Changing the World: Entrepreneurship:
How Innovation and Entrepreneurship Changes the World
-Jack M. Wilson

Chapter 12 Developing your Product or Service

Start with the Customer

Steve Jobs seemed to have conflicting points of view when he said "*You've got to start with the customer experience and work back toward the technology - not the other way around*," and then suggested that "*A lot of times, people don't know what they want until you show it to them*." Jobs, who was the Cofounder of Apple, NeXT, and Pixar and the visionary developer of the iPod, iPhone, iPad, iTunes, Macintosh, Apple II, and other new products, had a relentless focus on the customer experience, but he did not let current fashions dictate his new products. Instead he tried to look ahead and discover what customers truly wanted, even if they did not know they might be able to have it one day. In a time of rapidly changing technology, products that could barely be imagined in one year, became readily created in the next.

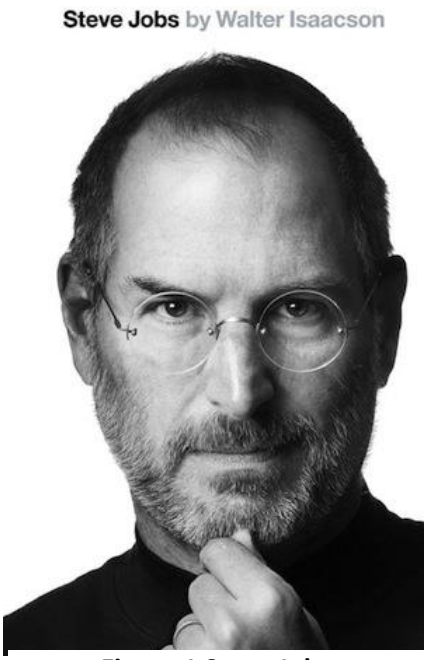

Figure 1 Steve Jobs by Walter Isaacson

He also had a superb confidence in his own instincts. He told a group of graduates in his Stanford Commencement Address "*Don't let the noise of other's opinions drown out your own inner voice. And most importantly, have the courage to follow your heart and intuition. They somehow already know what you truly want to become. Everything else is secondary*.[1]"

A more complete version of the Job's quote is "*This is what customers pay us for—to sweat all these details so it's easy and pleasant for them to use our computers. We're supposed to be really good at this. That doesn't mean we don't listen to customers, but it's hard for them to tell you what they want when they've never seen anything remotely like it. Take desktop video editing. I never got one request from someone who wanted to edit movies on his computer. Yet now that people see it, they say, 'Oh my God, that's great!'*[2]"

Developing new products and services requires a strong focus on the customer, but it also requires an ability to see where technology is going and to get there first and/or better. As

[1] http://archive.fortune.com/magazines/fortune/fortune_archive/2000/01/24/272277/index.htm
[2] http://www.simonandschuster.com/books/Steve-Jobs/Walter-Isaacson/9781501127625

the great former hockey plyer Wayne Gretsky loved to say "*Skate to where the puck is going, not where it has been"*. This has been so overused that it has become a trite business saying. It remains insightful, however.

The Ten Times Rule – 10x rule

If your solution is ten times better at meeting the customer's needs than current products, then you have a very good chance to succeed.

- Email is 10x better than snail mail
- Wikipedia is 10x better than encyclopedias
- Amazon.com has 10x times the books than the world's largest book star.
- Apple iPod has ten times the songs of a Sony Walkman
- Google is 10x better than competitors
- Facebook got 10x number of members as MySpace

The *ten times rule* is very closely related to Schumpeter's theory of **creative destruction** that we have introduced earlier. Creative destruction occurs when a new technology or a new product comes out that is so clearly better than former technologies or products that it quickly displaces the old product. This certainly occurred when CDs were introduced to replace the old vinyl records. The CDs had much better audio quality, were far more durable, and were much cheaper to manufacture and distribute. It was the end for vinyl records –except for those collectors who love the nostalgia and imperfections of the older technologies. But, those that live by creative destruction, die by creative destruction, and CDs faced their own ten times better product when digital music began to be distributed over the internet –first for free (and illegally) from Napster and then for 99 cents from the Apple iTunes store. Today digital distribution of music dwarfs CD sales and the entire business model of the music industry has been upended.

