyst	26.55	Late Stage Venture	542
Tintri	23.84	IPO	338
Twilio	23.75	IPO	1,174
Rubicon Global	23.73	Late Stage Venture	324
EVERFI	22.82	Late Stage Venture	501
New Relic	19.50	IPO	1,494

Source: Crunchbase and LinkedIn

It is interesting to note that, as we might expect, 6 out of these 10 firms have experienced an IPO.

We are at a loss to explain the employee count of Mozido, but despite this anomalous outlier, there is a high degree of correlation between financial velocity and the number of employees—another indicator of success for a firm. Financial velocity is clearly a very quick and easy tool for comparing companies founded in different years.

Summary

As we've seen, high growth requires significant amounts of capital. To drive a high valuation, you need a high financial velocity, which will drive employment and growth. In the next section, we will look at how high-growth firms spend the money they need to grow.

Growth Metrics By Stage

As you progress along your journey to high growth, you'll go through a number of distinct stages. Many commentators have tried to define these stages. Some of them have taken a product-centric approach while others are more customer-centric. We prefer a customer-centric approach, and we've adopted the stages of development proposed by Startup Genome. As they explain, this is loosely based on Steve Blank's ***4 Steps to the Epiphany***. (K & S Ranch; 5th ed. Edition, July 17 2013)

The six stages can loosely be defined as follows:

1. Discovery - Confirming that there is a meaningful problem.
2. Validation – Early customer validation through the exchange of money.
3. Efficiency – Refining the business model and improving customer acquisition.
4. Scale – Aggressively driving growth.
5. Profit maximization – Refine the model to maximize profits
6. Renewal – Identify new markets and products

In the following sections of this report, we have examined the way companies allocate people and money to enable growth. To do this, we've used the data from OpenView's SaaS survey as previously described, though this survey was designed for revenue-positive companies, so it doesn't cover the Discovery Stage—it starts at the Validation Stage for companies with under $1 million of revenue. We have grouped all companies with between $1 million and $5 million of revenue as being in the Efficiency Stage. Those companies with more than $5 million of revenue, we classified as being in the Scaling Stage.

This classification may be arbitrary, but there is no better way of attempting to classify them. The work done by Startup Genome shows that most companies think they are scaling (prematurely), when in fact they are in the Efficiency Stage; clearly, asking companies to classify themselves isn't an option. However, the structure we've adopted presents a framework for analysis, and we will try to improve on it over time.

Validation – Under $1 Million Revenue

Activities

Companies in the Validation Stage are actively selling to their first customers, trying to get reference accounts and obtain some level of repeatable sales. In this phase they have a useable product or service, are refining core features, and getting seed funding,

Expected Results

The key result in the Validation Stage is that the company identifies an opportunity, where there is good product/market fit with good initial findings regarding the size of the market. This might require pivoting from the first set of ideas.

Employees

Companies at this stage haven't started to put together a management team, but they may have one or more people working as managers. Every person on the team should be working at least some of the time as an individual contributor and none will be full-time managers.

The OpenView survey showed 119 companies in this category. The Validation Stage is characterized by very high growth, with average annual growth rates of 151%. Due to lower revenue, it is possible for companies to grow by up to 1,000% per year.

At this stage, companies have somewhere between 5 and 20 employees, with the average company having 14. This may seem like a high number when we saw earlier that we can expect around $300K of revenue per employee. But this is a stage of very low productivity in terms of revenue, and substantial seed capital investment is often needed to support activities.

It is noteworthy that there is a small correlation of .32 between the number of people employed at this stage and the growth rate of the company. Higher growth doesn't necessarily come from having more people. Higher growth comes from the way money is spent and, more particularly, from the quality of the product's market fit.

Exhibit 45

Validation - Growth and Employment

	Growth Rate %	Full Time Employees
Average	150.7	14.6
Median	78.0	8.0
Top Half	280.2	18.4
Bottom Half	21.1	10.8
1st Quartile	457.0	23.2
2nd Quartile	109.3	13.7
3rd Quartile	41.2	11.6
4th Quartile	1.7	10.1

Source (all data): OpenView 2018 SaaS Survey

Sources of Revenue

Companies were asked to reveal the nature of their revenue: whether it was from subscriptions, services or "other". We were surprised at the high numbers for services and "other"; we'd been expecting revenue to be almost entirely based on subscription. On average though, it is 74% of respondents' revenue.

