High Tech Startup Fundamentals

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Disclaimer

I hope you learn something from this book, but I take no responsibility as to how anything you use from here will turn out. I am not a lawyer and do not give legal advice. I am not an accountant, and am not telling you how to do accounting. I am a management consultant, but this book is not my consulting advice. Rather this book is just to give you some ideas and direction from which to work from to find other sources and professionals. Ventures are risky, and despite the best of preparation and intentions, most don't work. Marketing research, corporate structuring, company management, and everything else mentioned in this book should be executed by experienced professionals, and even then there are no guaranties.
Preface

What my colleagues and I try to do is start with a new technology invention, and then to build on top of that a rapidly growing business. We do this for the benefit of the company stakeholders. High tech inventions are typically such things as new drugs, machines, software applications, or gadgets.

What you will find in this book is a high level view of how to go about doing a startup. It moves quickly, and in about 100 pages you will have gone from the culture of startups to how to write a business plan.

This book roughly parallels the lecture slides for a semester long workshop on entrepreneurship I gave at the University of the West Indies, UWI, in 2011. In those lectures I had hoped to give college students from the computer science, math and physics departments a basic idea about doing startups, and to point them in the right direction for getting involved.

The lingering 2009 financial crisis and in general the university milieu has lead some students to experiment with the idea that business and money are negative forces. Others see entrepreneurship as only an individualist's endeavor. Because of this I thought it appropriate to talk about the culture of business and startups in the first chapter.

The easiest sort of business to start is what we call a small business or mom and pop shop. Such businesses are often restaurants, flower shops, plumbing repair businesses, landscaping, carpet laying services, or purchased franchise shops, ... and a myriad of others. A franchise is an interesting concept. Once a person signs up, the franchise may help in many ways, such as providing standard facilities, supplies, and even training.

However, our task of building a high tech startup is different than that of a building a small business or running a franchise, so the material in this book will only be tangentially related. The main differences are due to the startup having to deal with more unknown variables, product acceptance being unprecedented, the preparation for a higher rate of growth, the potential lesser pressure from existing competition, and the higher risks.
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The Culture of Startups

About Entrepreneurs

All new companies are born because someone took initiative. Initiative is a special quality that by itself often garners respect from others. This is especially so for young people. If your experience is like mine and my friends you will find that in general people want to see you succeed. We want to see what you've got, so to speak.

Initiative alone will get you experience, but to also have success you need to have resources, the skills to manipulate those resources, a team, and paying customers for your product. Such skills come from education, practice, and through the guidance of others. Getting a good education will require years of hard study in topics that apply to your endeavors, while practice typically comes from belonging to projects rather than from starting them.

A network of contacts is key. One of the more common networks is the one you develop while 'coming of age'. One often sees people from the same schools on company boards, and people who worked at the same company out of school together on projects later in life. Hemingway once quoted Gertrude Stein as saying that we should be patron's of our own generation. She was talking about art. High tech products are a sort of art.

The average salary-man has a life that straddles two worlds. In one world he labors, in the other world he has fun. The entrepreneur typically has one world where the labor is the fun. Or at least the rotation is done on a calendar basis rather than on a daily basis, and even then the fun can look a lot like labor to a salary-man.

Entrepreneurs are by and large self driven people. Though they network to build teams and garner resources, by and large they are not people who are highly concerned about asking for permission. Entrepreneurs I have known are keen listeners and data gathers. They read volumes and seem to know about all the developments in their field. However, once that data is ground down to a decision, and it catches their fancy, they will take initiative rather than ask for permission.
Building a company is a team sport, and entrepreneurs are team players. Most all companies have gifted administrative teams. If the entrepreneur is a leader in the singular sense, it is as an orchestra leader. To make beautiful music also requires gifted, inspired, and motivated musicians. Just as for music practice, there is a lot of work that has to be done as a team.

An unusual characteristic I noticed among chief executives and entrepreneurs when I was younger was that they are strong believers in the system. They believe in private ownership. They are often supporters of the community. And of course they also appreciate individual initiative.

Rebellion against the system is a popular attitude among college students. In a sense the struggle to become independent from one's parents is abstracted to one of struggle against the 'oppressive' system. Hence, young people can easily confuse what they consider to be struggle against authority with the initiative of entrepreneurs, and thus see the 'unusual characteristic' I spoke of in the prior paragraph. However, we business people need the system, and all the other help we can get, in order to succeed at our projects.

In other words, you have to pick your fights. If you want to succeed at producing a new gadget or a new computer program, or the like, don't take on the rest of the world also. One huge problem to solve is enough.

Many college students are accustom to having someone pay the bills. My parents gave me food, rent, and lot of good advice when I was growing up also. I had a side job and thought I pulled my weight, but really I didn't. However building a business is not the same as building a family. Whereas your mother and father gave things to you out of love, most probably while requiring nothing back from you except that you grow to have a vibrant life – people do not invest in a company for the love of the company or its team. They do it for a return on their money. I've noticed that college students have the same desire to get what they paid for when they spend their own money.
**Ambition vs. Greed**

The last paragraph in the prior section leads nicely into this section. I recall in about 1985 a speech by Ronald Reagan where he said greed drove the economy. I think it was a grand mistake that has lead to a lot of misery in the United States. Most recently there was a spate of immoral events starting from Enron executives stealing retirement funds, all the way through banks manipulating rates. I don’t think President Reagan intended for this outcome. I think what he was actually talking about was *ambition*.

Ambitious people are hard working. They make sophisticated plans in order to achieve goals. They work to build structures that make money. They have strong characters. They work in groups. However, they have a strong sense of ethics, and they work for the benefit of the people they love, such as family and those in their community. They want to leave a legacy, and indeed many ambitious people have done so.

Greedy people also work hard, make sophisticated plans, build structures that make money, have strong characters, and work in groups. However, they have no ethics, and no desire to leave a legacy.

In business the legacy we are talking about is a successful company that continues to benefit the stakeholders for years to come. Every investor would like to have ambitious people in the companies he or she invests in. While simultaneously investors fear greedy people who will fail to build a legacy but instead will enrich themselves at the investor’s expense, or worse.

This concept can be abstracted further. Having lived in many places in the world, it is clear to me that it is nicer to live in communities that are vibrant and active, where people are engaged, than it is to live in communities where people do not have these qualities.

**Frontier Mentality vs. Individualism**

As a person with American roots I often hear that Americans are individualists, and by extension that individualism is important to American entrepreneurship. I think this is a fallacy. The characteristic of American culture that lends itself to entrepreneurship is a *frontier mentality*. 
In frontier Texas settlers banded together for defense and betterment of their communities. They voted on what they wanted to do. Even organizations such as the Texas Rangers were made from volunteers. In the American West people settled in communities and raised families. Neighbors had barn raising parties and sponsored country schools. The colonists of the east coast came together and formed their own governments and stood together to defend their country.

People with a frontier mentality have a strong belief in freedom. They are adventurers typically with strong moral characters who set themselves to the task of establishing farms and erecting towns. They worked to build a legacy, such as homes for their family, schools and churches.

Note that while the frontiersman is building a community, the individualist is pitching camp. While the frontiersman is providing for his extended family, the individualist is working for himself.

Well of course this is a romanticized description as it would be pointless to write a thesis here. I'm sure many fur trappers were excellent parents. But the point stands. It is the frontier cultural heritage that is now playing as a strength in American entrepreneurship. But you don't have to be an American to have a frontiersman's approach – after all most of the frontiersman were not originally Americans. Really it is a question of your outlook on life.

Business works best when people deal straight and keep things simple. Often those looking for a short cut, or the quick buck, will fail to build a legacy, and will fail those around them. Furthermore, when many people are doing this investors become leery, healthy companies fear to award contracts, and people in general fear to participate in early stage projects – as it is in the early stage that the most faith is required from the participants. It is much nicer to live in places where it is possible to deal straight and keep things simple. It is no coincidence that the economy tends to do better in such places also.
The Role of Money

I hear a lot of talk among students about money being evil. Students are toying with alternatives. But Money is simply a tool we use for facilitating trade, and is neither good nor evil.

Some religions warn that the love of money is evil. Only paying attention to the money would be like only watching the steering wheel instead of the road when driving a car. However, just as one must learn to use a steering wheel when driving a car, in order to build a corporate legacy we will have to learn to employ capital skillfully.

In a free market society people express their actual decisions on who gets to work on what by spending money. I say actual because many people talk in one manner, and then spend in another. Companies that make a profit have been selected to prosper while those that have consistent losses have been selected to wither away.

The flow of money is the flow of the preferences and decisions of a society. As those preferences and decisions flow in one direction, goods and services flow in the opposite direction.

Greed is a negative quality related to money, but it is a quality of a person, not of the money itself. Ambition is a positive quality related to money, though it is also the quality of a person. Money does not cause greed or ambition rather it is just representative of the flow of goods and services at the will of the people involved in trade.

Money can be channeled through taxes and then spent by politicians. This machine for taking money from people is often criticize, sometimes rightfully so, though few people would disagree with the need for basic services, fundamental research, education, and common infrastructure. One may also rightfully question who gets to issue money or how money that is parked gets invested. I remember being very surprised at a young age to find out that the money I put in my 'savings account' was not sitting in a vault but rather was invested by the bank, and I still question how they can do this without my consent or guidance.

There have been attempts to build systems where a government body instead dictates the distribution of everything important, for example in the old Soviet Union. In such a place initiative was shown by becoming
the person in charge of such decisions, but this was at the expense of others who wished to make the decisions for themselves. Despite the trappings of a fancy new theory, it is in fact an old system. Long ago such a person who called the shots was called the King. It is true that some kings were good, such as Henry IV, but more typically kings have had a Malthusian view of population control. Note, however, that debating such things is not part of doing startups. When doing a startup we should embrace the system and keep a laser focus on getting the product out.

The closest example of anarcho-syndicalism we have in the software industry today is that of the Free Software Foundation. I agree that some free software makes sense. Machinists have always had a subculture built around the tools of their trade. So, for example, it is in the interest of hardware companies to share software that enables customers to use their hardware. Similarly it is in the interest of consulting companies to facilitate continued contracts – but note in this latter case there is a conflict of interest. We users would prefer to have software that is without flaws and easy to use, whereas consultants would prefer to give us software that facilitates their continued participation.

Note also, much of what is called free software was really paid for by parents and/or taxpayers. Someone had to be paying the bills while it was written. These people who paid the bills may have wished to have spent their money in other way. It is also the case that after graduation programmers often come to realize that they can not make a living while competing against products their old comrades are giving away.

I would suggest to you that the primary struggle for those who want to change the world into a better place is one of enriching the minds of people, and it is not in getting rid of money.

**The Goal of Entrepreneurship**

The goal of entrepreneurship is to create a *healthy* company. A healthy company is a sort of pump. Beneficial goods and services go out while money comes in. The money that comes in should be in excess of the cost of the goods and services used in making the product so that the
stakeholders may benefit from the project. Those who labor are compensated for their labor and those who took risk or initiative are rewarded for leading us to a better place.

A *developing* business is one which is building up to a point where it can be a healthy business. A *failed* business has taken in less money than the costs of materials and labor for such a period of time that it can no longer function. A *successful* business is one where the return on investment made the risk and expense of the initiative worthwhile. In a wildly successful business return is at least ten times what it would be for a successful business.

A *seed stage* or *early stage* business is one that is just starting to be built. It is at that this stage that the most initiative is required, and the most risky decisions are made.

A *growth* stage business is one that has matured through the seed stage and is now being expanded to take full advantage of the available market.

A *mature* business is one that has fully leveraged the market, and further return on investment will be through maintaining existing customers with follow on products, by expanding market share, or by opening new markets perhaps through education programs. Here is an interesting link how one mature industry has educated the market to drink bottled water,

http://www.storyofstuff.org/movies-all/story-of-bottled-water/

The makers of that video question the benefit of that initiative, as do many others. On the other hand the people who fear municipal water fluoridation would disagree.

Another example was the U.S. telephone company up until the 1980s. They had all the customers possible to have, so the only way they could profit further was to deliver the same service for more money or for less cost. We have Judge Greene to thank for changing that situation.

It sometimes seems to me that the owners of a mature business would be better served if they split such a business up into seeds for new ventures.
When doing startups we rarely face the types of challenges for expanding market share as just described for mature businesses.

**Join a Startup**

You don't have to be a leader or 'entrepreneur' to participate in a startup. Many more people join startups than create them.

Why not join a startup and get some good experience? I see college students take a year off to go travel and earn 'experience points' – why not spend a year on low budget working with your colleagues to attempt to build something of value?

Typically if you join a startup you will learn what it is like to be part of a team which faces challenges. You will know what it is like to believe in something. You will know what it is like to own part of a company, which is a big benefit if the company succeeds, but in any case you will get a lot of experience fast.

I see students pay to take courses where homework is handed out. They pay for the privilege of slaving away for years on end – yet when these same people are asked to participate in a startup with an equity stake but much lower pay than the rest of the market – they shy away. ... Look, you pay me to teach this stuff in one environment, but you don't want to participate in another environment where you will learn even more, *and* have a chance of making a return on the investment. That doesn't make sense.

You should probably think of joining a startup in the same manner as you would think of joining a local hockey team. People on such a team don't expect others to provide for them, rather everyone does their best to pull their weight and then some. Though they do not expect to be provided for they still respect the skills of others and listen to team captain and the coach. To be a good team player one has to be attuned to the skills of one's teammates.

So, joining a startup does *not* mean making a big salary. The initial founders are typically not paid at all, sometimes they self fund the company. It doesn't really mean you have a job. It typically would not
be wise to run out and get a new house with mortgage and a new car with a car payment after joining a startup. With a startup, if there is a monetary reward, it comes later.

Take for example, if a person spends a year working on an early stage business, and then the business turns out not to be healthy, then that person has an income deficiency from what he or she could have made in industry over that year. This type of risk only makes sense if the return on the investment is greater than that which would have been gotten from other endeavors. As I pointed out above, we could say that the experience still makes it worthwhile. After all in some circumstances people will even pay to get such experience – but for example's sake and to form some basis to work from when making a decision, lets take a look at it from a purely monetary point of view:

Startups are typically a lot of work. The salary a company would have to pay a person to do that much work is typically even more than the market rate. Lets suppose for the sake of discussion that the differential was 50,000 USD. Lets keep in mind, that most of you all will be new grads entering the work force, so lets not exaggerate the amount of the first year's salary differential too much.