It is not surprising that venture capitalists would favor finding ten times solutions and write about them as if they are the ultimate prize. Indeed they are, but they are also not the only way to bring new products to markets and we have explored and will explore some of the other paths to markets. If you can find a ten times solution, then, by all means, go for it! Finding investors will be much easier. As Wise and Feld assert: "*Having an idea that someone will pay for is a nice start, but the way to make it that everyone will pay for it is to focus on the 10x rule*." Well yeah, but!

We have already seen one of the most important paths to market comes through disruptive innovation as defined by Clayton Christensen. "*Disruptive innovation, a term of art coined by Clayton Christensen, describes a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors*.[3]" These are NOT ten times better solutions.

[3] http://www.claytonchristensen.com/key-concepts/

Focusing on ONLY ten times better solutions is limiting for new ventures and is deadly for innovators and intrapreneurs in established ventures. We have seen countless companies that have been bankrupted or severely cut down to size by having a blind spot to the simple solution which looks like it could never compete with the established companies. In the 1980s Digital, Wang, Prime, and other computer manufacturers never saw that the PC would finish them off. More recently, Kodak and Polaroid did not take digital photography seriously enough. Xerox felt that their domination of market share would protect them from what were (at first) lower quality competitors. They were all wrong, and now others dominate their old markets.

All this is to say that the 10x rule is a nice to have, but not a need to have. From an investor's perspective, it might be preferable to invest in the 10x solutions that will win by creative destruction, but a sole focus on that would cause the innovator to miss a lot of interesting action.

Remember the Two Key Concepts in Innovation

Creative Destruction: Joseph Schumpeter –Harvard University economist from Austria. Creative Destruction – 1934- new products and technologies make old products and technologies obsolete

Disruptive Innovation[4]: Clayton Christensen[5] –Harvard University Management Professor- 1997 – New products begin in new, unexplored markets but grow in quality and capability to displace older markets. Mini-computers disrupted mainframes and were in turn disrupted by PC's. Steel mini-mills created poor quality steel at low prices to take the least profitable part of the steel market. They then grew to displace the old-line steel companies.[6]

I cannot over-emphasize how important these two topics are in understanding entrepreneurship. Creative destruction and disruptive innovation are indeed closely related, disruptive innovation is a very special case when a company enters into a very low end of a market at a place where the dominant players are not so interested because it is not profitable or not able to satisfy their largest customers. But, the company doing the disruption gets a foothold in the market, establishes itself, and then learns how to do the things it needs to do to enter the more profitable and sophisticated portions of the market.

Often the established companies never see it coming.

Innovation is what makes enterprises sustainable. In the immortal words of Andy Grove, the former Intel Corporation CEO, "***Only the Paranoid survive!***"

---

[4] http://www.claytonchristensen.com/key-concepts/
[5] http://en.wikipedia.org/wiki/Clayton_M._Christensen
[6] http://en.wikipedia.org/wiki/Disruptive_innovation

Netflix and Blockbuster provide a great example of creative destruction. Blockbuster, and other vendors, would rent video tapes to homeowners who would need to return them or incur a late fee. Videotapes were later replaced with DVD's, but the model of rental remained the same. Then Netflix introduced a business model in which DVD's were mailed to subscribers and there were no late fees. Viewers no longer had to go to a store to get the disc and were not worried about late fees. This was a major improvement over the Blockbuster model. The result was that Blockbuster eventually went bankrupt.