Exhibit 46

Validation - Sources of Revenue

	Growth Rate %	Subscription %	Services %	Other %
Average	150.7	73.6	22.0	4.4
Median	78.0	90.0	10.0	0.0
Top Half	280.2	74.1	21.1	4.8
Bottom Half	21.1	73.1	22.8	4.1
1st Quartile	457.0	78.6	16.5	4.9
2nd Quartile	109.3	69.7	25.6	4.7
3rd Quartile	41.2	73.5	23.5	3.0
4th Quartile	1.7	72.7	22.1	5.2

There is a trend here: companies with higher subscription revenue grow faster than those with higher services revenue. This validates the typical VC disdain for services revenue, as it truly does appear to reduce growth rates, something we've seen elsewhere in this report, and something that dramatically affects valuation.

Gross Profit on Subscription

The results in Exhibit 47 are interesting, in that they clearly show that higher gross profits from subscription revenue alone correlate with higher levels of growth. Now, while there is a correlation here, it's not obvious why it exists, so we are reluctant to imply a causal link between the two. After all, it is not intuitive that raising prices to increase gross profit should result in higher growth rate.

Exhibit 47
Validation - Gross Profit

	Growth Rate %	Gross Profit %
Average	150.7	54.3
Median	78.0	60.0
Top Half	280.2	60.3
Bottom Half	21.1	48.2
1st Quartile	457.0	59.1
2nd Quartile	109.3	61.6
3rd Quartile	41.2	52.8
4th Quartile	1.7	43.7

Functions

The OpenView survey divides respondent personnel functions into five different areas. Exhibit 48 shows the number of employees, by percentage, in each major function.

Exhibit 48
Validation - Employment Functions

	Growth Rate %	Engineer %	Product %	Marketing %	Sales %	Customer Success %	Other %
Average	150.7	40.6	13.7	8.5	18.4	9.0	9.8
Median	78.0	40.0	10.0	6.0	19.0	10.0	9.0
Top Half	280.2	44.0	11.5	7.4	18.5	10.3	8.2
Bottom Half	21.1	37.1	15.9	9.6	18.3	7.7	11.4
1st Quartile	457.0	43.3	13.0	6.5	17.5	11.2	8.6
2nd Quartile	109.3	44.7	10.1	8.4	19.5	9.4	7.9
3rd Quartile	41.2	38.3	11.1	9.1	22.3	8.8	10.3
4th Quartile	1.7	35.9	20.5	10.1	14.5	6.6	12.4

At this stage of a company's growth, about 54% of employees are in an engineering or product function (we will refer to this as R&D), while about 36% are in a marketing/sales (M&S) or customer-facing function. The final 10% are in operations. There are several interesting things to note here:

- You may be surprised at how many employees are in an M&S role at this stage of development.
- The ratio of R&D to M&S at this stage is about 2:1. When we come to look at companies in other stages of growth, keep in mind the relationship between product- and customer-facing roles, as it will change.

Spending on R&D vs M&S

Exhibit 49 can be difficult to decipher, but it shows how much is being spent as a percentage of revenue on M&S versus R&D. In the Validation Stage, a typical firm is losing considerable amounts of money, so M&S, R&D, and G&A (General and Administration) in total represent spending that is 140% of revenue. At this stage, R&D is the more important of the two, although considerable amounts are still being spent on M&S.

In Exhibit 48 we saw that the ratio of R&D to M&S employees is 2.:1. Because M&S tends to be a more expensive function than R&D, There will be more money spent per person in M&S versus R&D. As a result the spending relationship between R&D and M&S is on average, 1.75:1. As we go on, you can note the changes that occur as firms grow.

Exhibit 49

Validation - Spending on M&S vs R&D

	Growth Rate %	M&S %	R & D %	G&A
Average	150.7	40.6	72.0	27.2
Median	78.0	35.0	50.0	20.0
Top Half	280.2	48.8	68.3	31.5
Bottom Half	21.1	32.5	75.6	22.9
1st Quartile	457.0	51.9	84.1	30.8
2nd Quartile	109.3	45.9	53.6	32.2
3rd Quartile	41.2	37.4	62.2	22.2
4th Quartile	1.7	27.8	88.5	23.6

Sales Channels

Exhibit 50 shows a breakdown of the various sources of revenue, with inside sales accounting for over half of all revenue. This does not appear to be a major factor in driving growth, as there is not an appreciable difference between growth rates, given the source of the revenue. However, you should watch it carefully, as over time the ratio between these items changes as the companies get larger.