The success rate for startups is variously reported around 1 in 10. Hence if you were able to do startups repeatedly for a long long time, then 9/10 of those times you would lose your 50k, and 1 out of ten times you would have a profit. Hence, for every 10 runs, that profit would have to be 450,000 USD for a break even in the average. But you want to do better than break even, so your potential return should be much more than this. You also probably don't want to do startups for a long time. Hence, you will either have to join for the experience and hope, or join because you truly believe that the odds are better than average – and be right. If you are good at being right with this you will gain great advantage. You might want to use that advantage and your talent to investment in other projects. We can quantify this concept of advantage as:

$$advantage = 1 * profit - 9 * loss$$

And you will want this quantity to be a large positive number, even larger than the break even amount.
The Basics

Stakeholder

A stakeholder in a business is anyone who is affected by the success or failure of the business. Examples include investors, founders, employees, customers, and suppliers. Because companies pay taxes and employees spend money we also include the government and the community in this list.

Competitors are typically negative stakeholders, though this is not always the case. In the early days of the semiconductor industry many companies would not buy integrated circuit chips unless there was a second source. This was because fabrication facilities were fickle and failures could stop supply for weeks or longer. In this situation competitors helped each other by providing second sources. In an infamous example a processor company, AMD, traded another processor company, Intel, a CMOS graphics chip in exchange for a microprocessor, and then they cross licensed patents.

Some stakeholders can influence administrative decisions or company operations. Such influence can be direct or indirect, short term or long term, strong or weak, and positive (for the health of the company) or negative. Stakeholders with influence will typically work to take care of their own interests whether those are align with the company's interests or not. As an example, a venture capitalist who has controlling interest in two companies, but say, finds the first company to be hopeful, but projects the second company will not succeed, may decide to shut the second project down and move resources to the first. That could be unfortunate for the minority stakeholders of the company being shut down if their projections differ.

A company's neighbors can be in a precarious position as they typically do not participate in the governance of the company located on their block while they may still be affected by it. Positive affects may be increased commerce at restaurants and other shops and a local supply of jobs, while negative affects may include such things as noise, traffic, or pollution. Ideally, local governments attempt to accent the positive
affects while attenuating the negative ones through zoning laws, licensing, and regulations. However, sometimes the very people in government who these neighbors entrusted to do their bidding may see themselves as stakeholders with independent and differing interests. We saw such a thing in Austin, Texas when the airport was to be moved and it turned out the city would be buying land not from original owners, but from the city counsel members who learned of the plan early on. Fortunately for Austin, another alternative became available.

Who is and isn't a stakeholder changes with time. Because of this there are potential stakeholders, and stakeholders who are real and immediate. For example, a person who is in a position to buy company stocks is potentially a stakeholder. When he or she buys, he or she becomes an actual stakeholder.

Though stakeholders typically have interests which correlate to the business interests of the company, even when interests align stakeholders may be friendly to, or adverse to, a project. An example of a stakeholder with aligned interests, but who works in an adverse manner may be a disgruntled employee.

A company really has two types of customers. The customers who buy the product, and the stakeholders. As for all customers, managing stakeholders requires doing research, forming strategies, and employing communications campaigns.

The Business Contract

In any business contract both parties to the contract are intended to benefit. If this is not the case it is not a business contract, it is something else. Take for example an insurance or hedge contract. The company enters the contract to insure against a negative event affecting cash flow and harming the business, so they see the premium worth paying. The contract backer believes that the average affect will be lower than the premiums in total, so they see the contract as positive also. The insurance company will even invest the premium money themselves.
The basis of any sort of ethical contract of engagement with a company is that the engagement is constructive for the company, and if the company is a success, it is profitable for the participant.

Even customers, who enter an implied contract through the purchase of the product benefit. They spent money but gained materials for themselves or their business. Customers find this material to be more valuable than the money. So for example, if you are a pizza man then you buy wheat flour, cheese and pepperoni because the cost of those ingredients is so much less than the price of a pizza that after selling pizzas you are able to take money home to your family.

Flipping this over, the supplier profits because she was able to change goods into cash that she uses to benefit her stakeholders. In the case of the restaurant supplier she takes the money from having sold the flour, cheese and pepperoni and pays employees, etc.

This situation is profound because the business contract is not a zero sum game (one with a winner and loser like chess or checkers). Rather is it a mutually beneficial relationship (win-win).

For a successful business the investors profit, and this profit inspires them to take further initiative and risks. Successful investors are able to make more investments, while unsuccessful ones are not. Thus the system favors those who make good decisions.

Again this is a bit of a romanticized view, as the situation in the real world is mitigated by the vagaries of the economy, world events, by our limitation to predict the future when making contracts, and by those who do not have the well being of others in mind and attempt to cheat the system.

**Structure**

A company must have some fundamental components, namely: marketing and sales, operations, product development, human resources, finance and accounting, administration, and legal.

Marketing is the interface between the company and its current and potential customers (also known as the market). Sales is that part of the company which reaches buying customers. Operations manufacturers
the product, gets it delivered, recovers the money, and probably also takes care of the facilities. Product development designs the products to be manufactured or designs the procedures for the services to be provided. Human resources deals with employee issues and staffing. Finance invests the company’s money and is part of the executive decisions to execute instruments to bring money into the company. Accounting keeps track of where all the money goes, handles purchasing, and cuts the checks. Legal handles employee engagement contracts, NDAs, drafting and execution of patents, etc. Support of a product after sale can go back to product development so as to keep them in touch with what they make, to marketing so that they can understand the customers, or to operations.

You need all of these functions, though some of these 'departments' can be outsourced. When there is limited staff some of these departments can be viewed as roles that employees rotate through rather than as full time jobs.

**Service is a Product**

Rather than repeat the phrase “product or service” throughout the book I am going to adopt the convention that 'service is a product'. Like physical products, services are developed, marketed, and paid for.

**The Business Building Process**

The basic steps are:

1. Identify a profit making product/service
2. Verify! through market research.
3. Do cost, risk, profit analysis.
4. Write a business plan (plan of execution)
5. Raise funds
6. Develop the business structure
7. Start operations

Step number two is very important. If you can't verify the proposed product's acceptance by the market, then you can save yourself and others involved a lot of trouble by not proceeding further.
These steps are not strictly independent or in this order. For example, in practice it will be necessary to build some of the business structure or to show evidence of a paying customer to raise funds, unless you are self funded or have a similar backer with a great deal of faith.

**Challenges**

Doing a startup is not easy and there are some seemingly contradictory goals to achieve. The first you will run up against I call the *bootstrap problem*. You will need funds to get the company to a stage of baring revenue, but typically need to show some revenue before justifying funding. Also, business plans need to show a strong team, but typically you need funding to get team members to commit.

Then there is the *execution problem*. A great deal of work must be done to transform funds into a healthy company. Even the best of teams can make mistakes or just fail to find the requisite opportunities.

Another one is the *predict the future* problem. Even after perfect execution independent of all else, including the market studies, buyers decide if the product is to be a success only when/if they spend money on it. Buyers will not read your plans or predictions, but will make decisions based on what they perceive benefits them at the moment.

In some localities and in some universities there are grant programs in place to help people overcome the bootstrap problem. Angel investors and incubators can also help startups with this. A program at the EPFL university, for example, provides funds to professors to commercialize their research, and then provides an incubator. Business plans are matched with potential customers so that the incubated startup has a built in customer.

In general, in my opinion, finding a customer willing to pay for delivery or pay to build your product is the best route for bootstrapping a company. As an example, Microsoft got their start this way with a contract to provide an operating system.
Startups Typically Are a Small Step Forward

I like to point out in lectures that the startup that did the 8 turn disk head in San Jose had as their CTO the man who did the 6 turn disk head for IBM. I like this example because it shows how technical some products are, that experienced people are often involved, and that startups are often evolution steps. In another example, a friend just started building instruments for oil exploration. He had been working with an instrument company for twenty years. He is well known, and customers are waiting.

Microsoft started with a contract to supply an operating system. They started work on that contract by buying the Seattle Monitor – an existing DOS already written. Both Bill Gates and Paul Allen were computer experts.

Andy Grove left National Semiconductor where he was already doing IC chips before starting Intel. Processors already existed at that time. Same for Jerry Sanders who started AMD, the company that created the processors that powered the PDP11 and many other computers long before the IBM PC existed.
What is a Market

The Profit Equations

In accounting profit does not have a precise meaning. This is because there is a bit of complication in defining what exactly constitutes profit. Is it the increase of worth of the company? Or is the amount of cash the company made? Say for example, the company would have gained in cash 100k USD, but it purchased a piece of equipment. Indeed the company did get richer; however, the owners of the company themselves can't take any money out of it, so the effort of building the company didn't make them richer.

At this point we don't want to get into accounting details, rather we just want to talk about marketing. So for now, we will calculate based on the definition that profit is what makes the company richer.

\[
\begin{align*}
Profit &= (Price - UnitCost) \cdot Volume \\
Revenue &= Price \cdot Volume \\
Cost &= UnitCost \cdot Volume \\
Profit &= Revenue - Cost
\end{align*}
\]

Price is how much we charge for an item of our product. This may not be the price on the shelf because, for example, if we sell to a middleman he will add margin. We also may have to subtract sales tax or other levies. We have to put in distribution costs somewhere. That is a bit more complicated, as the transportation cost may vary depending on where we ship something. For that matter price could be negotiated from sale to sale. So let’s agree that we are speaking about estimated averages or 'about rights' here. This is OK as we are just trying to determine if there is a business story here or not.

The UnitCost is the total cost we expect for making one item. Volume is how many items we sell. Volume will be something we are trying to estimate when doing our market research.

We have to denote a period of time for all this to make sense. We could do this per week, month, quarter, or year depending on our purposes. Adding a time component causes some extra complexity because of
inertia in the system. We may have inventory, costs may be related to a
time in the past rather than right now etc. But for our purposes in this
chapter we make the best, though conservative, estimates we can with
the information available. Again, this is product viability estimation,
not accounting.

By subtracting the UnitCost from the Price we get the amount of
money the company makes per unit.

Now if we multiply through by the Volume we get two new quantities.
The Price times the Volume is known as the Revenue. When we
multiply UnitCost by volume we get total cost, or just Cost as I denoted
here. Then our Profit is just Revenue – Cost. If we want to compensate
for taxes etc., we might multiply our profit calculated by 0.75 or a
similar fudge factor related to corporate tax rates.

In the end we have to show a very strong story to justify the effort of
doing a startup, so pick the numbers conservatively and see if the story
still plays. Look for sensitivities. A sensitivity is where changing a
number within a conceivable range affects the calculated profit by a lot.
Sensitivities will become risks to be managed.

Estimating cost is an engineering and operations department problem.
This is a chapter on market research, so for now we will just keep those
terms as unknowns. As we don't know cost we can't really set limits on
the price, and even if we did have a lower limit, there is no reason to set
an upper limit. This leads us to the following insight:

The market research for product validation problem reduces to
estimating Revenue(Price). I.e. revenue as a function of price. Due to
our second equation this the same as saying our problem is to estimate
Volume(Price). Repeating that second equation while making price a
free variable:

\[ Revenue(Price) = Price \cdot Volume(Price) \]
Many Disciplines Within Marketing

As noted in the prior section, the purpose of market research is to estimate revenue. However there are additional areas of marketing that the company will need to address. In addition to marketing research, we have marketing strategy, marketing communications, and sales.

A marketing strategy is a plan for getting the product into the market in a manner that is the most profitable. A marketing strategist will use market research data to give him or her hints on how to position the product and to communicate its existence to the market place in a manner that sales of the product make the most profit possible, and all this is done despite the existence of competitors, economic conditions, and everything else.

Marketing communications deals with getting the message to the customers. Marketing communications specialists must identify the words, phrasing, and packaging that the people in the market are the most receptive to, and implement an advertising campaign to reach them. Market research should be used to verify and direct marketing communications concepts, though sales numbers may do that as well.

The rubber meets the road in sales. The salesmen must find the people who are receptive to the message, and get them to buy. I'm a little surprised sometimes at how much alike marketing research for product verification is like qualifying people for sales. They both start out with a survey to see who has need for, and ability to pay for, and the power to decide to purchase of our product. However, during marketing research we only want to know that the need is there among the enabled decision makers and how wide spread it is. The product may not even exist. In contrast the sales people expect to have a product to show, and they are most interested in the phone numbers of these people so they can talk to them and close deal. Sales people look forward to making good money on commissions resulting from their sales skills. In contrast, market research work is typically a salaried position.

Later in the life of the product a lot of good market research data can come from sales and from product support. Those feedback loops must be kept in tact.
A company needs to do a good job in all areas of the marketing problem if it is to be wildly successful.

**Market Research is a Process**

Though we are not going to describe our product to those we survey during product concept validation research, we ourselves are going to have to know what it is at least in a parametric sense. To learn about the product will are going to have to work with engineering (product development department). The data we get back may affect the decisions the engineers have made, so this will be an evolutionary process.

Any time engineering mucks with what the product is we have to consult with operations to make sure it can be manufactured. If manufacturing is done overseas, the contract may have limitation or need to be changed. Also to do our research we may need to know lead times. Certainly the marketing strategist will need to know that. Operations of course then affect HR and finance.

Market strategists work closely with market researchers. The market researchers will have limited resources so they will have to have some sort of focus. That focus will be provided by the strategists. In turn the market research results will affect what the strategists want to focus on next. This is yet another iterative and evolutionary process.

Because of these interactions the executive staff must work together closely, which is why they typically office together. Though if you are an entrepreneur considering doing a startup, you might be in the best of possible positions for communicating with all these people – *because they all may be you*.

**Economy, Market, Market Share**

Market research work typically comes in three layers of abstraction. At the highest layer we have the economy as a whole. When the economy is booming we would expect to have higher revenue. When it is dead, nobody can sell anything, and revenue plummets. There is nothing our company can do to control the economy, so we have to predict and plan for such changes or find hedges against them.
The next abstraction layer after the economy is that of the market. Suppose for example, XYZ company makes pay phones. Then XYZ company sells into the pay phone market. The pay phone market consists of all the money spent on pay phones.

Because XYZ company sells some volume of pay phones it will own some share of the payphone market. We say that it owns some market share. Market share is the third layer.

Here is a graph of our hypothetical situation for XYZ:

![Graph of hypothetical situation for XYZ](image)

They x-axis shows time. This is intended to cover a number of years. The y-axis shows dollars. The blue area is the economy. The dollar amounts for the economy are scaled down in order to get the curve on the graph. The thing to notice here is that during this period the economy is expanding.

The red area is then the market for pay phones. This market is doing a strange thing. While most markets expand with an expanding economy, this market is contracting. That is because it is a technology that has come to the end of its useful life. Pay phones are no longer in demand because everyone has cell phones.

