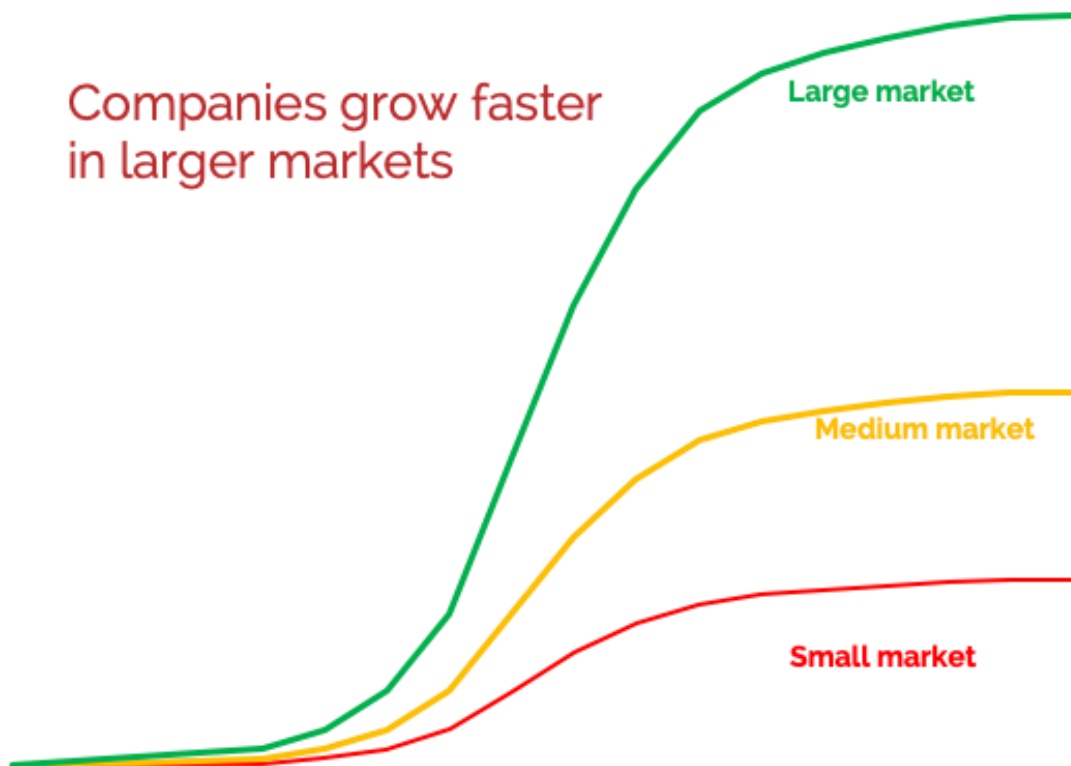


Market Size

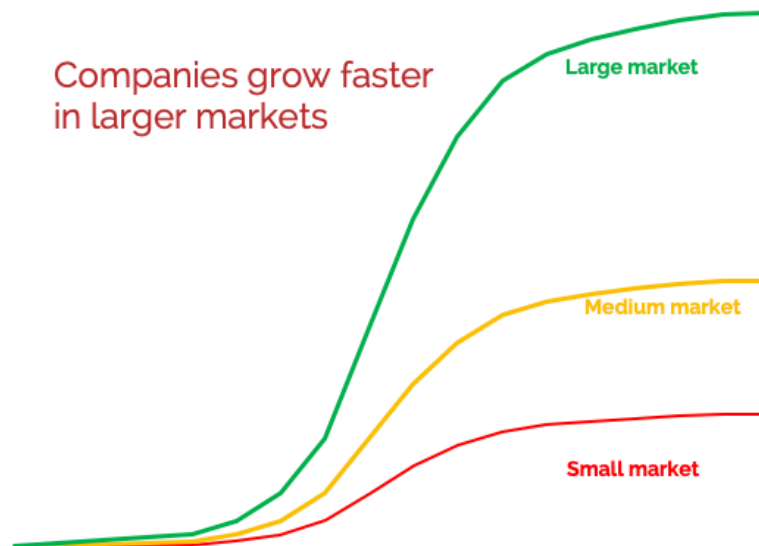
Go big or go home?



Why Market Size Matters

Uber and Dropbox managed to obtain a relatively small proportion of their markets but Uber, with a much bigger market, had a much bigger growth rate and ended up with much higher revenue. It takes about 30 years to reach saturation of a market for a new technology no matter what the size of the market. A larger market will have greater growth as seen in the following graphs.