Exhibit 50
Validation - Sales Channels

	Growth Rate %	Ecom or Self Serve	Inside Sales %	Field Sales %	Indirect Channels %
Average	150.7	18.0	40.4	29.4	12.2
Median	78.0	0.0	30.0	15.0	0.0
Top Half	280.2	9.8	44.4	34.9	10.9
Bottom Half	21.1	26.2	36.5	23.8	13.5
1st Quartile	457.0	7.1	45.2	39.7	8.1
2nd Quartile	109.3	12.4	43.6	30.4	13.5
3rd Quartile	41.2	13.0	42.0	27.9	17.0
4th Quartile	1.7	39.0	31.2	19.8	10.0

Time taken to recover customer acquisition costs

One would think that the faster a firm can recover customer acquisition costs, the faster it will be able to grow, as it fuels that growth with internally-generated cash sooner. However, there was no relationship seen between these numbers.

Exhibit 51

Validation - Months to Recover CAQ

	Growth Rate %	Months to Recover
Average	150.7	7.4
Median	78.0	5.0
Top Half	280.2	7.3
Bottom Half	21.1	7.5
1st Quartile	457.0	8.8
2nd Quartile	109.3	5.8
3rd Quartile	41.2	6.5
4th Quartile	1.7	8.6

Net Burn rate

Finally, we come to Net Burn Rate, or the amount of money lost by firms on a monthly basis. This may perhaps be the most important factor in driving growth. As we can see from Exhibit 52, the fastest growing firms burn 25% more cash than the more slowly growing firms. This relationship is even more pronounced in the next phase of growth.

Exhibit 52

Validation - Net Burn Rate

	Growth Rate %	Net Burn Rate $K
Average	150.7	53.7
Median	78.0	25.0
Top Half	280.2	59.7
Bottom Half	21.1	47.6
1st Quartile	457.0	63.7
2nd Quartile	109.3	55.9
3rd Quartile	41.2	39.0
4th Quartile	1.7	56.0

Efficiency – $1 - $5 Million Revenue

Activities

Many companies try to skip over the Efficiency Stage and end up scaling prematurely. It is very tempting—once you have a few customers and some repeatable revenue—to pour on the gas and attempt to scale, but you're missing one vital ingredient: you haven't figured out your growth algorithm, the business model that will allow you to scale efficiently.

Companies that are growing in an effective manner take the time to figure out their business model and create a customer acquisition process that will enable them to scale profitably . . . or to at least avoid haemorrhaging cash.

Figuring out that growth algorithm or business model involves:

- Identification of key metrics.
- Making assumptions about factors that will drive results.
- Measurement of those factors.
- Experimentation with different approaches to drive results.
- Development of a well-articulated growth plan.

There are other components of this process, and we'll address them in the last section of this report.

Expected Results

At the end of the Efficiency Stage, a company should have a well-articulated and properly tested plan to drive growth. It should be experiencing excellent growth and have the financial and employee resources to drive further growth in the Scaling Stage.

Employees

The Efficiency Stage is the time to put the initial management team in place, transitioning from the startup team to a more experienced, growth-driving team.

The OpenView survey detailed 133 companies in this category and if you compare Exhibit 45 with Exhibit 53, you'll see that growth rates in the Efficiency Stage have declined, on average, from 151% to 110%. The average company employs 39 people and it may surprise many entrepreneurs to find that many in what is effectively an experimentation phase. But don't forget that experimentation is done not by standing still, but by trying to grow rapidly while figuring out what works.

As with the Validation Stage, there is no correlation between the number of employees and the rate of growth.

Exhibit 53

Efficiency - Growth and Employment

	Growth Rate %	Full Time Employees
Average	109.8	38.6
Median	73.0	30.0
Top Half	186.3	39.7
Bottom Half	32.0	37.3
1st Quartile	273.2	35.4
2nd Quartile	102.1	44.0
3rd Quartile	47.6	45.0
4th Quartile	16.4	29.7

Sources of Revenue

In the Efficiency Stage, revenue has transitioned away from “other” sources towards subscription revenue, rising from 73% to 82%, on average. Just as in the Validation Stage, companies with higher levels of subscription revenue are able to grow more quickly than those with higher services or “other” revenue.