Such graphs often tell a story. Let me make up one for this graph. Now, the green area is XYZ's market share. Notice the hump on the left. XYZ company's initial product took the market by storm and at one time XYZ got more than 80% of all money spent on pay phone equipment,
but that attracted attention causing a competitor to enter the market. XYZ came out with a second product, which started to take off, but XYZ failed to transition to digital touch pads until late and lost precipitous market share. Then the pay phone market itself began to shrink. XYZ's major competitor was caught off guard, and though it was otherwise a healthy company, they had cash flow problems due to investment in modern manufacturing equipment. They had to declare bankruptcy and the company was liquidated to pay creditors.

So by the time we get to the right of the graph, company XYZ again owns the whole market, but unfortunately that market is shrinking, and as it shrinks to zero, so do XYZ's revenues.

Announcers on financial news casts like to tell stories like this one. However we can't get such a story just from the graph. We must do research to determine the forces that caused the changes seen on the graph.

Now here is another hypothetical graph inspired by a true story. Here we see the cell phone market from the 1980s to about 2005. The economy curve is probably not very accurate, it should be flat and sloping up except for dips in 1985 and 2001.

![Cellphone Revenue at Market Price](image)

* hypothetical data

What we see is a rising cell phone market. It is this market that took dollars away from the pay phone market, and probably home phone equipment also, but not office phone equipment. Now in the beginning Motorola owns a commanding share of the market. Then one day the
CEO and his market research crew decided that digital telephony would not take off so they did not develop a product for it. They were wrong, and their share dropped as competitors offered digital cell phone equipment. It took years to recover. In this graph their later products did well, but not to the extent of their initial success.

This next one is a real graph. This one is for smart phones:

![Changing smartphone market share by manufacturer](image)

This graph is normalized for percentage of total market, so we can't see if the market is growing or shrinking, however we can clearly see the relative market shares. In this case Nokia started out with the largest market share, but from Q2 2010 it started to drop. The new king of the hill appears to be Samsung.

When doing marketing research for product viability, we may get our economic data and even market size data from a market research company such as IDC or Gartner. We will then have to gauge our market share through surveys. If those resources are not available to you, or market research companies do not have research on your topic, you will have to estimate the market size yourself.
As a rule of thumb for a high tech startup in a new area, we expect to be first to the market and to quickly obtain a commanding market share. The strategists will then attempt to sustain this situation. This means we will expect revenue to quickly grow to be commensurate with market size. This fast growth shown on a graph is often called a 'hockey stick'. However you can't just draw the hockey stick – rather their must be data that paints a story that justifies it.
Product Positioning

Describe Product as List of Features

We do market research for determining product viability at an early stage. By doing this we save ourselves a lot of trouble if the market acceptance isn't there, and we make a much more convincing story when it is there.

Because we do market research for product validation so early, the product probably doesn't exist yet. So you can't sit down with the product and figure it out. Instead you sit down with the architects or engineers of the product and get a description of what the product does. This description can usually be encapsulated as a list of features.

Do not confuse features with the technology wizardry. The marketing communication people may want to brag about that, but it isn't going to help you know what the product does. Also do not confuse the feature list with product value. Value, which answers the question, 'what are these features good for?' is a perception of a customer, it is not a feature of the product. Later we are going to have to align features and perceived needs, but lets not let that later step get in the way of understanding what the product is.

Be careful of the “I got to see it to get the concept” fallacy when doing surveys. In a sense when person you are surveying says this they are taking control of the survey to acquire information from you rather than the other way around. It should be possible to understand a person's needs without asking them to share your vision. Saying you need to see a product in order to do the viability research can also circular, as often times we are doing the viability research in order to determine if we want to put in the work of building a first version.

I have learned from experience, to be careful about prototypes. Prototypes are often done in a different technology than the product itself, so it is easy to get the wrong impression about what can be done in the final product and how far along a project is. A prototype that is emulated in software is often nothing more than a power point presentation with a different interface. In hardware, programming
simulators, emulators and FPGAs can be a very different task than designing custom chips, and the physical properties of each may be very different. I think it is wiser to do a feasibility study on the base technical problems that need be solved to achieve features, than it is to spend time making sophisticated prototypes.

I say this relative to product viability due diligence done by marketing. A mockup may be useful when it occurs within the flow of a project and feeds into the product development. For example, the engineers can theorize all day that the instruments and toggles in a cockpit are within view and easily gotten to – but typically only a mockup where one can sit in front of them will tell if the layout is really correct. Lets extend this example a little bit further. Suppose the 'mockup' is a computer simulation. This technology may be too far away from them real implementation. We might learn more from actual size card board cut outs, which, strangely, are closer to the technology of cut out sheet metal than a computer model.

For marketing research level product viability assessment, I suggest getting to know the product simply by making a feature list. It may be that some of the features are parametrized. It may be that there is more than one feature list for various product variation proposals. Make sure to understand how likely these features are to make it into the final product. The operations people can help with that.

Here is a feature list for the events sign proposed by the UWI student: 24 hours, 7 days a week, visible to 100 people a day, attractive. These are not features: LED lighting, carbon composite, computer controlled. These latter items are technologies used for building the sign, but they don't tell us what the sign does. These are also not features: 10 feet high, 10 events listed. These are not features because they don't speak to the use of the sign in terms of its ability to advertise, and our customer understands our product as a vehicle for advertisement. The “10 feet high” might imply something about how many people can see the sign, and it might be useful for marketing communications, but the true feature we are talking about is how many people see the advertisements.
Here is a feature list for a VHF radio of the type used by firemen, policemen, harbor master's, etc.: volume, squelch, multiple channel monitoring, high/low range settings, clear sound, standard form factor. These are *not* features: quadrature modulator, fractal antenna, low manufacturing cost. These are not features because they don't tell us what the radio does for the customer. These technical specs may or may not have sex appeal that is good for marketing communications. Manufacturing cost is important as it can affect price and will affect profit, but it is irrelevant to the customer's mode of using the product.

**Needs List, Corresponds to the Feature Set**

Take your feature list and translate that into a set of needs a customer will have for those features. Take the classic example of our product being 'aspirin'. The corresponding need that the customer will have is 'to cure a headache'.

This might seem like a backwards process. One might imagine that we start with customer needs and then design solutions to meet those needs. However, that is an *engineering* process, not a marketing product validation process. In a sense with product validation we are checking if the engineering got it right, so we go the other way.

When surveying our potential customers we will want to be on the lookout for needs that are not on the list for which we might add features for. This will result in a *features wish list*. There is a Dilbert Cartoon where the marketing guy goes to Dilbert and 'psychic interface' is on his features wish list. Wouldn't that be nice?

Consider our example of a sign for events. The customer need will be to advertise their product. The need for a VHF radio with a standard set of features? To communicate line of sight for no more than 3km.

**Who Is The Customer?**

By definition the customer is the person who buys the product. Though on the surface this is a simple concept, in practice it may take a little thought.
A UWI student proposed a business concept of placing an events sign on the road leading into the university, as I mentioned above. In my opinion it is a pretty good idea – but I wouldn't invest just because I thought it was a good idea. First I would have to see data that convinced me that there would be customers who would pay enough money to make the sign a successful venture.

So how can we get an idea of what would-be customers will pay? Why not just ask them?

But who are these customers? Many students will suggest it is the people who read the sign. It is not. Rather it is the people who advertise on the sign. The people who read the sign do not pay the company money, so they are not the customers. The advertisers pay so they are the customers.

Let's consider another example. Take a VHF radio. Many people would think that the customer for the VHF radio is the fireman, policeman, or harbor master who uses it. This is probably not the case. These people are employed in organizations. Those organizations will have someone in accounting known as the 'purchasing agent'. That is the person who will be making the buy decision. Accounts payable will cut the check. Though you are paid by the accounts payable person, she is not your customer, because no matter how badly she wants to cut the check, she can't until purchasing makes the order.

Now let's consider the end user of the VHF radio. He or she potentially may participate in the decision making process. However, if this is the case, that participation may be limited to giving justified criteria for the radios because most companies tend to be frugal. Though the VHF radio manufacturer needs to understand such criteria, your customer will still be the purchasing agent.

Is the teenager really the customer for your video game? It may be the parents who are bankrolling the transaction.

OK, one more example. Suppose you make a consumer item. I don't know. Say you make lamps. Who is likely to be your customer? Chances are it is not the person who buys the lamp, as that person went to a retail outlet and found there on the shelf 3 lamps. He then made a choice and paid the clerk up front, but that clerk works for the retailer,
not for you. How is it that your lamp was one of the ones on the shelf? That is the key question here. In this case your customer is the retail outlet store itself.

**Profile the Potential Customer**

Now look at the list of needs you found that your product will fill and ask this question: what kind of person would perceive that they have such needs, have the funds to pay for satisfying them, and would be in a position to make the decision to buy? The answer is your customer profile. The customer profile will need to be checked by talking to people and gathering data. We discuss surveys in more detail in the next chapter on Product Concept Validation.

1. has perceived need
2. has money/resources to buy
3. is enabled to make the decision to buy

In general, businesses perceive the needs to increase their profit, lower risks, or to lower costs. When dealing with businesses these three attributes of a potential customer may be found with different people within the organization. Perceived need may originate from the employee user, the money may come from the accounts payable in accounting, and the decision to buy from a manager.

In general, individuals perceive needs to be entertained, be more popular, make their life easier, be a better person in some manner, or be more effective at taking care of loved ones. Their buy decisions may be made and coordinated in conjunction with family members.

Healthy businesses are the ones who have the ability to buy, and once management signs off it is typically a purchasing agent who selects the vendor. For a specialty item the vendor may be stated in the requisition, and in which case purchasing has little to do but to tell accounts payable to write the purchase.

Say for example you are doing a video game. People will buy it to fulfill a perceived need for entertainment. However, it won't be all people. To make the profile more specific we have to look at the features of the game and ascertain what type of person is attracted to
those features. If the game is intellectual, then we will have a profile for people that play heady games. If it is a very simple pretty game the users may be children, and then chances are that the buyers are parents.

The Value Proposition

The value proposition is a bridge between product features and customer needs.

One can state the value proposition in generic terms as 'our feature set meets your perceived needs'.

Take the classic value proposition that of aspirin for headaches. The product's main feature is that it cures headaches. The need is to have the headache gotten rid of. People see value in aspirin because it cures their headache.

We may often talk about value propositions within our team, but we may be at a disadvantage to measure them in surveys when discussing our feature list would give away secrets. Hence, our surveys will typically concentrate on finding customer profiles for people who express one or more points on our perceived needs list, have the ability to buy, and can make the decision to buy.

So lets take a simple contrived example. Suppose you are doing product validation for a business plan from Huntsville, Alabama, and that plan is presented by a currently unemployed red haired 170cm tall Russian engineer who is now married to an American (of course said engineer is just a device for this example, and the example is contrived). He wants to start a venture while saying he has a new pump design that can force 80 cubic liters of liquid hydrogen through a 4cm pipe per second. Also, we signed an NDA and swore we wouldn't tell anyone that there is an 80cl/s for 4cm pipe pump in the making. Now we are supposed to determine how many people will buy it and at what price.
Alright we are in the business of selling hydrogen pumps. The number of customers in this market is fairly small, so that makes the survey easier. We list some contacts at NASA, Morton-Thiokol, SpaceX, and Lockheed. We probably can't survey these contacts directly as people we know at those places don't buy pumps, but we can ask them to lead us to people who make decisions about buying new kinds of pumps.

Because the pump specs are secret we ask our survey subjects needs questions, such as 'what pumps do you buy currently and how much do you pay for them?' That establishes we got the right person, and it gives us a baseline. Then we ask, 'what sort of pump would make your life better?' 'Do you have any critical problems for lack of a certain type of pump?' 'If you could have any pump you could dream up what would it be?'

It may be the case that our buyer doesn't dream about pumps, so we may have to take our survey into the company a step further and find the engineer who does have such dreams. A buyer's scope is limited to filling requisitions, but an engineer initiates those requisitions.

In this example needs are probably stated in terms of specifications, so it is fairly straightforward to evaluate whether the proposed pump meets those needs. Note this is a contrived example. For such a case in reality, it may be better to apply for a patent on the pump technology, and then survey against the actual product specs. Or perhaps do a little of both, first do a little bit of work to determine if there is a market at all to justify the time and expense of engaging the patent system, and if so apply for one, and then go back and survey against the actual product specs.

These are examples of needs we may hear about when doing a survey for our VHF radio company; need to meet government regulations so vessels can be certified – having a radio is one regulation, radio required to allow vessels to enter harbor, need to reduce response time to accidents, better coordination leads to higher profits. Our value proposition would then be that our radio’s features will fill the customer’s needs.
The Value Proposition is a Function of Price

The customer must perceive that the effort for obtaining the product, which is typically mostly driven by price, is significantly less than the pain caused by letting the need remain or by filling it through other means.

We will have to ask a variety of questions in order to ascertain if the person being surveyed has the ability to make the decision to buy, perceives a need on our list, where the price threshold is, and to determine what profile they belong to (or to start a new profile). The next chapter discusses survey questions in more detail.

Research Your Competitors

A lot can happen in the time between the initial product concept validation and the time the salesman knocks on the door with 'a brand new kind of high tech vacuum cleaner', or whatever the product objective was. Perhaps one of the larger risks is that you have an idea who's time has come, and many others are going to enter the market at the same time. It may even be that in all your effort to convince others that the market was there you succeeded too well, or that your pitch fell on unscrupulous ears. Unfortunately this does happen on occasion and may lead to law suits to enforce patents or damage clauses in NDAs, precedent or statutes.

Fantastic Tech business model proposals often say they do not have competitors, but all businesses have competitors. If for no other reason it is because of this: if a company makes money, others will see that and then try to enter the same market. Anyone capable of making such a move is a potential competitor.

I like to ask people if the Wright brothers had competitors when they first sold the airplane. The typical answer is no, because obviously, as inventors of the airplane they were the only one's who had one. This is the wrong answer. To get the correct answer we start by asking what market they were in. It wasn't the airplane market, rather it was the market for reconnaissance data. There were already spy's on the ground and even balloons in the air that gathered such data.
But it doesn't end there. When the Wright brothers submitted their bid on the U.S. Military contract, unknown to them there were in fact two bidders. The other bidder claimed to have an airplane capable of everything the Wright brothers plane did, i.e. it had the same features. However, this other bidder in fact had no airplane at all and no intention of even trying to develop one. Instead he went to the Wright brothers and tried to contract out their airplane. His concept was that he would win the contract because he was a preferred vendor, and then the Wrights would have little choice but to work for him. Fortunately for history the Wrights refused to contract their plane out, and when the moment to demonstrate the plane could no longer be delayed the other bidder had to drop out.

Within a few years other people also started building and selling airplanes. The Wrights endeavored tirelessly to sustain their market share by enforcing their patents.

How will you sustain your market advantage?