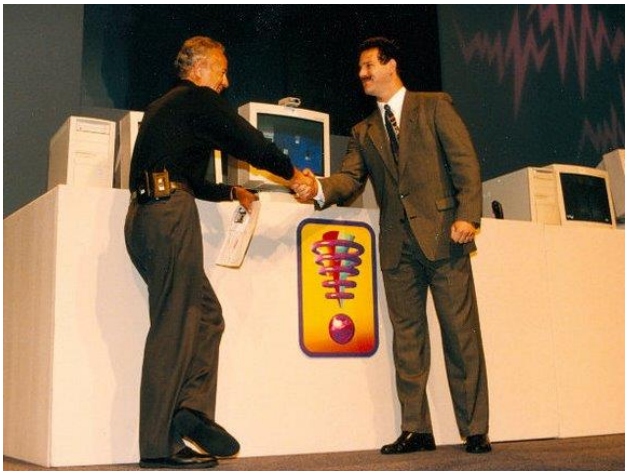

Figure 2 Andy Grove, then Intel CEO, and Mark Bernstein, ILinc co-founder, present the ILinc software at a conference (photo- J. Wilson)

But the story was not yet finished, because digital delivery of video then began to displace mailing video discs to consumers and video was delivered over the network directly to the viewer –just in time! Netflix managed to get through this change in business models –at least to this point. That is somewhat rare for a company to manage the transition to a new business model once they are well established in the old model. It is very difficult. As they say: no railroad ever became an airline. The Netflix Case is an interesting study in creative destruction and then avoidance of creative destruction.[7]

Figure 3 -Blockbuster store closing
(wikimedia creative commons license)

[7] http://www.jackmwilson.net/Entrepreneurship/Cases/Case-NetFlix.pdf

There is an enormous literature around the development of new products. One of the most popular models is called the stage gate development model.

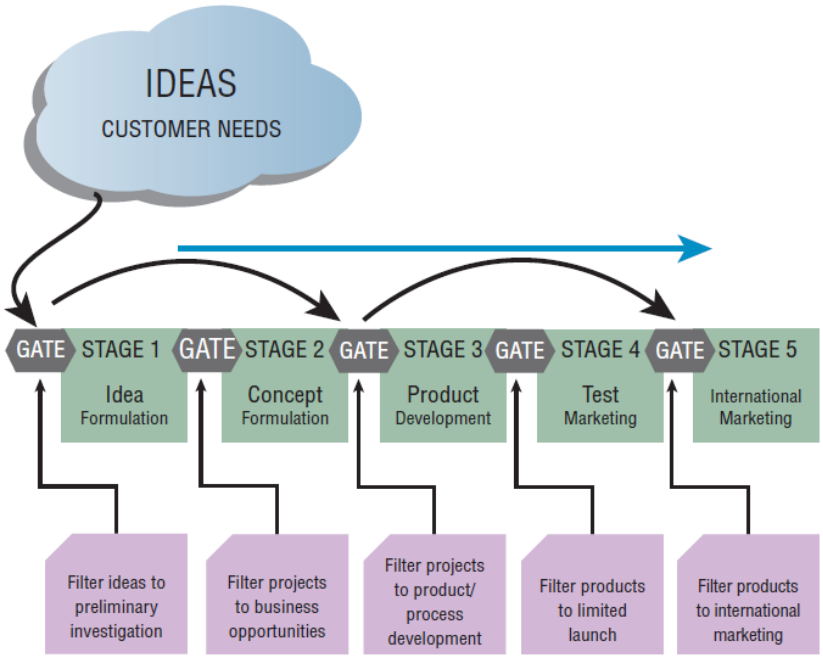

FIGURE 11.1 Stage-gate product development process

Sources: Derived from Cooper, R., *Winning at New Products: Accelerating the Process from Idea to Launch*, 2001, Cambridge, MA: Perseus Books; Doing it right: Winning with new products, 2000, Ivey *Business Journal,* 64(6), 1–7.

Figure 4 Stage Gate Product Development

In the stage gate model, one starts with an idea to meet customer needs and then proceeds through five stages with gates to each. These five stages and their gates are:

1. Idea formulation –the gate is to filter ideas for preliminary investigation
2. Concept formulation –the gate is to filter the ideas as business opportunities.
3. Product Development – the gate is product/process development
4. Test marketing –gated by filtering to a limited launch group
5. International marketing –filter products for international marketing.