Exhibit 54

Efficiency - Sources of Revenue

	Growth Rate %	Subscription %	Services %	Other %
Average	109.8	81.8	12.1	6.1
Median	73.0	90.0	8.0	0.0
Top Half	186.3	86.6	9.1	4.2
Bottom Half	32.0	76.9	15.2	7.9
1st Quartile	273.2	87.0	6.6	6.4
2nd Quartile	102.1	86.3	11.6	2.1
3rd Quartile	47.6	79.5	17.1	3.4
4th Quartile	16.4	74.2	13.2	12.5

Gross Profit on Subscription

There appears to be a correlation between higher gross profits from subscription and growth in the Validation Stage, and this holds in the Efficiency Stage. Perhaps this is a meaningless metric when applied to growth, but it is nonetheless an important factor in the development of a profitable algorithm.

Exhibit 55
Efficiency - Gross Profit

	Growth Rate %	Gross Profit %
Average	109.8	65.5
Median	73.0	74.5
Top Half	186.3	68.3
Bottom Half	32.0	62.6
1st Quartile	273.2	65.6
2nd Quartile	102.1	70.9
3rd Quartile	47.6	63.7
4th Quartile	16.4	61.5

Functions

Exhibit 56 shows how the nature of employment in a company changes as it grows. For reference, compare with Exhibit 48.

- Engineering as a function declines from 41% to 33% and the combination with R&D (product) declines from 54% to 44%.
- Marketing and sales as a function stays relatively flat, although more employees are devoted to customer success.
- The ratio between R&D and M&S declines from 2:1 to 1.65:1.
- The correlation between higher M&S and higher growth is less obvious, though there still appears to be some level of relationship.

Exhibit 56

Efficiency - Employment Functions

	Growth Rate %	Engineer %	Product %	Marketing %	Sales %	Customer Success %	Other %
Average	109.8	33.2	11.1	8.4	18.4	15.2	13.8
Median	73.0	30.0	10.0	8.0	18.0	15.0	10.0
Top Half	186.3	32.1	11.1	8.7	20.7	14.9	12.4
Bottom Half	32.0	34.2	11.0	8.0	16.1	15.5	15.2
1st Quartile	273.2	32.9	11.1	8.0	20.9	13.8	13.4
2nd Quartile	102.1	31.3	11.2	9.5	20.6	16.1	11.4
3rd Quartile	47.6	36.2	10.0	6.9	15.8	14.8	16.2
4th Quartile	16.4	32.3	12.0	9.0	16.4	16.2	14.1

Spending on R&D vs M&S

Following on from the split in personnel seen in Exhibit 56 we can see in Exhibit 57 that spending on M&S, as a percentage of revenue, is more pronounced than in the Validation Stage, while spending on R&D is in relative decline. The ratio (R&D:M&S) has declined from 1.75:1 to 1.07:1.

However, there is a clear differentiation between faster and slower growing firms. The faster growing companies spend more on both M&S and R&D as a percentage of revenue. We can see how this is happening when we look at the Net Burn Rate in Exhibit 60.

Exhibit 57

Efficiency - Spending on M&S vs R&D

	Growth Rate %	M&S %	R & D %	G&A %
Average	109.8	44.1	47.3	29.3
Median	73.0	36.5	40.0	20.0
Top Half	186.3	55.6	59.8	36.9
Bottom Half	32.0	32.7	34.7	21.7
1st Quartile	273.2	63.9	76.0	46.6
2nd Quartile	102.1	47.7	44.6	27.8
3rd Quartile	47.6	39.6	37.8	24.9
4th Quartile	16.4	25.8	31.7	18.4

Sales Channels

In Exhibit 58, we can see a change in the relationship between sales channels and growth. As companies move from the Validation Stage to the Efficiency Stage, inside sales channels become more important; they appear to deliver higher growth than field sales, which is, by its very nature, more difficult and time-consuming to ramp up.

Exhibit 58
Efficiency - Sales Channels

	Growth Rate %	Ecom or Self Serve	Inside Sales %	Field Sales %	Indirect Channels %
Average	109.8	12.3	46.5	35.3	5.9
Median	73.0	0.0	45.0	20.0	0.0
Top Half	186.3	9.5	43.5	41.9	5.1
Bottom Half	32.0	15.1	49.6	28.6	6.7
1st Quartile	273.2	13.9	41.7	38.9	5.5
2nd Quartile	102.1	5.2	45.3	44.8	4.7
3rd Quartile	47.6	13.6	45.8	32.9	7.7
4th Quartile	16.4	16.7	53.5	24.2	5.6

Time taken to recover customer acquisition costs

Once again, we can see from Exhibit 59 that customer acquisition costs do not appear to have an impact on growth.