Exhibit 1
Growth Rates of Different Sized Markets



The graphs show that the smaller markets achieved much lower revenue numbers half way through their maturation and thus the growth rates of the companies in this market were smaller. The end result would be, as we have seen, a lower valuation multiple and thus less return for investors.

Another reason is economies of scale. The biggest input in fueling a company's 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, is their internal rate of return (IRR). This rate is influenced by a company's valuation, and time. The faster a company can get to \$1 million, or \$5 million, of revenue, the higher the VC's return.

Because VCs 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 an investee company can reach revenue targets in a timeframe that earns the VC a satisfactory return. A larger market will enable a company 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, market size matters. The potential of a big market will bring in bigger players, who will finance in larger amounts, which will fuel greater growth.

Another factor is what is referred 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 a company gets 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.

Types of Markets

Horizontal Versus Vertical Markets

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 4 shows the world's leading R&D spenders and assignees of US patents.

Exhibit 2

Leading International Corporate R&D Spenders and Patent Assignees

Source: The Statistics Portal, US Patent Office

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

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 3).

Exhibit 3

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

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

The first thing that can be seen is that all of the companies on the list serve markets that are horizontal and that they don't seek to exploit vertical niches. High-growth companies serve markets that are broadly based; they are mostly 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 one will notice that they serve entire markets, not niches. Even the fewer examples of companies serving corporate markets, such as Oracle, or those serving small and medium sized businesses (SMB), such as Workday, target horizontal, not vertical, markets.

Further details on market orientation can be gleaned from those software companies going public as their prospectuses all outline the markets they serve. Exhibit 4 shows the number of companies that went public from 2012 to February 2020 broken down by the type of market they serve.

Exhibit 4
Market Types for Software IPOs 2013 - 2020

Market Type	Horizontal	Vertical	Total
Consumer Horizontal	15	1	16
Corporate	78	10	88
SMB	3	2	5
	96	13	109

It is evident from this chart is that 88% of the software companies that went public were selling horizontal applications. And of the companies serving vertical markets, only 3 went public after 2015. The problem with vertical markets is that it is usually difficult to find a vertical market large enough to support a public company.

This research shows that if a company is seeking to go public and become world class it should first look to serve horizontal markets.

Consumer versus Corporate Markets

Another factor to examine in looking at the creation of large disruptive companies is to determine what large segment these companies are serving. One can examine whether they are serving consumers only, businesses only, or a combination of the two (Exhibit 5). While the only company in Exhibit 4 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 5
Leading International Corporate R&D Spenders by Target Customer

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

Recent IPOs

Large markets are more likely to be consumer-based than based on corporate sales. Exhibit 6 shows the number of companies that went public from 2012 to February 2020 broken down by the type of market they serve.

**Exhibit 6
Markets Served by Recent IPOs**

Market Type	Horizontal	Vertical	Total
Consumer	15	1	16
Corporate	78	10	88
SMB	3	2	5
	96	13	109

As can be seen from this chart, there are fewer companies serving consumer markets than corporate ones. This follows on the US software emphasis on corporate markets as seen with all public companies. There were also very few companies serving SMBs and in fact there are no IPOs since 2015 for companies serving SMBs.

Top Performers

Another perspective on company performance comes from examining those firms with the highest returns for venture capitalists. Exhibit 7 shows a list of businesses compiled by CB Insights in November 2017. The top of the list is WhatsApp which had only one investor, Sequoia Capital, who invested US\$60 million for a return of US\$3 billion. As can be seen, a substantial number of these businesses serve combined or consumer markets, with only a small fraction (19%) exclusively targeting corporations.

**Exhibit 7
Companies with the Highest Venture Capital Returns**

Source: CB Insights

	Consumer	Corporate	SMB
WhatsApp	X		
Facebook	X	X	X
Groupon	X		X
Cevent		X	
Snap	X		

King Digital Entertainment	X		
UCWeb	X		
Alibaba	X		
JD.com	X		
Delivery Hero	X		
Zayo		X	
Mobileye		X	
Semiconductor Manufacturing International	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

Unicorns

Another older examination shows the customer segments targeted by privately-held unicorns. Exhibit 8 shows the top 10 unicorns, again from CB Insights (as of February 6, 2018).

Exhibit 8
Top 10 Unicorns
Source: CB Insights

	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	X
Lu.com	X		X
Pinterest	X	X	X

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.