**Identify the Market / Industry**

By dividing the market size by unit price we get volume, i.e. the number of units sold. In turn those units go to people. In market research we are going to want to know all about the people who would buy the product so that we might extrapolate out to see how many potential buyers there are. Then after extrapolating we can work backwards, the potential number of buyers corresponds to units, and units through price goes to back to potential revenue. In a nutshell this is how we make our estimates.

Because there is a correspondence between market size and the number of buyers we can loosely speak of the market in terms of the people in the market. From this point of view a sentence like “The market for scalp oil consists of bald people” might make sense. When necessary we can make a distinction by using the terms 'revenue from the market', or 'people in the market'.

For every buyer of a product there is a corresponding company that made that product. It follows that by defining a *market* we are also defining a set of companies. This set of companies is known as the
industry. So for example, the companies that sell into the cell phone market constitutes the cell phone industry. Market and industry are the opposite ends of the same stick.

For tax, census, and regulation purposes most governments keep a list of standard industry codes known as SIC codes. Those for the U.S. can be found on the Securities and Exchange Commission's website, http://www.sec.gov/info/edgar/siccodes.htm.

So the first thing we must do as we begin market research is to determine what market we are selling into. We will have to understand this in both a broad and specific senses. So for example, if we sold a router for networking, we might consider ourselves most generally as selling into the communications equipment market. More specifically we might be the digital communications equipment market, the computer networking equipment market, and perhaps most specifically in the such and such standard router market.

An engineer colleague who does naval architecture (designs ships) told me an interesting story that illustrates this point of broad and narrow interpretation of markets. There have always been a number of companies which participate in the industry of shipping goods across oceans. Significant up front investment is at stake in such ventures, and often times this investment is raised by selling stocks.

For the most part these companies used to perceive their business as ending at the waters edge. They would vie for contracts to take things from one port to another. Then there came a new technology known as the standard shipping container. The importance of this technology was subtle and thus not initially well understood. However at least one company saw this invention as an opportunity to broaden their market purview from that of a shipping company to that of a freight company, thus offering to customers the service of moving standard shipping containers from point A to point B where A and B might be on land instead of just at the waters edge. This was possible because with standard containers there is no need to leave material at the harbor side to be repacked. This company then bought and leased rail lines and equipment.
Customers liked it. So the time came when the whole industry was compelled to move from shipping to freight—but it was too late for the others to lease rail lines, because they were already dominated by the companies who saw the trend early. Those who didn't make the transition early went out of business.

It is important to find a market which is of appropriate size for your company to address while still being able to dominate it rather quickly to lock out competitors long enough to recover development costs. If there is potential to profit greater by generalizing the market to a larger demographic then there is an opportunity to make the business case to raise more money for the company and then to expand to address that potential.

**Set the Business Model**

Setting the business model is primarily a marketing strategy task, but market research will play into the decision. This step also interacts with the prior step, as how you set the business model will affect who your customers are.

Here are some example business models:  *fashion, fantastic tech, shelf space, price and margins, subscription/license, pay for service, product as a marketing tool.*

With the *fashion business model* people buy your product although it is very expensive because they perceive your product will enhance their image. With this model products are sold at very high margins per unit, but you typically don't expect to sell them to the everyone. I.e. you don't expect to realize the full market potential of the product.

Because of the high margins and low volumes, fashion based companies tend to make a lot of money on a successful product. However, their customers are fickle, so it is easy for them to miss the market opportunity, and the market opportunity will be of short duration. These companies have a tremendous burden of constantly generating new highly attractive items. Companies with a track record for hitting the market windows will develop a brand identity that will help smooth out the curves, so to speak.
As the fashion becomes old news, price and margins competitors will arrive in order to fill the full market potential of the product.

The *fantastic tech business model* has a lot in common with the fashion business model. For example, Apple has managed to sell computer equipment at higher margins than their competitors because people like to be seen with them. They are very popular among starving artists, musicians, and students. Yet these are the very people who would be wiser to be running on the cheapest hardware they can find.

The fantastic tech model has some aspects to it that the fashion business typically does not have. For example, superior technology facilitates people in accomplishing what they could not otherwise accomplish.

Fashion and fantastic tech create their own sort of market niche monopoly. This monopoly can sometimes be preserved through patents. A patent on a fashion item is called a *design patent* while one on a technology invention is called a *utility patent*. This is somewhat counter intuitive terminology, but it is the accepted convention.

In both cases companies usually sell lower volumes at high margins. Because of this they often do not put priority on controlling the manufacturing costs. Their typical reasoning is that each dollar higher price paid by the customer far outweighs 10 cents that can be saved on manufacturing costs for the same effort.

I gave an example of the *shelf space business model* in the section *Who Is The Customer* when talking about lamps. Retailers only have so much shelf space. Because products that are sold must occupy that shelf space temporarily the retailer can assign a dollar amount of profit per unit time to every square inch of it. It follows that the supplier that offers a product that allows the retailer to have more profit per unit area will make it on the shelf. The other suppliers will have no opportunity to sell anything through that distribution channel. Hence, in the shelf space model the name of the game is to get on the shelf, i.e. to find a distribution channel.

The Internet has had a profound affect on the shelf space business model, as now people have access to products located in warehouses rather than just in retail centers. The cost of keeping items in a
A warehouse located on inexpensive real estate can be much lower than that keeping items on a shelf of a facilitated retail outlet in a metropolitan area. This enables the Internet vendor to offer more products. The retailers have responded with what are called big box retail outlets.

We have now witnessed the emergence of a generic order fulfillment industry. These companies will, for a fee, place anyone's products in their warehouse, and then fulfill and ship orders made by customers from the company's website.

The shelf space question is a form of the more general problem of *opportunity for distribution*. Despite the Internet this can still play into technology. For years Microsoft managed to prevent competitors from getting on the shelves with alternatives to Microsoft products. They did this by penalizing distributors who did not bundle their products. As an example, I paid for Windows on this machine I'm working on at this moment even though it was purchased to be a Linux box. I had no choice, Windows was on every machine in the shop. At one time had the retailer offered a Linux box he would lose his discount on Microsoft products, and thus lose the ability to compete in that space.

According to the *price and margins model* you buy my product because it is cheap. Not only is it cheap, but because I am so good at keeping down manufacturing costs it is cheaper than anyone else's product in the same market. The price and margins model tends to dominate in commodity markets where products are readily available.

Do you recall that graph on smart phone industry market shares in the prior chapter, *Economy, Market, Market Share*? The one that showed Nokia market share diminishing and Samsung's increasing? Let me offer an explanation for that. Nokia, entered the market as 'amazing tech'. However smart phones are now old news. They are becoming a commodity. Hence, the Korean company that is very good at the price and margins model is taking market share. This is a usual trend for tech. A product starts out being fantastic and hard to get a hold of so it is expensive, but later it becomes a readily available commodity for which price and margins dominates.
It is not uncommon for a company that thought they were getting into the superior tech model to miss their performance goals, or to meet an unexpected competitor, and then end up trying to salvage something by competing on price and margins. I believe this happened to Cyrix with their x86 processor clone now owned by Via. I believe this describes the path taken by Transmeta with its VLIW x86 processor clone attempt.

With the subscription/license model the customer buys permission to use the product rather than buying the product itself.

Software companies are in a rather awkward position. If they sell you a program, then that program can be copied at infinitum with each copy being exactly like the original. But you bought and it is yours, so why shouldn't you be able to copy it? This problem does not exist with, say, wrenches or cars. It does not usually happen on the individual customer level with books because copies are hard to make, so book copies are not as good or are just as expensive as the originals. A software maker who sells a low volume of paid for product that then gets copied widely is not going to make back it's development costs, let alone be able to support all the post sales copies.

The solution most software makers have come up with is to sell a license for use of the program rather than selling the program itself. The license is a legal contract, and some expensive law suits have lead companies in the U.S. and many other countries to conclude that it is wise to adopt policies of not copying software.

The subscription version of the model has another advantage for both the vendor and the buyer. It can spread payment out over time, and thus make up front commitments smaller and revenue more predictable.

In the related pay for service model the initial equipment is probably inexpensive, but due to its complexity or poor reliability, you are going to need a service contract. The equipment is only bought once, but the service contract is paid every month (or whatever the terms), so it will typically add up to a lot of money over the long run than a direct purchase would have. The buyer may find many smaller payments to be more convenient or suitable, or perhaps he has signature authority to pay for service, but not for a large capital expense. In such a case the vendor contract takes on the air of buying something with a bank loan followed by payments by the customer.
You probably bought your cell phone on this model. You gained control of a sophisticated microwave transceiver for a fraction of its actual market price, but due to the accumulation of your monthly service fees you end up actually paying for the phone repeatedly every several months. Early computers from IBM and DEC and their software used this same approach. As I believe that around 1975 one could buy a DEC machine for about $12,000, but the service contract was $30,000 a year. If you had a problem and called them without a contract you paid a high hourly rate.

A related model to pay for service is that of paying for a consumable part of the equipment. For example you buy a printer for next to nothing, but then you become a captive to high price toner cartridges from the same manufacturer.

Richard Stallman of Free Software Foundation fame has postulated that all software should be given away, and that programmers should instead charge for service and training. I think this makes sense in some situations, and I share his concern about some modern practices stifling participation. However there are other situations where this would just give incentives to write bad code so it would need to be serviced. I can't remember the last time I invoked a service contract on code I bought, so if others are like me then service contracts would not pay for the code we use. I also know that many of my programmer friends who work as independents don't want to work as sysadmins or do product support their whole careers.

The **product as marketing tool model** is basically our example of selling advertising space on a sign. With this model the product which is free to the user carries along with it paid for advertising. For example a free email service might add an advertisement to the bottom of email messages, or a free hotspot might place ads into rendered pages in the browser. This approach emphasizes marketing communications. One can also make a business model by emphasizing market research. In such a case a free email service may scan the email for information it can sell to companies who are doing market research. Google has combined these two by scanning email and then putting related ads on the side of browsed pages.
Product Concept Validation

Suppose you have a product concept, but the product doesn't exist yet and indeed even the concept is secret. Now you want to answer this question: can making and then selling this product lead to a large profit?

Large mature companies can afford large marketing communications campaigns to educate markets, for example the beverage companies did this to convince people to drink bottled water. Startups typically cannot do this. Instead we have to create products for which people already perceive a need. It follows that the crux of the product validation problem will be in gauging the scope of that need.

Our biggest validation tool is to elicit feedback from the market. We can engage in this activity from the very start so that decisions such as product features and product positioning may have a firm basis and evolve as we understand our company better.

Attributes of Opinions

I once asked the class “who wants a new Ferrari?” The vast majority of the students raised their hands. Then I asked, “who wants a new Ferrari for $300,000” all hands except one then went down. All opinions have attributes. These include direction, magnitude, stability, truth, and duration, among others. In the case of these two questions, the first one measures direction, but leaves out magnitude. The second question measures the magnitude of the opinion.
Direction of an opinion is typically something like 'for' or 'against'. Or 'will buy' or 'will not buy'. It is possible for an opinion to go in more than one direction, in which case it is multimodal. We like to design our questions in a manner so as to avoid getting multimodal opinions as answers.

The magnitude of an opinion is a measure of how strongly the opinion points in a given direction. In our case this is typically the price that a person says they would pay for the product.

The stability of an opinion is the probability that the opinion is not going to change when the question is asked again. For example, the demand for Hula Hoops is not stable, but the demand for bread is. Opinions of weak magnitude are naturally found to be unstable. However, high magnitude opinions can also be unstable. When a person or survey group expresses high magnitude unstable opinions we say the group is fickle.

The truth of an opinion is the probability that the opinion is really true. Because the truth score is a probability it will be a number between 0 and 1 inclusive. The one hand that was remaining after asking about buying the Ferrari for $300,000 was that of Jimmy in the front row. He lives with his parents in a small house 'across the tracks'. So I said “yeah right”, and the class laughed as everyone understood it was a joke. The truth score for Jimmy's answer was zero.

Take as another example, a teacher does a survey of students entering the room and asks if they read the assignment in preparation for the lecture. Students have a vested interest in giving bad information to that question, and often will. The low truth to the answers was verified by the results of the pop quiz given that day.

A false opinion does not have to be due to an intentional deception. Though he is 100% sincere there is very little probability that the opinion of my son is correct when he says he will not be tired in the morning if he stays up late. Sometimes people like to volunteer information, even when they are not in a good position to know what they are talking about.
Duration is a measure of how long the opinion will be true, or even how the opinion is expected to change over time. It is well known, for example, that for the majority of people their political opinions become more conservative over time. As another example, a survey done in the middle of winter may predict that selling gloves would be a successful venture, but the store that opens first thing in the spring with a large selection of gloves may not be a success.

Potential Customer Profile

Customers are people who buy our product, while potential customers are those who we believe will buy our product when given an opportunity to do so.

If we are to extrapolate beyond our survey size for determining the larger market potential we must find some sort of profile for potential customers.

A completely random survey may not be practical if we have a specialized product, and as we are doing a high tech startup chances are that our product is specialized. For example, if we just randomly pick phone numbers and call people to find if they have a need for an 800cls liquid hydrogen pump we will not be able to collect a large enough sample group to get good data back for a reasonable amount of time and effort. In a case like this we should create a general profile and then endeavor to find a more specific one within it. I call this more general profile a demographic, but I mean this in the most general sense, not limiting it to such things as age, gender, or location.

As examples of demographics that we might start working from, we have a pretty good idea of who plays video games, buys sign advertising, and who buys VHF radios. We have an idea about these things in part from our personal experience, but also because of all the research data that is already out there.

We will then talk to people within the demographic and ask them a multitude of questions to find out if they perceive the key needs and what it is about the person that leads to these perceptions. We will try to
understand their motivations and to identify traits shared by groups who provide similar answers to our questions. These traits are then collected together and called the potential customer profile.

**Don't Ask People to Validate the Concept for You**

Talking about the concept has a number of drawbacks beyond the obvious one of not keeping it secret.

The awful truth is that it is easy to bat down a new concept, even a good one, while it is a heck of a lot of work to show one is valid. Asking a person to validate a concept is not a shortcut. After all, if man were meant to fly God would have given him wings.

Most people are not visionaries so it is not reasonable to 'run the concept by someone' and then expect them to share your vision. If they do share your vision then hopefully they are scrupulous and/or under NDA, but if they don't then it does not mean the concept is bad. Because of this you get nothing back while you give away a great deal.

Also, asking a person to evaluate a novel concept is asking that person to do your homework for you in reducing features to needs etc. and to do this impromptu and by intuition. Typically that would not be a process which would yield very accurate conclusions. If the person took your question seriously he or she would go off and perform *due diligence*, which is a lot of work and should be something you intended to happen.