Exhibit 59
Validation - Months to Recover CAQ

	Growth Rate %	Months to Recover
Average	109.8	10.7
Median	73.0	9.0
Top Half	186.3	10.6
Bottom Half	32.0	10.8
1st Quartile	273.2	12.2
2nd Quartile	102.1	9.1
3rd Quartile	47.6	11.6
4th Quartile	16.4	10.0

Net Burn rate

And, just as we saw in the Validation Stage, a higher Net Burn Rate results in faster growth. In the Efficiency Stage, the gap is even wider, as the faster growing firms burn 212% more cash than the slower growing firms.

Exhibit 60

Efficiency - Net Burn Rate

	Growth Rate %	Net Burn Rate $K
Average	109.8	114.6
Median	73.0	50.0
Top Half	186.3	172.4
Bottom Half	32.0	55.9
1st Quartile	273.2	190.6
2nd Quartile	102.1	154.8
3rd Quartile	47.6	72.5
4th Quartile	16.4	39.2

Scale – Over $5 Million Revenue

Activities

The Scaling Stage is when entrepreneurs are supposed to drive growth most aggressively. If they've prepared properly, they will arrive at this stage with a well-tested algorithm to propel that growth. For the purposes of analysis we've started this stage at an arbitrary figure of $5 million, but in reality, it may begin at a much lower amount . . . though it shouldn't start higher. Some firms may arrive at the $2 million or $3 million point with a well-tested algorithm and if that's the case, more power to them.

In any event, this is when firms solidify their corporate structure through departmentalization and add significant processes to drive growth.

Expected Results

If you're successful, there is no end to the Scaling Stage. Facebook, for example, is still scaling rapidly. However, for most firms, when growth begins to tail off they need to scale profit as a way of appealing to shareholders. In that case, they are entering the Sustain Stage.

Employees

A firm in the Scale Stage typically has a full cadre of very experienced senior executives and a well-built middle management team to guide the organization. With around 100 employees, the organization is maturing and, with luck, still growing.

The OpenView study details 154 firms with over $5 million of revenue, including some with revenue over $100 million. By this stage, growth has tailed off from the earliest days, but the higher growing firms have an average growth of 112% a year. The highest Quartile is even higher, at 160%. These are the firms that will be successful in obtaining later-stage capital to fuel their growth.

The data in Exhibit 61 seems to indicate an inverse relationship between growth and employment size, meaning that the higher the level of employment, the lower the growth. This is to be expected, as the larger firms in the study—those around $30 million—should have lower growth and more employees than those at the $10 million size.

Exhibit 61

Scale - Growth and Employment

	Growth Rate %	Full Time Employees
Average	66.7	182.2
Median	44.0	100.0
Top Half	112.5	130.7
Bottom Half	21.5	235.8
1st Quartile	160.1	115.9
2nd Quartile	64.9	146.0
3rd Quartile	32.6	218.4
4th Quartile	10.2	254.1

Sources of Revenue

In the Efficiency Stage, revenue sources transitioned away from “other” sources towards subscription revenue, and these numbers stay fairly constant at the Scale Stage. Just as in the Validation and Efficiency Stages, companies with higher levels of subscription revenue can grow more quickly than those with higher services or “other” revenue.

Exhibit 62

Scale - Sources of Revenue

	Growth Rate %	Subscription %	Services %	Other %
Average	66.7	80.3	11.0	8.7
Median	44.0	90.5	5.0	0.0
Top Half	112.5	84.2	8.2	7.6
Bottom Half	21.5	76.4	13.8	9.8
1st Quartile	160.1	81.2	8.7	10.1
2nd Quartile	64.9	87.3	7.8	5.0
3rd Quartile	32.6	82.2	11.7	6.1
4th Quartile	10.2	70.5	15.9	13.6

Gross Profit on Subscription

While Gross Profit on Subscription appears to be higher for high-growth companies, this may not be a relevant statistic, as the relationship is not constant at all stages of development. However, it appears that firms are able to generate more profitable subscription revenue as they grow.

Exhibit 63
Scale - Gross Profit

	Growth Rate %	Gross Profit %
Average	66.7	64.8
Median	44.0	74.0
Top Half	112.5	69.5
Bottom Half	21.5	60.2
1st Quartile	160.1	70.1
2nd Quartile	64.9	68.9
3rd Quartile	32.6	62.3
4th Quartile	10.2	58.0

Functions

As firms grow, particularly into the Scale Stage, the composition of employees continues to change.