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, as statistics show, 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

One can see from the *Exhibits* above that there are very few companies that serve small and medium-sized businesses exclusively. One 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.

But upon closer examination, one can 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 usually provide the platform for high growth that consumer or corporate markets do. However there are exceptions to the rule such as Shopify.

The second rule about markets is that the best markets are usually consumer or corporate markets.

A Rising Tide Floats all Boats

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 thousand 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 9 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
Sharing	Uber

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.

Since 2012, there have been over 100 software businesses in the United States that have gone public. The largest of these was Uber. It went public in 2019 with over \$11 billion of revenue only 10 years after it had been founded. Why were Apple and Uber able to get so large so fast? Part of it has to be the size of the market they entered. By their estimates, Uber's total addressable market was \$2.5 trillion, the largest of all the

markets addressed by those that undertook IPOs since 2012. What was true for Apple many years ago was true for Uber recently, the bigger the market the better.

How Big Should TAM Be?

Many years ago, investors would say that an entrepreneur needs to show that their company is entering a market of at least \$1 billion in size. Unfortunately, since those simpler times, markets for technology have increased in size, venture capitalists have gotten larger and public markets have come to expect larger and more mature IPOs. That means that the size of the companies going public has increased and the Total Addressable Market (TAM) for those firms has come to be much larger. How much larger can be seen by examining the prospectuses for those software companies going public from 2012 to 2020. Exhibit 10 shows the average market size

Exhibit 10
Average Market Size when Going Public
\$ Billion US

Market Type	Horizontal	Vertical
Consumer Horizontal	364.5	359.0
Corporate	36.8	8.6
SMB	77.3	7.5

Instructive as well is the median market size when going public.

Exhibit 11
Median Market Size when Going Public
\$ Billion US

Market Type	Horizontal	Vertical
Consumer	91.1	359.0
Corporate	25.0	5.6
SMB	90.0	7.5

Of all of the horizontal applications that went public, only 12 of them had TAMs of below \$10 billion. What is instructive as well is the percentage of market size reached when the firm went public.

Exhibit 12
Average % of TAM reached at IPO

Market Type	Horizontal	Vertical
Consumer	0.41%	0.05%
Corporate	0.89%	1.13%
SMB	0.55%	0.83%

This data also shows why investors like horizontal markets over vertical ones as the firm undertaking the IPO has captured less of the TAM thus has greater long-term potential. What can also be seen is the reason investors prefer consumer-based companies over corporate based ones due to the lower percentage of TAM already addressed.

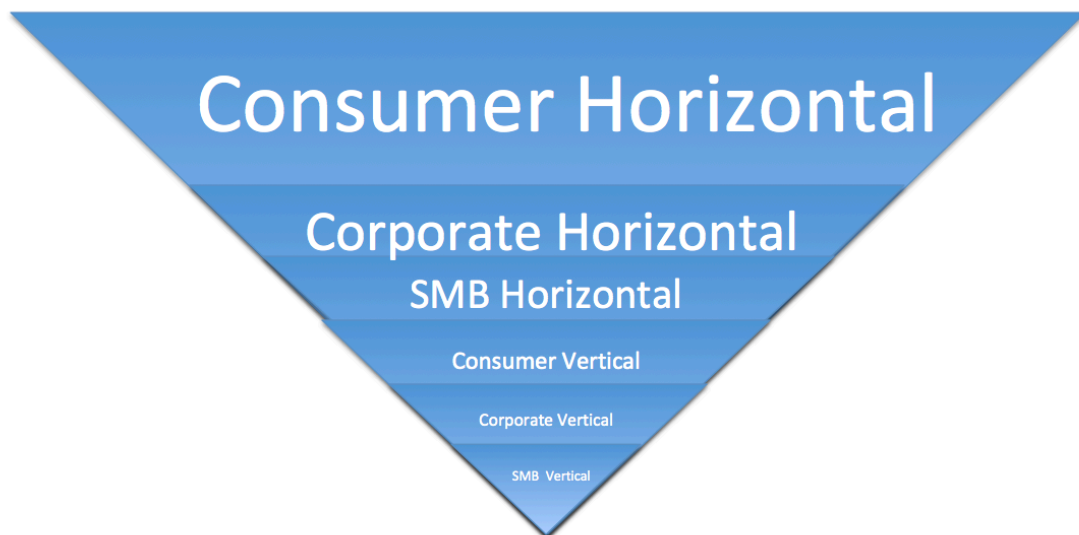
While virtually all of these prospectuses quote statistics from authorities such as Gartner, IDC, or Frost and Sullivan the most effective method for measuring TAM is by working upwards from individual client spending. The following example is from Apigee's prospectus.