Most people are concrete thinkers. If you discuss the concept they will want to see the product, they will typically say quite directly, “let me see it”. You will probably then answer somehow explaining that it does not exist, and then the person you are surveying will ask for a prototype. If you don't have one, the person may be disappointed, feel you have not done *your* homework before talking to him or her, or even request you go make one then come back. Such an exchange will not be useful for either you or the person you are surveying.

If you ask a person to think about your novel concept, that person may feel that you are expecting them to develop your product concept for you, and will want to be compensated for this, or worse. There does exist a mode of thinking where, for example, a thief feels it is OK to
steal something that a person left behind by accident, such as a laptop in a classroom. When you present a concept rather than showing a concrete object, unfortunately, there are people who may feel you have left behind your idea. I had personal experience with a person who justified stealing ideas by saying “ideas are a dime a dozen, the only valuable talent is in making them happen.” Because of such things it is good to avoid sounding like you want someone else to take initiative in your place.

I am convinced that there is a phenomena whereby some people confuse what they are asked to imagine in their mind with what they are recalling from memory. Perhpas this effect is assisted by wishful thinking and convenient errors.

Take for example the day that the student proudly spoke up about her business concept by asking the class to imagine a large events sign you could see when driving into campus. Shortly later another student said there was already such a sign there. Conversation immediately stopped as no one wanted to look stupid. The original speaker was tacitly accused of not having done her homework. I too have to admit to having been unsure. After class I walked to the driveway. There was no such sign. I have a friend who has made a great deal of money on willful patent infringement cases due to asking engineers to image inventions while selling applications. They often reject the applications and then go forward to do it themselves while saying they thought of it.

**When to Talk About the Concept**

Remember that this chapter is about product concept validation, in other contexts you are going to need to explain the concept and have others get it.

One would hope that a potential investor's first question would be if the product will make money, and that he or she would want to answer that question by seeing the data gotten from the market place. From this perspective the details about the product are immaterial, while the marketing data is everything.
However, not all people believe in data driven decision processes, and some folks are incurable concrete thinkers. It may well be that to get your business plan reviewed even at the earliest stages that you will need to have a convincing power point presentation, mock ups, or even a prototype and then to engage in a 'please share my vision' conversation.

There are cases where having a 'share my vision' conversation is important. For example, the team itself will need to understand the concept very well if they are to follow through with turning it into a reality. You should expect that in this context the “please share my vision” conversations will be a lot of fun as people have *ah-hah* moments and things start to click into place. Something is wrong if the team isn't having fun doing this.

Also, when you shift out of the product validation phase, and towards investor due diligence, getting joint development agreements or actual customers, being able to invoke a mutual understanding of the value proposition becomes increasingly important.

**Designing Product Concept Validation Questions**

First you will want to ask questions that determine whether a person has a need from our needs list. Secondly you will want to know if he or she has the ability to buy, and thirdly if he or she has the power to make the buy decision. Then you want to ask questions which determine what profile the person fits in.

Our approach to surveys works well when individuals have long duration stable needs perceptions. There may be markets where this is not the case. To make predictions in such markets it will be necessary to predict what a person will perceive as needs in the future at the moment the person decides to make a purchase. This once removed prediction problem is beyond the scope of our current discussion.

If during a survey the person you are speaking to fits the potential customer profile of a potential customer, but he or she would not buy, try to determine why. It may give you more insight into how the profile
can be improved, or it may be the case there is a competitor who already fulfills his or her needs. In which case you will want to learn who that competitor is and what the person thinks of their offering.

In the complementary case, if you find a person with a strong need and ability to buy story, but does not fit the potential customer profile, you will want to talk to him or her further to try and figure out how to modify the current profile or how to make a new one. It is possible to have more than one potential customer profile. It is good to ask is if the person knows more people in the same situation so that you can expand the survey.

You must gauge how the opinions vary as a function of price. This will result in a histogram or a curve for each profile that has as its x-axis the price and as its y-axis the probability the profile predicts those interviewed will buy. Or perhaps you just find the break point, “anything more than price $p$, and folks start getting shaky”.

The typical approach used for getting a handle on truth is to ask the same question in different ways. In general contradictions indicate something is not right. For example, it is a contradiction for a person to be getting by on student loans, but also saying he wants to buy a Ferrari. If you talk to the same person in different sessions you can get an idea about stability, though stability is also affected by environmental factors. Those factors should be explored in your more general research. You can ask directly about duration and how the person thinks their opinion will change over time.

Another thing you want to explore is how your questions are working. You may want to ask questions in multiple ways or to ask confirmation questions to see if person really understood what you asked. Sometimes it is truly amazing how people interpret something differently from what was intended. Use this information to design better questions.

Note, we are not necessarily talking about a large task here. Sometimes just a few questions will suffice. The fewer the better. Also we are not necessarily talking about a highly formal process, especially at first. Sometimes this is just a lunch meeting where you manage to learn what you need to know. Getting good at this so you can do it impromptu is a very useful skill to have.
Remember above all that you do surveys to learn something new. The richest information is found in the surprising answers. In general always be struggling to understand the value proposition better wherever you have an opportunity to do so. Having some simple questions ready in advance can help you take advantage of unexpected opportunities.

**Make the Calls**

Surveys may be done through informal meetings, face to face visits, phone calls, emails, etc. Though one thing for sure, there is no replacement for hard work and personal communication at the beginning of the process. As the product or company matures a process can be put in place to gather data from product support and sales. Services can be hired to execute more formal surveys.

Before doing a survey create a call list. Plan to do two or three iterations. Perhaps start by calling personal contacts, or personal contacts once removed, see how it goes and gather more contacts. Then improve the questions and your approach. Expand the call list out using linkedin, professional services directories, lists of hiring companies perhaps, conference rosters, Google searches, and anything else that can reach people potentially in the market.

When only talking with a few people, rather than in a mass survey, keep a CRM database of contacts especially of those who give strong needs feedback. If possible keep relationships alive and later turn them into sales leads as the company matures. Though keep in mind, that when doing product concept validation, there is no product to sell, rather we are testing the product and business model concept so as to justify the effort of building a company or bailing out early before too much work is done.

**Document Your Results**

During the first survey iteration you will want to take special note of things that are insightful or indicative of future success or failure. As you survey more people make up names for profiles and start counting membership.
Because the surveys are for a startup, we really are just trying to establish if there is a strong buy story. We typically don't have the time or resources at this stage to deal with the marginal stories. We keep the price parameter, but everything else reduces to 'is a strong buy story' or 'is not a strong buy story'.

\[ S_i(\text{Price}) \]

In this function \( S \) is the number of strong buy stories at a given price. The variable \( i \) is the profile that this strong buy story belongs to. If there is only one profile we can safely drop the subscript.

When doing the surveys each time you find a strong buy story belonging to the profile \( i \), increment \( S_i \).

We only want to count a person as a strong buy story if he or she truly has a need for the item, obviously has the ability to buy, and clearly can make the decision.

Also, you will need to keep a tally of the total number of people in each profile independent of whether they would buy or not. Lets call that total:

\[ T_i \]

It is possible to get fancier with the mathematics by summing estimated buy probabilities rather than making counts. However, such an approach is a bit beyond the scope of the current discussion. It is also typically of limited value as our only goal in product validation is to find out if there is a salient strong buy story or not.

**Calculating the Results**

If you have enough data points the \( S_i(\text{Price}) \) can be plotted as a histogram or graph.

So for example, suppose the profile for my potential Ferrari customer is any person who happens to be a UWI student. The population of people with this profile is the number of students who attend UWI. Now suppose that my sample within this population consists of the class, so \( T = 33 \). Now, I know that for this sampling of the population that the number of people who perceive a strong need for a free Ferrari, \( S(0) \) is

\[ \frac{55}{100} \]
everyone in the class. However the revenue at this price point is not so
good, as \( 0 \cdot S(0) = 0 \) so, even though there are 33 strong buy stories
there is no revenue. However, as the price rises there are still people
who profess a need, so I get the following histogram:

Here we see that all 33 students would still buy for $10. However by
1000 dollars many have dropped out. About 10 students have Googled
and found they could resell the car for even more money – but being on
an island it might be difficult to find a buyer. These students are willing
to buy out to 100,000 dollars. Jimmy is a liar and tells me he would buy
even at a million dollars. I don't know what his true answer would be at
any of the price points, so rather than guessing, I take him out of the
sample set. So \( T \) is now 32 and the data looks like this:
My statistics teacher told me that a rule of thumb for data with five nodes is to have 25 sample points. Here we have six nodes and 32 samples. There is a good chance this data is representative of UWI students as a population – or is it? After all these are students who self selected to sign up for my class when they could have been doing something else. Well lets suppose it is. The next step is to convert the strong buy story counts at each price point to a probability. Take the 1000 dollar price point for example. 9/32 students would buy so the probability is 0.28125. In general we divide each S bar by the sample size T and get:
Here I use a lower case \( s \) to indicate we have an estimated probability an individual has a strong buy story rather than a count of strong buy stories.

Looking at the bar for $1000 purchase, \( s(1000) \), if I randomly select someone from the sample group, i.e. from the class, I have a 0.28125 probability that person said he or she would pay a $1000 for a Ferrari. Now here is the interesting part. Provided that the sample is representative, I have an estimated 0.28125 probability that any student I pick from from the population of UWI students would buy a Ferrari.

*The probabilities we find for the sample group are estimates of the probabilities for the population as a whole.*

Given 15,437 students at UWI we could expect, \( 0.28125 \times 15,437 = 4342 \) buyers in total at the price point of $1000.

We then multiply these estimated volumes by the price to get estimated revenue. So at this price point we get an estimated expected revenue from selling Ferrari cars to UWI students of 4.3 million dollars. In general revenue will be described by:

\[
R_i(price) = price \cdot s_i(price) \cdot N_i
\]

This equation says that the revenue from the number of strong buy stories in profile \( i \) is the number of buyers in the population, \( N_i \), times the probability that a person will buy at that price point, times the price. For our example we get the following revenue against price curve:
This revenue curve looks nothing like our strong buy stories curve. It appears that a good pricing strategy for us would be to charge over $100,000. Typically such curves have a bell shape, so we really need to do some more survey work to understand better what is happening between $100,000 and $300,000.

It is reasonable to suspect that we have a stability problem with this particular survey. After the students in my class get a chance to study the value of a Ferrari on the open market, the opportunity to distribute these cars in Barbados and wherever else they can, and they have a chance to evaluate their personal priorities and desire to get into the car business – the results will surely change. This stability problem occurred because the survey questions were considered to be silly and fun rather than taken seriously. Also, those questioned did not have sufficient time to think through their answers.

**Multiple Profiles**

If we have more than one profile we can only add the results for each of them together when the profiles groups have different people in them. For example if one profile was short fat bald men, and another was tall skinny long haired women – chances are very good that no one person would belong to both profile groups. Hence we could safely add the revenue estimates from both groups to get a total revenue estimate.
Probably the simplest way to handle overlapping groups is to treat the overlaps as separate profile groups. For example, if you had profile group B of Bajans and profile group A of Trinidadians, then you could handle cases where a person is both Bajan and a Trinidadian by creating profile group C for people who are both. The members of group C would not appear in either group A or B, but instead would be treated as a completely separate group of their own. Total revenue would then come from the sum of A, B, and C.

**Summary of Product Concept Validation**

1. create a product features list and position the product  
2. derive a 'needs that would be fulfilled' list  
3. create potential customers profiles  
4. design survey questions to verify and evolve the profiles  
5. repeat the prior steps while refining against the survey results  
6. extrapolate the profiles to the population and estimate revenue against price

This is the market research side of product concept validation. The other side of the problem is in determining costs, and we left this to the product development and operations people. We will discuss this other side later in the book.

**Revenue as a Function of Time**

To get a complete estimate of revenue we must consider our market strategy for positioning, pricing, and distribution, and use this to transform our estimate of market share as a function of price to an estimate of market share as a function of time. For a startup we probably measure time as calendar quarters (three month blocks).

\[ R_i(t) = \text{Strategy}(R_i(\text{price})) \]

So for example if our strategy is to price the product at 1k USD and then to sell to 3 customers the first quarter, 10 customers the second, and 30 the next quarter, then Revenue as a function of quarter will be 3k, 10k, then 30k. Which is roughly a line of slope 3.
Typically a company will have no revenue before the product is launched. After that sales will be throttled by its ability to get the word out about the product and to distribute it. It is possible that competitors will react by lowering prices on related products, by making promises perhaps even ones they can not keep, or by offering discount rebates that can only be claimed if our product is shunned.

For a startup we expect that the revenue per quarter graph should look like a hockey stick as we act quickly take advantage of all the opportunities available in the market before someone figures out how to compete with us.

As we get to the top of the hockey stick, we start reaching diminishing returns on our sales and marketing work, and revenue starts to drop as anyone who ever wanted one now has one. This will happen sooner if competitors enter the market. Hence, for a long period of time the revenue over time curve tends to look bell shaped. A good time to introduce our next improved product offering is shortly before we approach the peak in the bell curve for the old product.

An interesting attribute of the group of UWI students that we discussed earlier is that it changes from year to year. Every semester when old students go out who have not bought cars we have lost the opportunity to sell to them, but as new students come in we gain new opportunities. If we do a good job at marketing communications and sales, there will be few lost opportunities leaving, but new ones still arriving. This effect will elongate the right hand side of our bell curve.
Corporate Structure and Management

Legal Structures

A legal structure is how the government and legal system interfaces and deals with your company. It is usually set by a lawyer, sometimes by an accountant, though now in the U.S. and the U.K. one can go to websites to do it, such as www.legalzoom.com. When incorporating in the UK the UK companies house website has a great deal of information and electronic filing for accounts and corporate taxes. However, one should be very careful as there are liability and tax implications in choosing a corporate structure, so it is advisable to involve an experienced professional.

The laws for corporations vary from country to country, and even from state to state, though there are usually variations on the options of 'Doing Business As', Private Limited Liability Company, and the Public Limited Liability Company.

Doing Business As, or DBA, is a sole proprietorship or a partnership. With a partnership it is also important to have a partnership agreement even when one is not required by law. With a DBA a lawsuit against the company is the same as a law suit against the owners. They are personally responsible. When the company makes a profit, that profit is considered income to the owners.

A Private Limited Liability Company, or PLC, is owned by stock holders. Stocks are official legal documents that represent ownership in the company, and are registered with the company's house. Only qualified investors are allowed to purchase stocks in a PLC. An exception is made for the founders and for 'friends and family'. This
latter group is often jokingly called ‘friends and fools’. A PLC has a governance structure, and it is considered to be an artificial person in the eyes of the civil legal system, which means that the stock holders are typically not personally responsible should the company be sued. Taxes must be paid on profit at the corporate rate. In turn the company may distribute profits with the shareholders, in which case this is considered income for the shareholders so it is taxed again.