- Engineering as a function declines from 41% in Validation to 33% in Efficiency to 27% in Scaling.
- When combined with R&D (product), this function declines from 54% to 44% to 37%.The ratio of R&D to M&S declines from 2:1 to 1.15:1.
- As we've seen in other stages, firms with higher growth levels have a greater focus on M&S.

Exhibit 64

Scale - Employment Functions

	Growth Rate %	Engineer %	Product %	Marketing %	Sales %	Customer Success %	Other %
Average	66.7	27.4	9.5	8.3	23.4	17.3	14.1
Median	44.0	25.5	6.0	7.0	22.0	15.0	10.0
Top Half	112.5	28.1	7.9	8.6	23.8	17.3	14.2
Bottom Half	21.5	26.8	11.0	7.9	23.1	17.2	14.0
1st Quartile	160.1	29.5	8.7	9.1	23.2	15.6	13.9
2nd Quartile	64.9	26.6	7.1	8.2	24.4	19.1	14.6
3rd Quartile	32.6	27.7	8.4	9.0	22.2	18.7	14.0
4th Quartile	10.2	25.9	13.7	6.7	23.9	15.7	14.0

Spending on R&D vs M&S

In the Scale Stage, the spending on R&D versus M&S has flipped, and M&S now predominates. Whereas the R&D:M&S spending ratio was 1.07:1 in the Efficiency Stage, it is now at 1:1.45, in favour of M&S.

Exhibit 65

Scale - Spending on Sales vs Development

	Growth Rate %	Sales and Marketing %	R & D %	G&A %
Average	66.7	44.9	31.8	22.9
Median	44.0	40.0	30.0	20.0
Top Half	112.5	53.4	41.1	26.4
Bottom Half	21.5	36.5	22.6	19.3
1st Quartile	160.1	59.4	45.3	27.0
2nd Quartile	64.9	47.4	37.0	25.9
3rd Quartile	32.6	38.1	24.6	18.9
4th Quartile	10.2	34.8	20.6	19.8

Sales Channels

Inside sales channels were more dominant in the Efficiency Stage, but in the Scale Stage, field sales close the gap. This may be due to the larger nature of companies in this stage, and a more B2B-focused approach, with larger clients who require a local sales presence.

Exhibit 66
Scale - Sales Channels

	Growth Rate %	Ecom or Self Serve	Inside Sales %	Field Sales %	Indirect Channels %
Average	66.7	11.0	39.2	39.0	10.8
Median	44.0	0.0	26.0	25.0	0.0
Top Half	112.5	8.8	42.2	37.3	11.7
Bottom Half	21.5	13.2	36.2	40.6	10.0
1st Quartile	160.1	3.9	39.8	43.0	13.3
2nd Quartile	64.9	13.9	44.7	31.4	9.9
3rd Quartile	32.6	10.7	32.4	48.6	8.3
4th Quartile	10.2	15.7	40.2	32.4	11.7

Time taken to recover customer acquisition costs

Once again, we can see from Exhibit 67 that recovering from customer acquisition impacts growth rates, but the difference is less dramatic in this stage.

Exhibit 67
Scale - Months to Recover CAQ

	Growth Rate %	Months to Recover
Average	66.7	13.7
Median	44.0	12.0
Top Half	112.5	13.0
Bottom Half	21.5	14.3
1st Quartile	160.1	13.4
2nd Quartile	64.9	12.6
3rd Quartile	32.6	13.9
4th Quartile	10.2	14.7

Net Burn rate

The data for Net Burn Rate is not as clear as in the other stages, due to the dollar size of the revenue classifications in the range. There are several very large firms—10 times the size of others in this stage—whose Burn Rates are large in absolute terms, which increases the average even though their Burn Rates are low relative to their revenue. In other words, it makes things look as if a large Burn Rate does not impact growth rates.

However, if we were to eliminate those firms from the analysis, we would see a similar pattern to those in prior stages. In fact, you can see it in the first three Quartiles of Exhibit 68. A higher Net Burn Rate increases growth rates.

