

3. Recognizing Opportunities and Generating Ideas.

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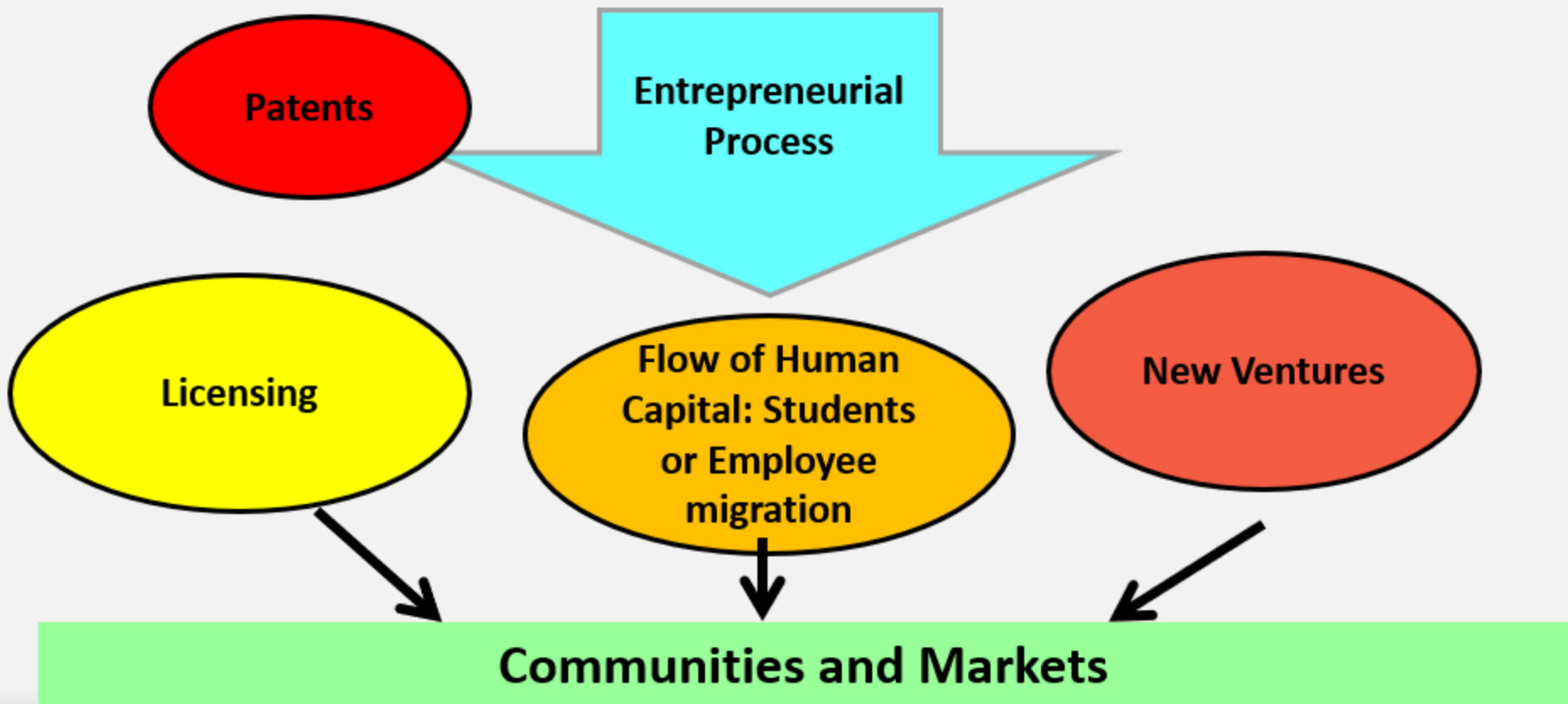


Where do opportunities start

- Technological opportunities almost always start with breakthroughs in new technologies. Those breakthroughs can come from:
 - University research labs
 - Industry research labs like Bell Labs, Google Labs, IBM Labs, General Electric Labs, Phillips Research Labs,
 - Industrial laboratories are generally seen as sources of incremental innovation rather than radical innovation.
 - <http://www.jstor.org/discover/10.2307/1828511?uid=3739696&uid=2129&uid=2&uid=70&uid=4&uid=3739256&sid=21104913961097>
 - Over the last three decades, the center of gravity of research has shifted further toward universities and away from industrial laboratories.
 - The biotech industry has been an exception –particularly in the applied research areas.
 - Government research laboratories like FermiLab, Argonne National Laboratories, Sandia, National Institutes of Health, National Institute of Standards and Technology, and others.
- To get to market they need to either be licensed to existing organizations or used to develop new ventures.
- Students who graduate and then go into existing organizations also carry the intellectual property with them into their new positions. This is an important flow of ideas into the marketplace or community.