A Public Limited Liability Company is also owned by stock holders; however, the stocks are traded publicly so anyone may buy them. The Public Limited Liability company also has a governance structure and is an artificial person in the eyes of the civil legal system. Corporate profits are taxed. It is often a big event when a company converts from private to public, and for the first time offers to sell shares publicly. This is called the IPO, or Initial Public Offering.

Some localities offer variations on these structures or offer special structures. Barbados for example offers tax breaks to companies for a limited time. Some countries have free trade zones where a company may be located domestically, yet be treated as though it was not. Companies that do special kinds of work may be offered breaks on tariffs or taxes. On the other hand, some companies that deal with hazardous material, industrial workers, or arms or weapons have additional restrictions.

**Governance**

With a Sole Proprietorship, governance is limited only by labor laws and ethics in setting up the administrative structure. Often times the sole proprietor is referred to simply as “the boss”, and he or she can hire and fire employees, and parse out assignments and pay at will.

In a Partnership the issues of who gets to do what are determined by either the partnership agreement, or through an ad hoc manner. Typically there is a division of labor based on complementary skill sets or a daily schedule that has different partners on duty.

All companies must keep account books in standard forms that may be audited by government agencies. Tax rules vary with locality.
Unlike a DBA, the Limited Liability companies are required to have operating bylaws, basic governance structures, stock holder meetings, election of board members by stock holders, board meetings, properly prepared books, and they are required to provide annual reports.

In every case I know of, board members appoint executives who in turn set up additional administrative structures to execute the business plan. Typically the board interfaces with one to three of the chief executives.

This diagram is intended to show stock holders picking the board, and the board picking an executive staff. However, it is typically the case that large stock holders will sit on the board directly. Each stock typically corresponds to a vote, so stockholders who own many stocks in a company are powerful. A stockholder who owns 51% of a company or more is said to hold a controlling interest in the company. It is common in a startup that the investors will have a controlling interest in the company rather than the founders.

A Conventional Administrative Structure
A conventional administrative staff will have a chief executive or president. Reporting to him or her will be a number of other C-titled people or vice-presidents. Each will have a specialty. Shown in the diagram we have human resources, product development, operations, marketing, finance and legal.

**Of Hats, People, and Contracts**

In a startup we may not have enough people to fill out such an organization chart as shown in the previous figure. What I propose in such a situation is to think of the titles shown above as job functions, which I call more simply as hats. In a large company perhaps there is a manager for each of these hats, but in a startup individuals rotate through the hats as needed.

Each person in the company will have a set of skills, a background of training, and carry with them a unique personality. We may say that a person is narrow meaning that he or she is good at wearing exactly one hat. In contrast another person may be broad or flexible and able to wear any one of a multiple number of hats and then rotate among them.

In addition to human resources we can enter into outsourcing contracts.
It follows that one of the executive management tasks is to circulate the hats among the people or contractors who have the skills to perform the corresponding tasks. Sometimes the exchange of hats will be planned, and sometimes it will be done to react to immediate needs.

**Departments**

**Human Resources**

The Human Resources department, often referred to as HR, is responsible for recruiting, employee conduct, company policy, and keeping employee records. Human resource people are typically involved in merit reviews and in determining promotions.

In a startup the human resources function may be handled by a single person dedicated to the task, or it may be assigned to a person who has other administrative duties. Parts of the function such as recruiting may be outsourced and then managed by the HR person. In a tight situation HR could be combined with finance.

**Product Development**

The product development department is responsible for developing the next product. They will work along with strategic marketing and operations for costing out future products. Product development is responsible for fixing bugs in all existing products. They may handle customer support, though this may better put under marketing.

Product development is often the primary skill set brought by startup founders, though sometimes founders are marketing strategy people.

**Operations**

The operations department is responsible for getting the product manufactured, for order fulfillment, facilities, and the IT center. Order fulfillment means taking the orders, finding the inventory, putting it in a box, and getting it shipped.
IT can also go under product development or be in conjunction with product development.

In a startup manufacturing and order fulfillment are probably outsourced. A startup can be located in an executive suite or incubator which takes care of facilities.

**Marketing/Sales**

Marketing and sales is responsible for the marketing research and estimating the revenues portion in the product viability assessment. Marketing assesses the success of current products. It tracks competitors, opportunities, and trends. The marketing strategy people position the product so it will garner maximum market share. The marketing communications people get the message to the customers – all the customers including those who buy the product, the stakeholders, and the investors. The sales staff acquires customer orders. (Operations then fills those orders. Finance collects the payment, though if there is a physical component to processing payment, operations handles that.)

In a startup marketing and sales are core competencies.

Often times the CEO role will overlap into marketing.

The initial product viability study is usually done by the founding team.

General market research can be purchased, and the current product can be assessed by sales.

Marketing has an advantage in doing or participating in customer support as a means for feedback about the product. In which case field application engineers are considered marketers.

**Finance**

Finance is responsible for accounting, purchasing, accounts receivable, shareholder accounts, publication of fiscal reports, management of company investments, and matching cost projections against funding sources.
In a startup finance is a core competency, though purchasing can go to the administrative assistant, the same one who may also be doing HR work. Accounting can be outsourced.

**Legal**

The legal department is responsible for IP including trademarks, copyrights, and patents. They draft or review contracts. They are instrumental in negotiations, and handle litigation.

In a startup the legal work is often outsourced. The outsourcing is possibly managed by finance, though that could create a conflict in the company. If there is such a concern the management task goes to the CEO's office.

**Minimum Requirements**

The minimum number of people needed to wear all the hats described above is typically three. The emphasis of skills for these three depends in part on the culture of the company. For a marketing oriented company these three people may have their primary experience as CEO, Marketing, and Finance. For a product oriented company the three may CEO, Product Development, and Finance.

In a sole proprietorship it is not uncommon for one person to wear all the hats.

**Modern Management**

We have come to recognize two distinct types of work, project oriented work, and resource oriented work.

A project is something of fixed duration with a well defined beginning and ending. The requirements are well defined. We see this type of work in new product development, the creation of new marketing strategies, and events such as product launch.
In contrast resource related work has an unclear duration, with some tasks lasting for as long as the company is in business. Typically the work evolves and changes slowly rather than having a fixed start and end. Examples include IT services, accounting, and purchasing.

Because of these two types of work we end up with three types of management. Project management is now a science with the Project Management Institute and others providing certifications. There is a book, the PMBoK which contains core conventions. We would like to have experience well trained managers running projects at our startup, or at least one person who can teach others how to do it.

Resource managers are often what people think of as department heads. Their job is often to make sure that projects are supplied. The resource manager may be tracking the needs of multiple projects at any given time.

In the diagram above I show three departments, that of Product Development of which IT is part of, Finance of which Purchasing is part of, and Marketing of which Marketing Communications is part of. IT, Purchasing, and Marketing Communications are resources from which projects are pulling from. Leading each of these departments is a hat, and there will be employees wearing those hats who do the work of making sure the resources are there.

This diagram shows three projects going, two of them are Product Development projects, and one of them is a Marketing project. Leading each one of these projects is a hat for a project manager. There are people on each project who are working on tasks. For the product
development projects these people will typically be programmers or engineers. For the marketing project they may be researchers and strategists.

A third type of management task is to make sure all of the projects in the company come together. Groups of projects are called programs. Hence this could be called program management. A large company may have program managers, but in a startup this work will typically be the job of the executive staff, or the CTO (Chief Technology Officer).

Management is planned against hats, but executed by people. There are typically more hats than people, so the matrix diagram above is more than just about people, but about people while playing various roles (wearing different hats). A unique aspect of a startup management is the task of balancing hats (responsibilities) across a limited number of people and outsourcing contractors in a manner that the machine runs smoothly.
Expensing, Costing, and Profit

*Expensing* is a procedure where we calculate the cash outflows that will be needed for getting our company off the ground. These cash outflows will typically have to be raised in some sort of financing scheme.

Closely related to cash outflows are *costs*. Some purchases convert cash from one asset type to another. For example, we might buy a piece of equipment for 10k USD. That purchase required a cash outflow of 10k USD, but now we have a piece of equipment. If its market value for it holds, we could convert it back into cash by selling it. Hence, the *cost* of the equipment is the sum of the transaction fees and the depreciation of the equipment's market value.

In our example of buying equipment, the *expense* of buying the equipment is the sum of the transaction fees and the purchase price. Hence, the *cost* will typically be considerably less than the *expense*.

This disparity between cost and expense can lead to an unusual situation where a company might not be able to afford to buy something it needs even though it has enough money to cover the cost (but not the expense). In such situations the company may seek debt financing to cover the expense, convert other assets into cash, or raise some cash by selling more stocks. These are the kinds of problems that the finance people deal with. There have been companies that failed while having enough money to cover costs, but were unable to come up with money to cover expenses.

Because of this situation we make a distinction between *liquid assets* as those that are cash or are easily converted to cash - and *fixed assets* that can not be easily converted.

In our example the equipment is not a liquid asset because of accounting convention and perhaps more importantly because we need the equipment for production. This fixed asset will remain a fixture at the company until it is replaced or operations cease. Should operations cease and the equipment still has value it will surely be sold.
Finance people typically don't like to keep too much cash on hand, and nor do banks or insurance companies. That is because cash that is invested makes interest and there is little reason not to take advantage of that fact. There are many financial instruments the finance people may purchase with company cash. Some of these instruments may take time to mature, or may have a penalty if liquidated early. Such investments affect the company's liquidity, i.e. its ability to turn its assets into cash.

We will subtract estimated costs from our estimated revenues to get estimated profit. In general the processes of costing and expensing will give us the numbers we need to finish our proforma financial sheets.

From the proforma financial sheets we can estimate our break even point. This is the point where the company stops using financing and starts living on its own revenue. Though new projects that need new financing may overlap, and we may have issues with cash flows on break even day due to cost and expense issues, but we will still be able to analyze the break even on a per component basis and get some warm feeling that the company has reached a milestone.

From the proforma cash flows sheets we can see when there will be an opportunity for investors to start making a profit from the business and how big that opportunity will be. It is not uncommon for an investor to open to the cash flows page of a business plan first, and then work backwards to see if those numbers are well justified.

Costing will also give us the piece we need to set the company valuation.

**When Garaging It**

Some models for getting a startup off the ground include: garaging it, dual purposing a university research grant, going through an incubator, and building a standalone company outright.

When *garaging it* people use their weekends, holidays, and vacation time, or perhaps work part time, - or even quit their job and spend their own savings while putting together the company.
This is best done while having a contract to bill time and material against, or a contract to get paid for deliverables. It is sometimes practical to garage a project based on pay for proof of principal. In absence of all of that, one can still go for a letter of intent. This is a letter where someone says they intend to be a customer if indeed you make a product. A bank might loan money against such a letter. The next thing to garage against is strong market validation. In absence of all of that, perhaps you do it based on faith.

Calculating expenses for garaging it is similar to working out a family budget. You need to calculate the expense of supporting yourself and if necessary, your buddies for the period of time it takes to get to the first product that will bare enough revenue. On top of that add in all the stuff you will need to buy for yourself, others, and the project. Surely you will want to also add to the expense for some breathing time away from the business.

When you get to the bottom line number multiply by some margin - unless you are truly a die hard adventurer. Add in at least 30% if you are working while garaging it, and can continue to work in that arrangement for 2 to 4 times as long as you estimate is required. If you are planning to spend savings, expect to require 2 to 4 times as much savings as you estimate the expenses to be.

Even when garaging it write a business plan. The next chapter is on that topic. I may look a bit thinner than one made to attract institutional venture capital. Follow your plan. Also, should you want to transition from garaging it to some sort of financing you will have a plan to discuss.

It is best to use money from paying customers and to be attempting to transition to a startup company. For example a person who does system administration work may want to develop a product that he knows his system administration customers need and have the ability to buy. He might solicit the help of a buddy and spend nights, weekends, and holidays coding to get it done.
Dual Purposing Research Grants

The exercise of adding up expenses for dual purposing a research grant is similar to garaging it, though you may be in the enviable position of already having a lab and a salary. Add in stuff you need to buy, the expense of engaging students, and a travel budget to go to conferences and brag about your project. It is seldom that does much for the startup, but professors get a big boost from it, and it may justify the grant for its research value.

Also use the grant proposal money to engage an incubator and marketing researchers. I wish that universities would directly acknowledge that grants are often extended into commercial ventures, and then match up aspiring staff who has different skill sets, such as people from the business school and those, say, from biochemistry, to create a single project. Stanford, MIT, and EPFL appear to be going in this direction.

Expensing/Costing for an Incubator

In an incubator many expenses will be predetermined by one's presence in the incubator. This is a sort of cousin to the franchised small business. Mentors can help with the rest, and there will be a lot of historical precedent based on other small companies in similar areas of endeavor.

In an incubator I suggest you approach the problem of expensing/costing as though you were making a standalone company, remove items that are covered as part of the contract, then add in fees and the cost of leaving the incubator. By doing this exercise you will have experience in doing the calculations for a standalone company, and you will understand the cost of being in the incubator and can later weigh that against the benefits.

Expensing/Costing for a Standalone Company

I have seen expensing/costing done in roughly four different ways:

1. historical/comparative
2. pragmatic – do what you can
3. estimated general blocks of expenses that are summed

4. with full accounting of all estimated expenses/costs

With the historical/comparative approach we go find an analogous company, crack open the account books, and use those numbers as a guide. A buddy with a company in the same general market to one I was proposing once did me the favor of showing off their numbers before a pitch. The funny part was that I was still criticized for making unreasonable estimates by the people who went over the numbers although they were real numbers. It seems there is nothing a person can do to elicit positive feedback when people have come to an emotional conclusion of not wanting something. Though I must say that among the things pointed out was that the price of computer equipment. Indeed those prices had dropped dramatically from just the couple of years prior.

The pragmatic approach to budgeting is to use what you can get. Unfortunately this happens more often than most of us care to admit. You go to the budget meeting, or to an investor, you present carefully derived expense numbers, and then the administration disagrees and allots a different amount. You make do, and you know you almost always can. This is because expense numbers can very widely depending on the scope of features implemented and the depth of market penetration aimed at.

For example, consider a compiler for making programs from source code. It is standard practice to write one as a class project during a course on the subject at a university. This means that writing a compiler is about an 80 hour task for a student (10 weeks at 8 hours a week). However, a compiler purchased from Greenhill or Microsoft has tens of thousands of hours of work put into it. In this case, you get what you pay for, but the point is that you can have a compiler either way. So it goes with other projects also.