Another approach is called the Development Funnel:

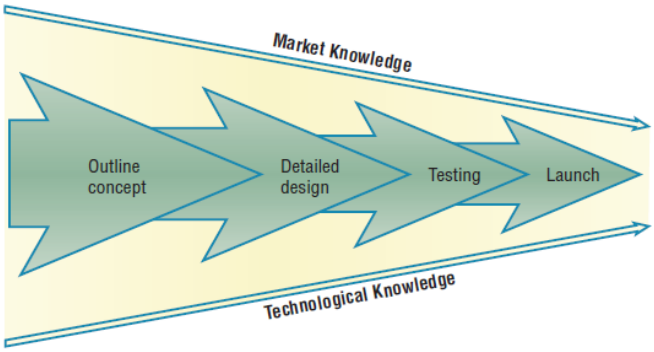

FIGURE 11.2 Product development funnel

Source: Derived from Wheelwright, S. C. and K. B. Clark (1992) *Revolutionizing Product Development*, New York: Free Press.

Figure 5 The Development Funnel

The funnel uses market knowledge and technological knowledge to narrow a concept into a launchable product or service.

Diffusion of Innovations

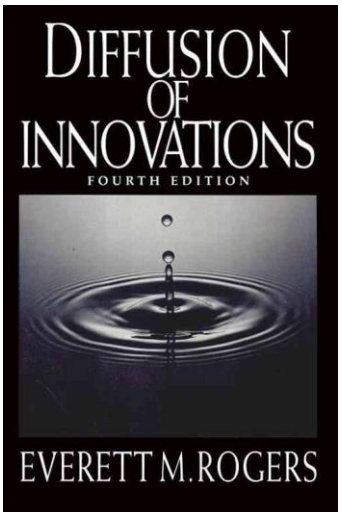

Figure 6

Diffusion is the means by which innovations are translated into social and economic benefits.

We know that the impact of the use of innovations is around four times that of their generation

However, the benefits of innovations can take 10–15 years to be fully effected, and in practice most innovations fail to be adopted widely, and so have limited social or economic impact.

Rogers' definition of diffusion is used widely:
"*the process by which an innovation is communicated through certain channels over time among members of a social system. It is a special type of communication, in that the messages are concerned with new ideas*[8]*"*

Rogers suggests that there are three types of innovation decision making:

- *Individual*, in which the individual is the main decision-maker, independent of peers. Decisions may still be influenced by social norms and interpersonal relationships, but the individual makes the ultimate choice. For example, the purchase of a consumer durable such as a mobile phone.

[8] "Diffusions of Innovations;" Everett Rogers; Simon & Schuster; (1962).

- *Collective*, where choices are made jointly with others in the social system, and there is significant peer pressure or formal requirement to conform. For example, the sorting and recycling of domestic waste.
- *Authoritative*, where decisions to adopt are taken by a few individuals within a social system, owing to their power, status or expertise (e.g. adoption of ERP systems by businesses, or MRI systems by hospitals).

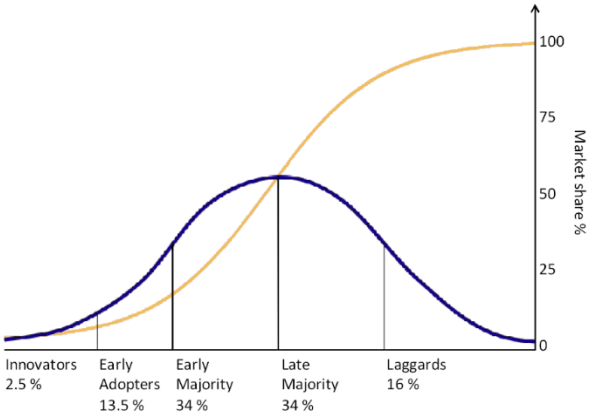

Figure 7

By Tungsten – (self-made based on Rogers, E. (1962) Diffusion of innovations. Free Press, London, NY, USA., Public Domain, https://commons.wikimedia.org/w/index.php?curid=8043923)

Rogers shows that innovations proceed through adoption by various groups at different times and that saturation of the market is achieved after even the slowest groups have adapted the product, service, or technology. The process leads to an s-curve of saturation.

This process starts with a small group of innovators and then moves toward the early adopters. Getting into the early majority is a big step, and then the late majority and laggards come along in due course.