From Idea to Market or Community Use

Idea Generators: University Research, Corporate Innovation, Individual Invention, Government Labs, Social Innovation, Intellectual Capital



The virtuous value chain

- Research
- Applied Research and Development
- Licensing to new or established ventures

- New venture
- Business plan, Business Model
- Elevator speech or pitch
- Customer Discovery
- Early stage funding from bootstrapping, friends and families, angels, loans, or other sources such as the Small Business Innovation Research (SBIR) program.
 - <http://sbir.nih.gov/>
- Establish company structure (Corporate, partnership, LLC, sole proprietorship, etc)
- Prototyping the product or service
- Middle stage financing from venture capitalists or others
- Growth of new company
- Exit strategy
 - Acquisition
 - IPO –Initial Purchase Offer for stock
 - Remain a private business

- Licensing to established ventures
- New Product Development process.

Crossing the chasm

Crossing the Chasm is closely related to the [technology adoption lifecycle](#) where five main segments are recognized: innovators, early adopters, early majority, late majority and laggards.

According to Geoffrey Moore, the marketer should focus on one group of customers at a time, using each group as a base for marketing to the next group. The most difficult step is making the transition between visionaries (early adopters) and pragmatists (early majority). This is the chasm that he refers to. If a successful firm can create a bandwagon effect in which enough momentum builds, then the product becomes a de facto standard.

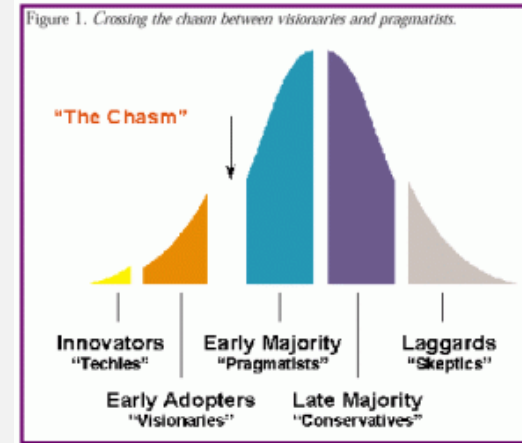
However, Moore's theories are only applicable for disruptive or discontinuous innovations. Adoption of continuous innovations (that do not force a significant change of behavior by the customer) are still best described by the original technology adoption lifecycle. Confusion between continuous and discontinuous innovation is a leading cause of failure for high tech products –

- http://en.wikipedia.org/wiki/Crossing_the_Chasm

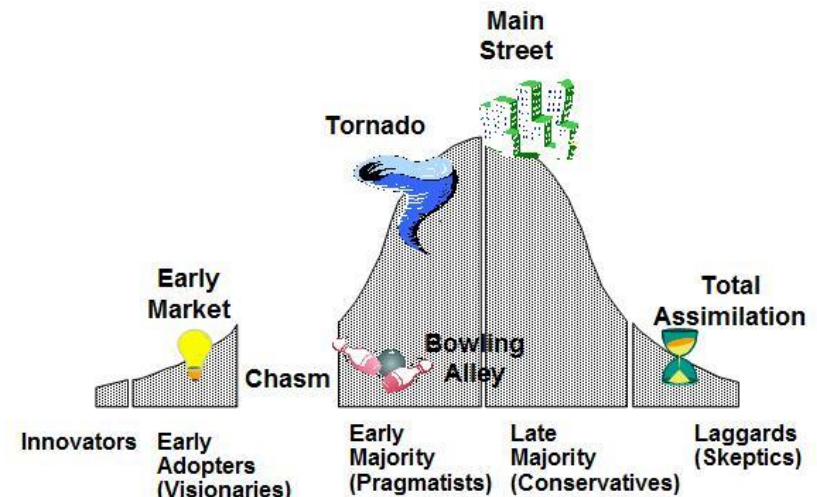
Innovators-> early adopters-(the chasm)-> early majority-> late majority -> laggards

Crossing the chasm: some jargon

- Early market – the early adopters
- Chasm – getting from the early adopters to the early majority.
- Bowling Alley – once established in the early majority
- Tornado – as the innovation moves from early majority to late majority it becomes a tornado of adoption.
- Main Street – we made it!
- Total Assimilation
Now it is old news!