“By 2016, Gartner estimates that the application infrastructure and middleware market and the business intelligence and analytics market will be approximately \$27 billion and approximately \$18 billion, respectively, of which we believe that the global API market is a subset. We estimate the total addressable market, or TAM, for our solution is \$5.5 billion. We have arrived at this figure by taking the number of operating companies listed in all industries with greater than \$500 million in annual revenue using certain S&P Capital IQ commercial data and multiplying that figure by the average historical customer spend on our products and services. The total number of companies was 19,246 and our average customer spend in fiscal year 2014 was \$287,988. Therefore, we estimate the TAM for our solution is \$5,542,617,048, or about \$5.5 billion.”

The reason this approach is better is simple. Each market report defines the market slightly differently. And each defines the market differently from the market that exists for what any particular company is selling. The type of data that can be obtained 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 a market will be is to do primary research and to work up wards in the way that Apigee did.

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 13
Relative Market Sizes



How Big is Big Enough?

The first question that must be answered is big enough to do what? As we are talking about Unicorn Math in all of this, then we are talking about being big enough to be a Unicorn. A Unicorn has a valuation of at least \$1 billion which according to Unicorn Math, means capital of \$212 million and revenue of \$125 million. Looking at the results obtained by software companies that went public in the last decade, we can figure out what TAM is enough to get a company to \$125 million in about ten years. To do this we looked at over 100 companies and determined from their prospectus what their TAM and revenue was.

The average firm in this group achieved revenue in 10 years that was 0.75% of their TAM. The median of this group recorded 0.51% of their TAM as revenue. In fact, there is

a pattern as to how much revenue can be achieved based upon the number of years from startup. The following chart shows that relationship.

Exhibit 14
TAM Achieved at IPO

Years to Prospectus	Average % of TAM Achieved	Median % of TAM Achieved
6 or less	0.49%	0.25%
7 or 8	0.59%	0.51%
9 or 10	0.77%	0.61%
11 or 12	1.00%	0.48%
13 - 15	0.83%	0.61%
More than 15	1.18%	0.84%

If you want to get to \$125 million then you need a market of about \$16 billion on average in about 10 years or about \$25 billion using the median number. The size of the market you need now will depend on the growth rate expected for this market in the time frame you expect.

Some Caveats

What if your TAM looks too small to Support a Unicorn?

This is the critical question. A TAM of \$10 billion may be enough to support a Unicorn if the company has tremendous competitive differential or product market fit but that will be much more difficult with a TAM of \$5 billion and likely impossible with a TAM of \$1 billion. This is why TAM is so important, it is critical in coming up with a strategy for the firm. It is critical to understand in order to figure out where to look for financing.

If the TAM in 10 years is above \$15 billion then certainly, a firm will have the opportunity to maximize its growth and target an exit through IPO by raising venture capital funding. With a slightly smaller forward TAM, venture capital funding may be possible but a firm will need to be very efficient with its use of capital as it will not get the high valuation through M&A with a lower growth rate. A firm that is in this category that has the potential to grow consistently at 30% a year could look to angels, government funding, corporate VCs, growth equity firms or private equity firms for capital. Each of these investors has a lower risk tolerance and demands a lower growth rate. These firms make money, not through creating one or two Unicorns out of a set of 10 investments but by getting 50% of their companies to grow at 30% and very few going under. With an expected growth rate of below 15%, there might not be much appetite from institutional investors so a firm should consider bootstrapping or angels.

What if there is no current market but you think one will develop?

This is a tricky one. There is no such thing as magic money. For someone to buy what you are selling, they must stop buying something else. People switched to smartphones so quickly because they were already buying cellphones and when it came time to get a new phone, a smartphone was an easy switch. How about when they first bought a cellphone? Well cellphones replaced pagers and payphones. In the mid 1990s there were 2.6 million payphones. By 1994 there were 61 million pagers in the world. Virtually everything that is successfully introduced to the market replaces something that is already being purchased and does a better job than the incumbent. Your TAM is what they are buying now.