Crossing the chasm: some jargon

The process begins with the innovators and then moves into the early market characterized by the early adopters or visionaries.

The Chasm is in getting from the early adopters to the early majority or the pragmatists.

Once into the early majority one enters a large part of the market knocking down customers like bowling pins.

The adoption may then become a tornado sweeping everything in its path as it heads into the conservatives or late majority.

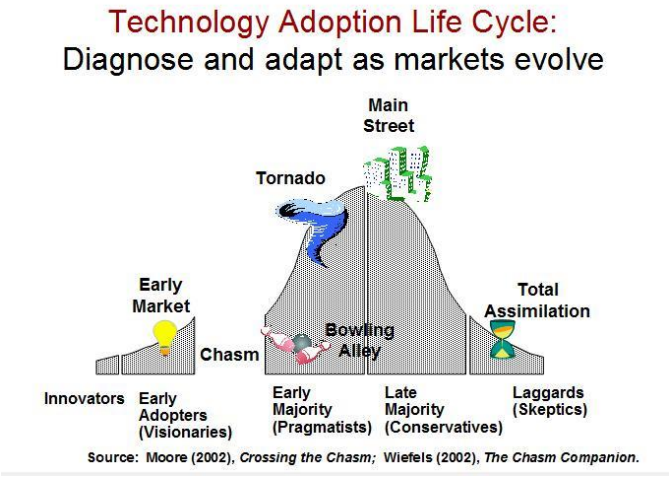

Figure 8 Technology Adoption Life Cycle

Now we are on Main Street. We made it! There is total assimilation, and the product is now old news!

Barriers to Adoption

It is not easy or fast to get new technologies products adopted into the market place. There are usually some barriers that must be overcome, and it may take good strategies to overcome those barriers.

Economic barriers are often the most difficult to overcome. For some adoptions, particularly when environmental issues are involved, there may be personal costs versus social benefits. A lack of access to information about costs and benefits can also hamper adoption. For many new products there may be insufficient incentives to make the change.

Behavioral barriers may be even more difficult to overcome. We discussed the sources of irrational behavior as elucidated by the behavior economists, three of who have won the Nobel Prize for their work. We cannot assume that people will make rational choices in making decisions, and we need to understand and address the sources of bias. Characteristics such as personal priorities, motivations, rationality, inertia, and propensity for change or risk, may slow adoption.

Organizational barriers are often substantial. Organizations have goals, routines, power and influence, culture and stakeholders all of whom may oppose change.

Structural barriers may be the hardest to remove. Things like infrastructure, sunk costs, and governance, can hinder change. Elon Musk realized that there were structural barriers to adoption of electric cars. Our highway infrastructure is built to service gasoline cars. He realized that he had to build out an infrastructure of charging stations to have any chance for widespread adoption beyond the innovators and early adopters.

Research on diffusion of innovation has shown that there are five key issues to address to overcome the barriers. In predicting the rate of adoption of an innovation, five factors explain 49–87% of the variance[9]:

[9] Rogers EM, Singhal A: Diffusion of Innovations (5th ed). In An Integrated Approach to Communication Theory and Research. Fifth edition. Edited by Salwen M, Stacks D. Mahwah: NJ:LEA; 2003: 409–419

1. **Relative advantage**: This is related to the 10x rule. Relative advantage is the degree to which an innovation is perceived as better than the product it supersedes or competing products. Typically, it can be measured in narrow economic terms, for example cost or financial payback. In the example of the Mass Green High-Performance Computing Center we were confident that Harvard would join our group since the payback time for their investment was calculate as about one year. Today, because of this economic advantage, they are the largest user of the facility.

2. **Non-economic factors** such as convenience, satisfaction and social prestige may be equally important.

3. **Compatibility**: How compatible is the innovation to existing systems?

4. **Complexity**: How complex is it to implement?

5. **Trialability**: this refers to the degree to which an innovation can be experimented with on a limited basis. An innovation that is trialable represents less uncertainty to potential adopters, and allows learning by doing. Innovations which can be pust to the test easily will generally be adopted more quickly than those which cannot. Trialability lessens the risk of deployment since you can "try it before you buy it." Sometimes this is called 'divisibility' – how far can the risk of adoption be broken down into small steps rather than requiring a full commitment at the outset.