And it is not just the tech that has a tremendous range to it. One can go to vWorker and get an ecommerce site developed for about $800. On the other hand it will cost millions of dollars to have international distribution backed by a marketing communications campaign and personal visits by salespeople.
Because of this range the question 'what does it costs to do your startup', must be interpreted before it can be answered. One reasonable interpretation is 'how much investment is needed to get the maximum return while taking a conventional risk and preserving value for future customers - for this type of venture'. For an early stage venture a better interpretation might be, 'what does it take to get us to the next stage while following a conventional development model'.

In any case, to be pragmatic we do our best to work toward the maximum return on our investment given the budget we have.

In another approach to expensing we estimate expenses in general blocks and then add these together. Perhaps we have a fair intuition of what it costs to run a sales department for a year. Or we might look at our development team as a resource rather than from a project perspective, while having a good idea what a group of programmers is going to cost per month. This is also the approach we are using when outsourcing.

The approach that is considered the most credible, but almost always falls short when done by people who lack intuition of block costs or do not have historical data, is to do a full accounting of all estimated expenses. The project managers especially like doing this with expenses for a project. However we need to include *everything*. Typically many many things will be accidentally left out of the accounting.

I would suggest an approach of full expense accounting, where capital items are noted so the accounts can count costs, and then to verify this against a block expense analysis and historical data. Once the budget is created one only has to be pragmatic to a point. Make adjustments as soon as it becomes apparent they are needed.

**Main Areas of Costs/Expenses**

I tend to think of expenses as being of four different types:

1. startup expenses
2. recurring expenses
3. project expenses
4. per unit expense
Startup expenses only occur on major phase changes for the company. For example, the legal expense of filing a prospectus when going public occurs only when changing from a private to a public company. A true project manager would say that the phase change itself is a project. However these projects are of a different nature from those we see in the normal everyday operating of the company. Almost by definition, we as a team will have little experience when running across them. That means they need to be handled differently.

Examples of startup expenses include establishing a legal entity, lease deposits, purchasing of real estate and facilities, purchasing office equipment, purchasing heavy equipment, recruiting fixed staff.

We can distinguish between cash outflows that are conversions of asset type from other expenses by making special note of them.

To a first order recurring expenses are paid regularly independent of what projects are being run. I say to the first order as some of these expenses may come or go when loans are paid off, the technology we are using changes, or the company direction changes. According to this convention, they should not be included in project expenses calculations.

Examples of recurring costs are lease payments, outsourced standing work, payroll for permanent staff, non project part of department budgets, the base of continuous operations costs, and depreciation on assets.

We can shift startup expenses to recurring expenses through debt financing that has regular payments. We can also shift startup expenses to recurring expenses by leasing instead of buying. Both of these techniques will cause the total expenses to go up, but the importance of the cash to the company may be very different earlier rather than later in the company’s life.

Project expenses are those that would not have occurred had we not done the project. Examples include project specific staff, project specific equipment, project materials, and special facilities. I say special facilities, as most projects will occur within the company facilities that have already been accounted for as startup or recurring expenses. The same is for the power bill. However, if project specific
equipment takes a lot of power that increases the power bill, that is a project related expense. Similarly full time employed staff is a recurring expense as they remain employed even after the project ends.

Per unit expenses are those related to the costs of materials for, distributing, and recovering the price paid for our product. If a machine we own and operate is more expensive to run when it is stamping out parts for our product than it is when sitting idle, then the incremental increase in operating expense is added to the unit cost.

Examples of per unit expense is the price paid for material going into the unit, the price of packaging and shipping each unit, taxes or tariffs paid per unit. If we have a contract with an order fulfillment company we may expect that to have two components, one being a recurring expense and the other being a per unit expense. In general it may be that our per unit expenses change at certain thresholds of volume. Typically the price of materials and order fulfillment per unit drops when volume is very high. This typically happens because your vendor is amortizing startup expenses into unit expenses. Though this increment per unit expense drops with volume, the total expense will rise with more volume of course, though it will rise more slowly. This is called the economy of scale.

Projected Cash Flows

Expense Table

Start by picking a period of time to work with. Perhaps a quarter. Sometimes it is useful to have smaller units of time for near future projections, and larger units of time for longer term projections. Perhaps starting with months, then shifting to quarters, then to years.

For each time period multiply unit costs by projected number of units sold as derived from your marketing research and strategy. I mention marketing strategy as that is the part that gives revenues a time axis.

Then make a table. For each category of expense, and for each time period when the expense must be paid, sum the expenses for that time period. Lets call this the expenses table.
You can also derive a costs table by subtracting out company assets from the expenses. The company may be able debt finance against assets, but these costs must come from venture financing. Venture financing is typically much more costly than debt financing. I estimate venture financing to be equivalent to roughly 26% interest. However, though the equivalent interest rate may be lower with debt financing the bank may rudely liquidate collateral if payments are late.
Here is a hypothetical expenses table:

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There are rows for each category of expense. The row for per unit expenses is multiplied by the volume for the period. Each column is totaled out, and the result is graphed. I turned on smoothing for the graph as that makes it nicer to look at. The values in the rows would come from you expensing exercises done by the founders as they rotate through the appropriate hats.

Here we see that startup expenses are initially high, but then drop quickly. Recurring expenses slowly rise as our facilities etc. come on line. Each project becomes expensive while it ramps out, and then becomes less expensive as it is finished up. In this snapshot our initial projects are the most expensive, the ones where we are breaking into new territory for the company. However, we can expect a new round of expensive projects as the company moves from its startup to its growth phase.
Subtract Expenses/Costs from Revenues

You may recall our profit equation from the marketing chapter:

\[ \text{Profit} = \text{Revenue} - \text{Cost} \]

As we have subtracted costs rather than expenses this concept of profit has to do with how much more rich or poor the company became during the period in question. I.e. how the company as a whole changed in value.

However, this concept of profit does not tell us how the company's cash situation changes. It may be the case that expenses were much higher than costs, so even though the company made a profit in the sense of making the company richer, the cash situation could be very different. The cash situation is very important as it is cash that gives the company the ability to pay its bills, invest in new projects, pay employees, etc.

In order to see how the cash position changed during the period of time we are analyzing, we subtract expenses from revenues:

\[ \text{CashIn} = \text{Revenue} - \text{Expenses} \]

If \( \text{CashIn} \) is a negative number, then in fact cash went out during the period. Cash that goes out has to come from somewhere, perhaps cash on hand, the liquidation of company assets, or through investment activity. If the company ever reaches a point where there is not cash available to cover expenses the company may fail – even if it happens to be making a profit. In all but the most unusual circumstances a healthy company can always find a way to avoid such a situation.

In the following table I have subtracted expenses from revenues to get a picture of the cash situation.
These numbers are a bit contrived so that some trends would be visible in the diagram. Roughly months could be exchanged for years here to get and the y axis could be scaled by about 10 or more to get more typical numbers. Also the positive cash region is weak, we should do much better than this.

The blue curve is revenue into the company. It starts at zero, and in year 3, apparently, the company comes out with their product. This causes revenues to rise like a hockey stick until market saturation is reached a year and a half later. Then revenues level off, or even drop as everyone who ever wanted one of the product now has one. However, the market is sustained perhaps by newcomers to the market, follow on products, customer support contracts, patent license fees.

The orange curve is expenses. These start out high due to startup expenses, and then slowly drops and levels off as recurring expenses and projects expenses take over. We don't see bumps so there must be many overlapping projects averaging out.

(Miracle company breaks even in 3 months, 3 years would be more typical.)

"Company Can Pay Its Bills"

Positive Cash In Region

Blue - revenue
Orange - expenses
Yellow - cash in

At least $354,000 finance needed
The yellow curve is *CashIn* calculated by subtracting expenses from the revenue. It starts out negative showing that cash is flowing out of the company. As revenue kicks in the cash flow changes direction. Then at almost 4 years out the company revenues overpower expenses to the point the company can pay its own bills. This includes providing a return for investors.

Later major initiatives may cause expenses to go up again, thus requiring more investment. If the company has gone public by this time it can raise money by selling stocks on the open market. Otherwise it must acquire funding from banks, qualified individuals, or institutional investors.
Accrual vs. Cash Accounting

Do you think cash should be deducted from the company books when an expense is promised to be paid, or should it be deducted when it is actually paid? Most people answer this question saying when it is actually paid, but that neglects a legally binding promise that was made. An in fact most people don’t do it this way.

Consider your own checking account. When you write the check you have made a promise to pay, and you deduct the money from the register in the check book. However, if you go online and check your bank balance, the amount in the account is only changed when the check hits the bank. According to your own “books” you paid at the time of the promise.

When we do our accounting based on the promises made we are doing accrual accounting. When we keep accounting based on the time of actual payment, we are doing cash accounting.

It is possible to file taxes, for example, based on the numbers we get from the bank for when transactions actually occur – this is cash accounting. But it is also conventional to file taxes based on the numbers in the company books. This is accrual accounting.

Cash accounting is consistent with the numbers in the bank account, while accrual accounting is consistent with the legal binding obligations the company has created. Accrual accounting is also more technically feasible, though that is changing with increased banking automation and electronic transfers.

Most companies find that keeping obligations straight and being able to keep their books local without checking the bank on a per transaction basis is more important and convenient thing to do, so they do accrual accounting. Though the bank doesn't care if you are doing accrual accounting or not, any withdraw must still be done against an account with a positive balance at the time of the withdraw.

In any case, a company must pick one approach and use it consistently.
**Worth**

Imagine that the owners of a company decided to settle all their debts, and to rip up the floor boards and sell everything. The amount of money they would make while doing this would be the *worth* of the company.

\[ \text{Worth} = \text{Assets} - \text{Liabilities} \]

Here assets are anything we can get money for by selling them. Liability is anything we have to pay while 'settling the company's debts'. This would include costs associated with a buyout, and the difference between actual market value and the depreciated value of fixed assets.

Liabilities are usually thought of as being either short term or long term. Short term liability is money that is owed in the next accounting period while long term liabilities is money owed any time after that.

Example short term liabilities include accounts payable, taxes, loan payments, and when doing accrual accounting the uncollected amounts that remain in the company's accounts but are not on the books. Example long term liabilities are balances on loans that are due after the short term payments, and money for cleaning up sites or winding down projects.

Assets are considered to be one of two types, liquid assets and fixed assets. Liquid assets behave like cash as a normal part of operations during the next accounting period. Fixed assets are everything else.

Example liquid assets are cash, accounts receivable, inventory, and prepaid expenses due to accrual accounting. Examples of fixed assets include equipment at its depreciated value, facilities, and tax discounts on the depreciation.

Here is a graph showing the worth of a hypothetical small business:
From 1963 to 1964 this enterprise worth went down, so we say it had a loss. From 1965 to 1966 it went up, so we say it had a profit.

**The Importance of Cash**

Expenses are paid with cash. For example, return on investment is a cash payout. Though a company may have a large worth, it still cannot conduct business unless it has enough cash available when it is needed. Because of this we must account for cash flows.

\[
cash_{\text{end}} = cash_{\text{start}} + \text{revenue} + \text{financing} - \text{expenses} - \text{investments} - \text{payouts}
\]

Here \( cash_{\text{end}} \) is the cash the company holds at the end of the accounting period \( cash_{\text{start}} \) is cash the company has on hand at the start of the accounting period. \( \text{Revenue} \) is cash the company has made from selling its product. \( \text{Financing} \) is cash the company has made from others investing in the company, for example by buying stocks. \( \text{Expenses} \) is the cash outflow due to buying things. \( \text{Investments} \) is money the company made on its own investments. Don't confuse that with
financing, which is money the company received from others investing in the company. *Payouts* is money paid to the company owners typically as stock dividends.

**Standard Financial Statements**

There are three standard financial Statements:

1. Balance Sheet
2. Profit Or Loss
3. Cash Flows

The Balance Sheet statement lists assets and liabilities and gives the worth of the company at the time of reporting.

The Profit Or Loss statement explains how assets and liabilities have changed since the prior report.

The Cash Flows statement derives the total amount of cash from the total amount of cash reported on the prior statement by adding revenue and financing and subtracting expenses, investments, and payouts.

**Present Value**

Suppose you had a pear tree full of fruit ready to harvest. Furthermore suppose the tree had 200 pears each worth 1 dollar after subtracting costs for maintaining the tree, the land, taxes, the harvest, transport, marketing, etc.

Now suppose someone offers to buy the tree from you. What is a fair price? Surely it would be at least $200 as that is the value of the fruit currently on the tree. But surely it is more than this because the tree will make fruit again next year, and then the year after that etc.

A million dollars then? Probably not that much because storms, disease, or fire may damage the tree. The tree itself has a lifetime. Political unrest or the vagaries of the economy could remove the opportunity to harvest fruit, take it to market, or to find buyers. Increased prices for irrigation, fuel, and agrochemicals could lower the profit made.
So what then?

The probability that we will have success at doing something is the product of 1 minus the probabilities of all the failure mechanisms that we depend upon not happening:

\[ p_s = (1 - p_{f1})(1 - p_{f2})(1 - p_{f3}) \ldots \]

Also, if we rely on other other events actually happening we can multiply those probabilities in directly.

Suppose we list out all of the threats, assign them probabilities, multiply this through and find there is a 0.8 probability that the tree will bare fruit that nets 200 USD again. Under circumstances like this if we buy trees often in different places over a long period of time then we can expect on average to make:

\[ \text{profit expected} = \text{profit base} \times p_s \]

So in this case the expected profit for next year is $160 dollars.

We can continue to apply this method of finding profit for the future recursively for many years going forward to find what is the total expected present value of the pear tree and thus answer our question of what a fair price is for it.

<table>
<thead>
<tr>
<th>Year</th>
<th>Base Profit USD</th>
<th>( p_s )</th>
<th>Expected Profit USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>200</td>
<td>1</td>
<td>200</td>
</tr>
<tr>
<td>1981</td>
<td>200</td>
<td>( p = 0.80 )</td>
<td>160</td>
</tr>
<tr>
<td>1982</td>
<td>200</td>
<td>( p^2 = 0.64 )</td>
<td>128</td>
</tr>
<tr>
<td>1983</td>
<td>200</td>
<td>( p^3 = 0.51 )</td>
<td>102</td>
</tr>
<tr>
<td>1984</td>
<td>200</td>
<td>( p^4 = 0.41 )</td>
<td>82</td>
</tr>
<tr>
<td>1985</td>
<td>200</td>
<td>( p^5 = 0.32 )</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>758 USD</strong></td>
</tr>
</tbody>
</table>

In the table above I stopped estimating five years out due to lack of confidence in the predictions. Instead I just punt the rest, writing down $20. Note I kept \( p_s \) constant from year to year. A more sophisticated prediction might have different values year to year.
So we find that the expected present value of the pair tree is 758 USD. If the seller asks for significantly less than this amount then buying the tree is a good deal, and the buyer can expect that if he does a good job as an orchard grower, that he will make a profit. For example, if the seller offers the tree for 300 USD, the buyer could expect to make a profit of 458 USD.