Exhibit 68

Scale - Net Burn Rate

	Growth Rate %	Net Burn Rate $K
Average	66.7	281.4
Median	44.0	147.5
Top Half	112.5	439.3
Bottom Half	21.5	123.6
1st Quartile	160.1	368.2
2nd Quartile	64.9	510.4
3rd Quartile	32.6	50.2
4th Quartile	10.2	200.9

Conclusions

From the OpenView study, we can draw some conclusions about operational variables and their relationship to growth:

1. Growth declines, on average, as firms move from inception to scaling up. While average growth rates in the Validation Stage are 150%, this declines to 67% by the time firms are in the Scale Stage.
2. In the Validation Stage, employment favours M&S over R&D at a rate of 2:1 and this declines to 1.15:1 by the Scale Stage.
3. At all stages, there is a correlation between employee composition and growth. The higher the M&S composition, the higher the growth levels.
4. Significant funds are spent on M&S at all stages. While the ratio of R&D to M&S stands at 1.75:1 in the Validation Stage, by the time a firm is in the Scale Stage, that ratio has flipped to 1:1.45.
5. Higher spending on M&S is correlated with higher growth rates.
6. At all stages, the higher the Burn Rate, the higher the growth rate.

Companies need to examine these factors while developing their own growth algorithm. In the next part of this report, we will look at how a firm can create its own algorithm. You can compare your own results with the firms in this study, by using the interactive benchmarking tool provided on our website at:

Impactcentre.ca/software-metrics

Using These Metrics

The Scaling Process

This report contains a lot of data about what works in scaling up SaaS-based companies, which begs the question: how should this data be used? We recommend you use it as a starting point to examine how you'll scale your company. Use it to make your initial plans, financial forecasts, and to do the analysis that you'll need to raise money. As you proceed through the Efficiency Stage, you can follow the process outlined below to prepare you for scaling.

Set your growth objectives for the next three years

The first step is to set your objective for the next three years. We recommend this timescale because three years is the better part of two funding cycles. This is important because, if you want to be a unicorn, you need to think several years ahead about the results needed by the funders who'll come ***after*** the ones you're currently trying to land. If you think three years ahead, you can put in place the systems and procedures you need to drive growth well ahead of time.

Instead of starting your plans from the bottom up, start them from the top down. You'll know from the first part of this report what revenue-growth objectives are sought by venture capitalists, so you can establish a target—perhaps something like 150% growth per year, to start your analysis. Think of your forecast not as what you ***think*** will happen, but as what you are trying to ***make*** happen. These targets will drive action, not the other way around.

If you're currently sitting at $1 million a year, then growing 100% per year will mean you need to hit $8 million in three years. That might not be enough, given how many companies fail to realize their plans, so maybe a target of 150% growth per year is what you should aim for. In that case, you'll be looking for revenue of $6.25 million in two years, and $15 million in three.

Figure out how much capital this will require

The next thing to figure out is how much capital you'll require. If you go back to the third section of this report, you'll be able to see how much capital it takes to grow at 150% a year. Using the broad parameters we've discussed, getting to $15 million will probably take $20 million to $25 million of total capital. Given that you must have raised funds to get to $1 million (let's say you raised a $2 million seed round), then you'll need to raise perhaps another $20 million.

Figure out your workforce

The third section of this report also identifies how many people you'll be able to support with that level of funding. According to the results of our research, you'll need $300,000 to $500,000 per employee. So, with your $20 million, you'll be able to support approximately 50 employees. Using the data in the fourth section of this report, you'll start your forecasts with personnel divided up as follows:

Area	Percentage
Engineering	28.8
Product	9.6
Marketing	9.2
Sales	24.8
Customer Success	14.1
Other	14.5

Figure out key spending plans

Next, you'll figure out your key revenue and spending plans. Use the data from the fourth section of this report to establish:

- Sources of revenue.
- Gross profit from subscription.
- Spending on R&D versus M&S.
- Sales channels.
- Inbound versus outbound selling.
- Recovery of customer acquisition costs.
- Net burn rate.

Figure out key metrics to track

With these initial parameters in hand, you'll need to work out the detailed metrics that will create your growth algorithm. Don't forget that Fiix has over 600 individual metrics that form part of their growth algorithm.

Implementing a metrics-based management system

Having decided which metrics are important, there are four final steps to implement a metrics-based management system:

Make assumptions on metrics

As you start a metrics program, you'll need to make assumptions about the level of activities required and what results you'll get from those activities. You'll need to keep track of your assumptions on a regular basis, re-evaluating at least on a monthly basis, and maybe even weekly or even daily.