6. **Observability**: This is the degree to which the results of an innovation are visible to others. The easier it is for others to see the benefits of an innovation, the more likely it will be adopted. The simple epidemic model of diffusion assumes that innovations spread as potential adopters come into contact with existing users of an innovation.

Rate of Technology Adoption

Considerable research indicates that the rate of technology adoption is much faster today than it was decades ago. As Rita Gunther McGrath, a Professor at Columbia Business School, suggests: "*Many people suggest that rates of new product introduction and adoption are speeding up, but is it really, across the board? The answer seems to be yes. An automobile industry trade consultant, for instance, observes that "Today, a typical automotive design cycle is approximately 24 to 36 months, which is much faster than the 60-month life cycle from five years ago*.[10]" Michael Felton, in the New York Times plotted the rate of acceptance of various technologies from the telephone to the internet. The telephone took several decades to reach a penetration of 50% of the US market but the cell phone only took a few years.

[10] https://hbr.org/2013/11/the-pace-of-technology-adoption-is-speeding-up

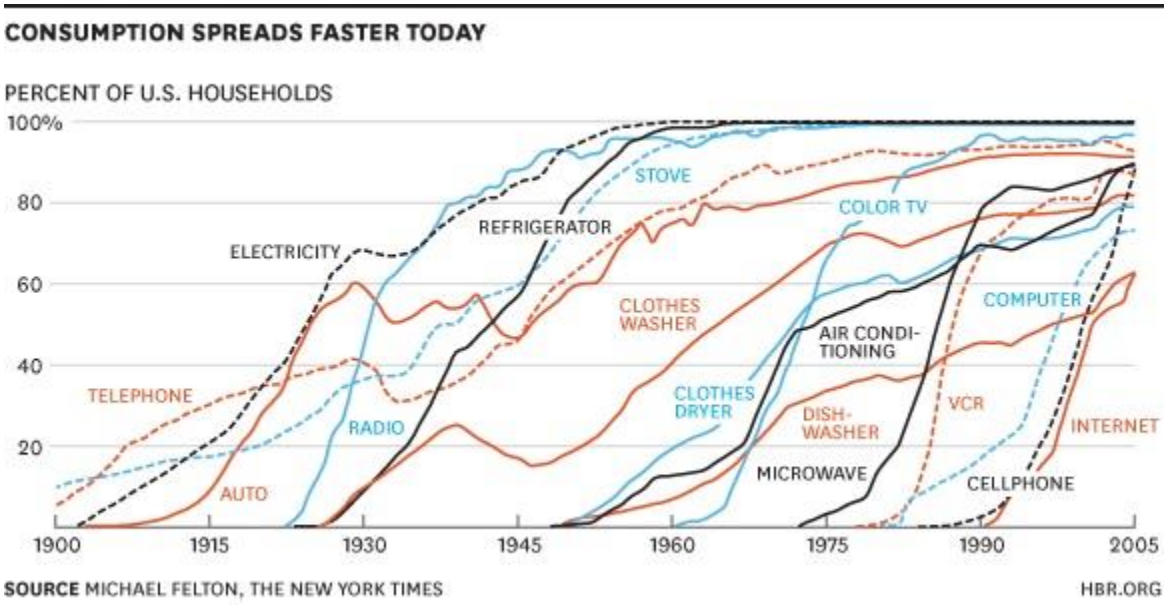

Figure 9 Technology Adoption Rates

This increased rate of adoption has a number of implications for the new venture. The good news is that your new product may be adopted quickly. The bad news is that if you do not move quickly, others may get to the market before you do!

It is also important to consider that all of these technologies that are being shown on this graph relate to electronic advances. For new ventures in the bio-technology areas, the barrier to entry remain very high and the time to market remains very long.

Things you need to be ready to discuss with an investor to show that you are ready to address these issues.