Of course we can't know the future, anything could happen to this one tree, or not happen to it. With one tree we are almost guaranteed the expected value is going to be wrong one way or the other. Expected values tend to bare out in the averages, and one tree does not an average make.

Transactions are usually the most vigorous when the seller estimates the value of something lower than than the buyer estimates it.

For certain often traded items there are public markets that publish the prices paid in transactions. These prices tend to gather around one value known as the market price. Typically a seller or buyer can not expect for the transaction to vary much from the market price, though the market price may change from day to day as perceptions and estimates change.

**Share Value**

Worth divided by the number of shares outstanding for a company is one measure for the value of a share. This value would be realized should the company be bought out or liquidated. There may be some wrinkles that have to be taken into account when a company has multiple classes of shares. For example, preferred shares typically will have privileges such as being bought out first upon a liquidation event. To keep our nomenclature consistent, lets call this type of value *share worth*.

As a second measure of share value we can calculate the present value of the profit to be made from holding a share over the life time of the company. We will do this in analogy to how we calculated the present value of the pear tree profit. Lets call this the *share's earning potential*. 
So let’s take an example, suppose that the expected profit from a company is 200M USD a year. Suppose also that we feel there is 0.8 probability that next year the profit will be 200M USD again, etc. Now suppose that we expect that the company will payout 10% of the profits to investors, and that 1M shares are outstanding. Then the present value of the company profit times the percent paid out, divided by the count of shares outstanding will give us the following numbers:

<table>
<thead>
<tr>
<th>Year</th>
<th>Base Profit M USD</th>
<th>ps</th>
<th>Shares Outstanding</th>
<th>Payout % of profits</th>
<th>Expected Profit per Share USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>200</td>
<td>1</td>
<td>1M</td>
<td>10</td>
<td>20.0</td>
</tr>
<tr>
<td>2013</td>
<td>200</td>
<td>p=0.80</td>
<td>1M</td>
<td>10</td>
<td>16.0</td>
</tr>
<tr>
<td>2014</td>
<td>200</td>
<td>p^2=0.64</td>
<td>1M</td>
<td>10</td>
<td>12.8</td>
</tr>
<tr>
<td>2015</td>
<td>200</td>
<td>p^3=0.51</td>
<td>1M</td>
<td>10</td>
<td>10.2</td>
</tr>
<tr>
<td>2016</td>
<td>200</td>
<td>p^4=0.41</td>
<td>1M</td>
<td>10</td>
<td>8.2</td>
</tr>
<tr>
<td>2017</td>
<td>200</td>
<td>p^5=0.32</td>
<td>1M</td>
<td>10</td>
<td>6.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>total 75.8 USD</td>
</tr>
</tbody>
</table>

This says that the expected share value for this company is about 76 dollars.

Now it may not be reasonable to assume that the number of shares remains constant. Companies can park cash by investing in themselves, i.e. by buying shares back. This has the advantage of reducing the supply of shares and hence tending to increase their value. A company may raise more money by selling shares. This is known as share dilution. Share dilution for a startup can be extreme at phase changes, such as when moving from a seed company to an institutional venture capitalist backed A-round company, when and if such an event actually happens.

We can also take the present value of the profits of the company to say how much the company would be worth. When doing this for our example, we find the present value of profits to be 758 M USD.
Company Valuation

We have now found the value of a company with two different methods.

The first method was one based on the worth of the company according to the balance sheet at a particular time or when a special event occurs. This approach dominates at a liquidation event.

The second method was based on the earning potential for the company. It was derived using a weighted sum of expected future profits, where each term in that sum was multiplied by a diminishing probability of continued success. This approach dominates for early stage startups.

In the early stages the assets of a startup are untested. The worth found in an audit will surely be very small. This is not necessarily the case, but it is the typical one. On the other hand for any credible startup the market validation will be strong and thus the estimated present values of earnings will be very high.

There are other possibilities but these are the two primary modes of valuation.

When approving loans Banks almost exclusively use criteria of the worth valuation of a company and will contract to own assets if payments on the loan are not made. Consequently debt financing is rarely available to a startup, and may be unwise to accept even if it were. Exceptions can occur if the startup has letters of intent, contracts to deliver or some sort of accounts receivable. Exceptions can also occur if a startup qualifies for a special program.

Hence, the startup will typically be looking for equity investment from individual or institutional investors who specialize in investing in startups. Its primary tool for communicating its vision of future profits is the business plan. Writing the business plan is the subject of the next chapter.
Return on Equity Investment / Exits

The typical ways an equity investor may get a return on having bought shares in your company is by 1) selling them to another investor early on 2) selling shares after an IPO event 3) having his shares bought out during an acquisition 4) redemption of shares, for example, when a company goes private 5) dividends paid on retained earnings.

In the first case, something happens that causes an early stage investor to want out. This can be due to a personal event causing a need to raise money, due to a trigger in the share contract, or perhaps not having a board vote go in a manner he or she deems to be reasonable. In such a case another qualified investor may desire to take over the shares and buy them.

Depending on the trigger event the seller may not be in a strong position. The primary value of early shares is based on the faith that there will be strong earnings in the future, but the seller may be professing to no longer holding this belief as a reason to sell. He or she is giving testimony against the very thing that gives the shares value, so he or she will have to find someone who literally disagrees with him or her if the share price is to be maintained.

A company will typically decide to go public because it sees that the law of supply and demand as applied to its shares will be strongly in the company’s favor. In other words the company expects that the share price will go much higher. Higher share price will benefit the current share holders, so they may sell their shares to reap a return on their investment.

Sometimes a larger company will believe that a smaller company has made a good start at developing a product which they see has high potential when integrated with their own product offering. In which case the larger company may move to acquire the startup, which is done by offering to buy out the current share holders. If the owners of the privately held startup agree to sell, the share price could be much higher than original paid, though it could possibly be much lower. One would not expect to see the latter case because the very fact a company is offering to acquire the startup indicates that someone important sees the product has earning potential.
Usually a venture capitalist wants a company to IPO so that they can reap a short term profit from the investment in the startup. However, if the board opts to instead keep the company private, it may trigger a contract clause that requires the startup to buy the venture capitalist's shares, i.e. to *redeem* their shares. This can also happen when later funding rounds buy out prior rounds. Though in this case it may be the case that the earlier investors want to *participate* in the new round.

Many companies will regularly take some faction of their profits, divide by the number of shares, and then send payouts per share. This payout is known as a *dividend*. Among all the strategies mentioned above this is the only one that is not an exit. This is because after dividends are paid the share holder still owns the shares, and he, she, or the holding entity, can hope to see dividends again in the next accounting period.

Of course these strategies are for equity investors. Entities or people who invested by giving out loans or buying other financial instruments will be repaid according to the contract on the paper they hold.
The Business Plan

Purpose

Your business plan will be the primary vehicle for describing the company to potential investors, the board of directors, and to the executive team. It will roughly parallel the chapters of this book in the chapters of the plan:

1. executive summary
2. value proposition
3. marketing strategy
4. operations and expenses
5. proforma financial statements
6. finance model

The business plan may be a living document that evolves as the team learns more and the company adapts to the realities of the market place.

Incarnations

The business plan takes roughly four different incarnations depending on the context. In the simplest form you take 10 to 20 seconds and get right to the point while telling someone what the company is about and why he or she should be interested. This is known as the 'elevator speech'.

In a longer form of the elevator speech the business plan may be presented in a 20 minute, or surely no more than 40 minute, presentation. When giving such a presentation be sure that questions do not cause you to run out of time. One method of doing this is to leave

Philosophers Rock, Zilker Park, Austin Texas
long questions until the end or to ask for contact information and to take them off line. The presentation may use as the top level of the outline the points given above.

The executive summary is roughly the written form of your presentation. It is six paragraphs to three pages in length. Both this and the presentation are probably written after the full document form of the business plan has been written.

In full document form the business plan is of appropriate length to convey the information in the outline in sufficient detail that a person who is diligent about checking the work will have everything he or she needs. Such a person may be an investor, a person working for an investor, or even someone on your executive team.

The full document form of the business plan will probably not be read if the executive summary of the presentation did not strike a chord with the listener.

**As a Vehicle for Communicating with Investors**

The business plan will have the executive summary at the front. This summary may start with a variation of the elevator speech in order to draw attention.

The plan in general will convey the look and feel of the company. The investor will read the plan while trying to 'get it', and to see if they can 'see the story'.

Investors typically work in specific areas and will have a portfolio of investments. They will want to know if the company is in their area of expertise and if it would fit well with their portfolio and investment objectives.

If the plan passes these hurdles the investor may share it with potential mentors and staff who may perform *due diligence*. During due diligence they will check the research and the numbers. They may attempt to reproduce some of your survey results and in general try to see if they agree with the product feasibility study. They will look at the team and see if their skills and experience cover all the basis needed,
including marketing and finance in addition to product development. They will go through the costing/expense analysis and see if they agree that the funding request will be sufficient.

The result of due diligence may cause the investor to make a suggestion, such as sending the team to an incubator, asking them to work with a mentor, or sometimes in proposing team members. Sometimes investors do not like to take a project in whole, so they will want to meet others who are interested in the plan, or for you to shop it further to see if it picks up more interest.

As a Root of the Department Charters

Sometimes for startups there will be an initial business plan proposed by the primary founder or founders. The executive team will then refine the plan to create a working document for founding the company. Each part of this document is then the founding charter for each executive's purview.

Accordingly the market research section sets the basis for further market research work, aligns targets for marketing communication, and sets minimum sales goals. The marketing strategy outlined is the plan for execution for the marketing department. The product features set the requirements for the product development group. The market
validation revenue and the costing analysis tells financial officer what to expect and plan for. The CEO will be working to co-ordinate these activities, working to make sure major customers are in line for the product to be accepted, and working to see that interested investors get an opportunity to step up and cover financing needs.

**Sections**

**Business Concept / Executive Summary**

Can you explain what your business is and why it is fantastic in just a few sentences? If so that should be the first paragraph of the executive summary. The remainder of the executive summary goes through the outline of the business plan while giving a bit of explanation and the conclusions for each section.

“Corner bumpers attach to table corners rendering them safe from head bumps by little children. Every year in the United States 3 million children require stitches from cuts obtained by running into tables. Ten percent of demographic of day time shoppers at Crib, Bed and Beyond would pay 20 USD for a set of such bumpers, representing 10 million strong buy stories. They cost 25 cents to produce under contract and can be sold for 5 USD wholesale. We have a standing contract with Crib, Bed, and Beyond to place bumpers on their shelves, and start up expenses are 500,000 USD.”

Something like that might be a good opening. The product, market, business model, and opportunity are all well defined. After reading that paragraph, I have a few thoughts. My first one is to question if I have an interest in this sort of product. Personally I might be more excited if the bumpers were some sort of high tech material with more applications. The second thought I wonder about is if this is going to be a one off production run or there is a method to sustain the market. Because of this question I will keep reading the summary. The third thought I have is that the deal is kind of small. It isn't really in the venture realm, unless this opportunity turns over every few months, but this is just a restatement of the prior question.
Value Proposition

A conventional value proposition section will start with a short history that leads up to a situation. For example, something like, “Advances in communications, logistics, management science, and transportation and manufacturing techniques have increased the pace of business. This has lead to worldwide increase in lawsuits.” This situation may be justified against some library research and be accompanied by some statistics.

Then we introduce the problem within this situation that has given our customers some strong needs. “Companies have difficulty monitoring the progress of outsourced legal work, senior attorneys have difficulty keeping track of the work of juniors, lawyers are faced with difficulties in collaborating time zones, borders, and language barriers. The complexity of modern cases is becoming unwieldy.” Hopefully such statements come directly from or are derived from our marketing survey work. We then show results from that work and may quote some of the more interesting interviews.

Then we present our solution. The above example quotes come from the Reasoning Technology Ltd. business plan value proposition. The solution that is described in that same plan is a sophisticated new type of enterprise software that has features for managing the problems described. There are screen shots and other graphics.

Marketing Strategy

This is where you describe your business model, how the product is to be positioned, and how that position is to be defended. In the Reasoning Technology plan the proposed business model and positioning is one of enterprise software sold to large entities for a license fee. The company also sells training and consulting.

This section should also discuss competitors and the method to be used for besting those competitors including marketing communications campaigns, branding, and patents. It should answer the question of projected price and how the market will be sustained. It should present the projected revenue graphs/
Operations and Expenses

This section describes the team, the company organization, and the outsourcing services that are to be used. It discusses how the product is to be manufactured, gotten to the customer, and how the purchase price is to make it back to the company. It presents expenses and costs while associating those with departments and projects. It provides a timeline of significant events.

When describing team members we typically like to know the person's experience, longevity with the project, and the hats they will wear. I like seeing something about the initiative the person has shown in regards to the project. Examples would be in taking steps as a founder, giving up other opportunities, or in investing his or her own money.

When working out expenses and costs, it is good to see general categories, with the more specific data in an appendix or available for request. It is also good to hear about other companies that are analogous in same fashion and how much funding they went through.

Proforma Financial Statements

These are estimated projections of what the financial sheets are going to look like to get the company to the next stage of its maturity. It is traditional to do five year projections. This seems to be long enough to get the idea of where the company is going, and short enough that the estimates could conceivably have some accuracy. I would probably expect to see a break out by quarter for two years or three years.

Risks should be discussed. Is there an unusual resources required? If so what happens if it goes up in price, it is delivered late, or not delivered at all. Are there sensitivities in the financial sheets. What happens if all the project funding does not materialize. Are there key skill sets in your team, what happens if you have to go buy those. What happens if product development takes twice as long as expected. What if your marketing projections are off, a new competitor arrives, or the economy shifts?

Present the valuation of the company in this section. It is probably best to present the valuation as both the present value of earnings and as total value of assets at a given date.
Finance Model

This section should describe who is bringing the business plan forward including a description of the major stockholders and a list of who is on the board of directors. If there is a separate advisory board, those people should be listed also.

This section should describe the legal structure and give the name of the accounting firm. The operations section already listed the executive staff, though the CEO may be mentioned again here.

This section should describe the model by which the company intends to raise the required financing. Is it through individuals, institutional venture finance, joint development with customers, debt financing, or a combination?

This section should describe how the investors will get a return on their investments. It should answer the question of what happens to investors in the next funding round, if the company is bought out, or if it is liquidated.

Chances are if you are writing the business plan you are one of the investors, so it shouldn't be too hard to put yourself in their place and answer the questions you would like the answers to.

----- end of the book High Tech Startup Fundamentals -----