Build a model

Using the metrics you've established and the assumptions you've made, you'll need to build a model. This model is effectively your business forecast. It is built using an interconnected set of metrics, starting with all of your activities—and the results achieved from them—and how they are connected.

For instance, if your customer acquisition process starts with Google AdWords, then you might build a model that connects:

- Ad spend
- Unique Visitors
- Trials
- Sales calls
- Sales
- Churn rate

Using this data, you could calculate:

- Monthly recurring revenue
- Customer acquisition cost
- Customer lifetime value

All of these would tie into a set of financial forecasts enabling you to calculate how you're going to achieve your revenue targets.

Measure and manage

Once you've built your model, and you know what sales you need to achieve and what actions you need to take, you'll need to measure the results on an ongoing basis. You'll need to report on assumptions and results using a dashboard, or some other reporting tool, and you'll need to discuss those assumptions and results regularly.

Continually adjust the model

Finally, you'll need to continually adjust your model, changing assumptions, activities, results, and how you're going to reach the sales targets you have set.

Good luck in your journey and we hope these metrics have been helpful to you.

About the Impact Centre

The Impact Centre
Science to Society

We generate impact through industry projects and partnerships, entrepreneurial companies, training and research.

We bridge the gap between the university and industry to accelerate the development of new or improved products and services based on physical technologies. We work with graduate students and researchers to help them commercialize their discoveries. We provide undergraduate education and training for students at all levels to ease their transition into future careers.

The Impact Centre conducts research on all aspects of innovation, from ideation and commercialization to government policy and broader themes such as the connection between science and international development. We study how companies of all sizes navigate the complex path between a discovery and its market and how their collective innovations add up to create a larger socioeconomic impact.

Our objective is to understand how we can improve our ability to create world-class technology companies, how governments, companies, and academia can identify and adopt best practices in technology commercialization.

Impact Briefs

Read our collection of Impact Briefs: *www.impactbriefs.ca*

Charles Plant
Senior Fellow, Impact Centre

Charles Plant is a Senior Fellow with the Impact Centre, developing research and education programs in innovation and entrepreneurship. He is also a partner in the venture capital firm, Pool Global Partners.

Charles is a serial entrepreneur who has been an officer, director or investor in several dozen technology companies. He was co-founder and CEO for 15 years of Synamics, a telecommunications software firm that provided mass calling platforms to telcos.

He spent four years at MaRS ending as CFO but spent most of his time as Managing Director, heading up a group of former entrepreneurs and specialists who developed thought leadership, provided education, mentorship, market intelligence and capital to over 2,000 technology startups in Ontario.

Active for much of his career in the world of finance, Charles has been a corporate banker, an investment banker and served on the Management Committee and as CFO of the Investment Accelerator Fund (IAF) at MaRS and CFO of MaRS Innovation.

As an educator, Charles spent seven years on the faculty of York's Schulich School of Business teaching in the MBA program and now teaches innovation and entrepreneurship at the University of Toronto. He has an MBA in marketing, is a CPA and Chartered Accountant and is currently pursuing a PhD in Economics.

Contributors

Tihana Mirkovic
Emina Veletanlić
Scott McCauley
James Li
Harim Ulfig

Sponsors

Communitech
https://www.communitech.ca

Communitech helps tech companies start, grow and succeed. That's our mission, our mantra, our reason for being. Everything we do ties back to collaboration and helping—values that run deep in our organization.

Communitech was founded in 1997 by a group of entrepreneurs committed to making Waterloo Region a global innovation leader. At the time it was crazy talk, but somehow this community managed to pull it off. Today, Communitech is a public-private innovation hub that supports a community of more than 1400 companies — from startups to scale-ups to large global players.

Openview
https://openviewpartners.com/

OpenView, the expansion stage venture firm, helps build rapidly expanding software companies into market leaders. Through our expansion platform, we help companies hire the best talent, acquire and retain the right customers and partner with industry leaders so they can dominate their markets. Our focus on the expansion stage makes us uniquely suited to provide truly tailored operational support to our portfolio companies. Learn more about OpenView at ov.vc.

Financial assistance provided by the Government of Canada

IMPACT CENTRE
SCIENCE TO SOCIETY

Impact Centre
Suite 411 - 112 College Street
Toronto, Ontario
Canada M5G 1L6

Tel: 416-978-3875
info@imc.utoronto.ca
www.impactcentre.ca

Canada

UNIVERSITY OF TORONTO

COMMUNITECH

OPENVIEW