- **Intellectual property**: Do you have a method for protecting an investment in this new product, service, or innovation? We will discuss patents, copyrights, trademarks and trade secrets in the next chapter as a way to protect your intellectual property.
- **Key Asset Access**: what key assets do you have, including intellectual property, that would make it difficult for others to imitate your innovation. Today many companies are dependent upon things like Facebook, Amazon Web Service –the Cloud, or IBM Watson. Losing access to those things would be a challenge.
- **Proof of concept** –Selling the product in advance is one way to validate the customer market, demonstrate proof of concept, and raise funding for an expansion of the product development. In software this is often called selling "**vaporware**." In our discussion of the ILinc new venture case, we saw that Success magazine described the way the ILinc took orders for future development of software as the

"Wimpy Model," named after the Popeye character who loved to say "I'll gladly pay you Tuesday for a hamburger today.[11]"

- **Scalability**: How do you plan to scale your venture up after you have found your business model using the customer development process? My partner, Mark Bernstein, told his father, a dentist that a dentist could only treat so many patients per day, but that selling software had no limit as to how much he could sell (or make) in a day. Variable costs versus fixed costs: Variable costs do not help in scaling. The amount of steel in every similar car is the same, thus the cost of steel is a variable cost. The cost of the machine used to stamp fenders out of steel is a fixed cost. Stamping more fenders does not raise that machine cost, but the electricity to operate the machine is a variable cost. Fixed costs do not go up with more sales. A machine that stamps steel fenders does not cost any more to stamp 100 per day as it does to stamp one.

There are also some financial terms that you need to be ready for:

- **Gross margins**. How much do you make on each sale after deducting expenses.
- **ARPU**: This is an acronym for Average Revenue per User. Is this a single sale, or do you keep the customer for future sales and how much revenue do you expect per user.
- **COGS**- Cost of Goods Sold
- **CoCA**- Cost of customer acquisition (also CCA). The CoCa is very important. If that is more than the average revenue per user, then there is no hope. This is why customer retention and multiple sales is important. If each sale is a one-time event, then it is difficult to gain sufficient revenue. As discussed earlier, this is why drugs for chronic diseases are more profitable than one time vaccines.

Checklists for elements of adoption[12]

Checklist for **Relative Advantage**

- How well does my plan show how much better off people will be when they adopt it?
- Why is this plan better than what has been done before?
- What advantages or benefits may there be to accepting the plan?
- Who will gain from the implementation of the plan?
- How will I (or others) be rewarded by adopting the plan?
- How can I emphasize the plan's benefits to all?

Checklist for **Compatibility**

- How well does my plan demonstrate that it is compatible with current values, past experiences and needs?
- Is the plan consistent with current practice?

---

[11] http://www.jackmwilson.net/ILinc-TheFullStory.pdf

[12] Innovation & Entrepreneurship 3e by Bessant & Tidd; John Wiley and Sons (2015).

- Does the plan meet the needs of a particular group?
- Does it offer better ways to reach our common goals?
- Who will naturally support and agree with the plan?
- Can it be favorably named, packaged or presented?

Checklist for **Trialability**

- How well does my plan allow for trialability?
- Can the plan be tried out or tested?
- Can uncertainty be reduced?
- Can we begin with a few parts of the plan?
- How can others be encouraged to try out the plan?
- Can the plan be modified by you or others?

Checklist for **Complexity**

- How well does my plan provide for easy communication, comprehension and use?
- Is the plan easy for others to understand?
- Can it be explained clearly to many different people?
- Will the plan be easily communicated?
- How can the plan be made more simple or easy to understand?
- Is the plan easy to use or follow?

Checklist for **Observability** (Visibility)

- How well does my plan provide results that are easily observed and visible to others?
- Is the plan easy for others to find or obtain?
- Can the plan be made more visible to others?
- How can I make the plan easier for others to see?
- Will others be able to see the effects of the plan?
- Are there good reasons for not making the entire plan visible?

Viral marketing is a derivative of this issue that is a critical way of bringing your new product to the public's attention.

What other factors do we need to pay attention to?

- What other resources will I need; how can I get them?
- What obstacles exist; how can we prevent or overcome them?
- What new challenges will be created; and dealt with?
- How can I encourage commitment to the plan?
- What feedback about the plan is needed?