Often entrepreneurs attempt to estimate TAM based upon the economic costs of something that a new product can reduce. For instance, a camera built into a doorbell

can be thought to reduce the loss from the theft of parcels left at the door. But the TAM cannot be the loss from theft of all goods sold by Amazon let's say as there are all sorts of other uses for doorbell-based cameras. Also, customers have to get the funding to purchase the cameras by not purchasing something else. It doesn't come down to a choice between having parcels stolen and buying a camera. The market exists in the choice between different types of cameras and grows based upon the triggers for the purchase of cameras as a result of the market maturation from expansion of use cases.

On many occasions, I have met entrepreneurs who have come up with a software application that saves people time. It might be logical to think that the TAM is represented by the cost of the time that is saved. Unfortunately, this doesn't work as companies don't actually terminate employees when they save time so there isn't a budget offset. We will get into later what triggers a purchase and unfortunately, saving time is rarely a trigger and it isn't a good foundation for a market.

If you manage to come up with an invention that is a net new thing, something that is not replacing any product then you may have a very slow route to becoming a Unicorn if at all as you must create a market where one doesn't exist and that is a slow and lonely journey.

Your Options for Capital

Within these markets, statistics from IPOs indicate that a company that wants to become a world class company should be addressing markets with a minimum TAM of \$10 billion and preferable in the more than \$20 billion. For those companies with smaller TAMs it is unlikely that the company will qualify for an IPO in which case there is a decision to be made. Exhibit X shows the financing and exit options for firms of different size TAMs.

Exhibit 15
Financing Options

Size of TAM	Type of Financing	Exit
Under \$100 M	Bootstrap	None Required
\$100 M - \$1 B	Angel	M&A
\$1 B - \$10 B	Small local VC	M&A
Over \$10B	Larger VC	IPO

Putting this into Practice

Companies seem to be encouraged to focus and that often means starting up in a niche market. This isn't what focusing really means. Niche markets are usually not big enough to support massive firms, ones that can go public. As a result, firms will not get financing or will get less than they could if they targeted massive opportunities. What focusing really means is that you identify a massive market that you want to tackle in the long term, build a product that could serve this massive market but focus initially in that segment of the market that will give you the best short-term traction and growth. In getting investment you need to be talking about how you will serve the larger market first by tackling the smaller one and building up to the larger market. Unless of course like Uber, you can get the capital to attack the entire market virtually from day one and if you can, do it. Here are a few things you can do in order to improve your market potential.

1. How can you potentially expand the size of your market by moving from one vertical to multiple verticals to even a horizontal market that needs your solution?
2. If you are in a small or medium sized business market, is there any way you can enter a corporate market?
3. Find the prospectuses of several public companies that are most like your own and determine how they figured out their TAM and how big that TAM is compared to how much revenue they recorded in the year before they went public.

About the Narwhal Project

The Narwhal Project works for technology companies at the intersection of strategy, marketing and finance to help them analyze strategic options, adopt and document a strategy, and raise funding. We help entrepreneurs figure out the best markets to serve, how to differentiate effectively, ensure product market fit, improve unit economics and raise capital.

The Narwhal Project was also established to conduct research in order to discover the underlying factors that are essential to create world-class technology companies. Our objective is to understand how companies can accelerate their growth and adopt best practices in technology commercialization.

Charles Plant

Charles Plant, the founder of the Narwhal Project, is a serial entrepreneur, financial strategist, and innovation economist. He was co-founder and CEO for 15 years of Synamics, a telecommunications software firm. He has been co-founder of four, Board Chair at four and CFO of eight emerging technology companies. He has worked on financing and M&A transactions totaling over \$400 million in investment banking, on the management committee and CFO of three venture capital firms, and as an advisor at a number of incubators. Charles has also served as an advisor to national, provincial and city governments on innovation policy and written over 40 research papers and one book and has another on the way. As an educator, Charles spent seven years on the faculty of York's Schulich School of Business teaching in the MBA program and has taught innovation and entrepreneurship at the University of Toronto. He has an MBA in marketing, is a CPA/CA and is currently pursuing a PhD in Economics.

Marielle Voksepp

Marielle is an experienced leader, operator and educator who's work with startups and early-stage entrepreneurs spans 10 years. She has designed and delivered numerous entrepreneurship programs and advises leading entrepreneurial support organizations across Canada on program strategy and operations including MaRS Discovery District, Futurpreneur Canada and the University of Calgary's Hunter Hub for Entrepreneurial Thinking. Marielle led the design and launch of the IFH Impact Accelerator, the first impact-focused fintech accelerator in Canada. She is also an investor in real estate and early-stage technologies. Marielle has a BSc and BEd and is currently working on a master's degree from UofT.