Technology Adoption Life Cycle:
Diagnose and adapt as markets evolve



Source: Moore (2002), *Crossing the Chasm*; Wiefels (2002), *The Chasm Companion*.

Two Key Concepts

- Joseph Schumpeter –Harvard University economist from Austria
 - **Creative Destruction** – 1934- new products and technologies make old products and technologies obsolete
- Clayton Christensen –Harvard University Management
 - **Disruptive Innovation**-1997 – new products begin in new, unexplored markets but grow in quality and capability to displace older markets.
 - Mini-computer 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.
- 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.
 - <http://www.claytonchristensen.com/key-concepts/>
 - [http://en.wikipedia.org/wiki/Clayton M. Christensen](http://en.wikipedia.org/wiki/Clayton_M._Christensen)
 - [http://en.wikipedia.org/wiki/Disruptive innovation](http://en.wikipedia.org/wiki/Disruptive_innovation)

World Changing

- Thus the world can change due to new technologies either directly because the new technology displaces the old directly (**Creative Destruction**) or because the new technology enables an indirect entrance into the market at the low end of price and sophistication –but then grows to devour the entire market (**Disruptive Innovation**)
- Examples of creative destruction:
 - Records were replaced by tapes which were replaced by compact discs (CDs) which are being replaced by network based digital delivery.
 - Movie theaters were partially replaced by loaned video tapes from stores (Blockbuster) which were replaced by mailed out video discs (NetFlix) which are being replaced by network delivery of video (NetFlix, Youtube, FIOS, Xfinity, Amazon, DirectTV, etc.)
 - The Polaroid Instant Camera was replaced by digital cameras.
- Examples of disruptive innovation:
 - Floppy disk drives captured the home market but then replaced the business market.
 - Steel mini-mills learned to make rebar, the cheapest, lowest quality, and least profitable steel product, but then learned to make better quality steel and took away the higher profit market from big steel.
 - Personal computers captured the low end home market, but then displaced mainframes and mini-computers in the business market.

What is an Opportunity?

- **Opportunity**- a favorable set of circumstances that creates a need for a new product, service, or business.
- **Opportunity gap** – identifying a missing piece, a NEED, and a new way to fill that gap.
- An opportunity is NOT driven by a desire to make and sell.
- An opportunity is NOT an IDEA –unless that idea is directed at solving a problem that people will pay for.
- An opportunity is driven by filling a markets need to (and ability to) buy.
- Some innovations are radical –an entirely new way to solve a problem or an entirely new product.
- Other innovations are incremental, or sustaining, and are extensions of existing solutions that are somewhat better.
- Incremental innovation rarely works for new business, but is often the hallmark of established businesses.
 - Building a better mousetrap rarely leads to the market beating a path to the inventor’s door – unless it visibly and significantly changes the game for mouse catching!
- **Window of Opportunity** – timely, not too early or too late. Opportunities depend upon acting at the right time. Too early and too late are sure ways to fail.

Opportunity Gap

- Here are three ways to look for opportunity gaps –if many people share the same concern.
(Extraordinary Entrepreneurship, Stephen C. Harper, John Wiley)
 - 1. If only there was a business that...
 - 2. I wish I could buy a product or service that...
 - 3. There has to be a better way to...
- I wish I could find a gym that was not full of health nuts that intimidate me.
=> *Planet Fitness*
- I wish I could find a tee shirt that did not come untucked so often => *Tommy John Underwear*
- I wish I could carry my music with me everywhere => *iPod*
- I'm tired of carrying a phone, camera, laptop computer, and music player around with me => *iPhone* and other *smart phones*.
- I wish I did not have to transfer my files among my various computers => *cloud computing*
- I wish that I could better keep in touch with my friends and family => social media- *Facebook, Twitter, Snapchat, LinkedIn, etc.*
- I wish I could find a date for this week – *Tinder, Bumble, Match, eHarmony, etc*

Example: Rabies Mono-clonal antibody –UMass Biologics Lab

- Researchers at the UMass Biologics lab of the UMass Medical School discovered a monoclonal antibody for rabies.
- It is spectacularly more effective than current treatment regimen of a 30 day series of rabies vaccine shots.
- It reduces the cost of treatment dramatically from current treatments
- It reduces the suffering of person being treated.

- Now, This is a great **IDEA!**

- Is it a great **OPPORTUNITY?**

- For an idea to become an opportunity it needs a market ready and willing to pay for the alternative.

Example: Rabies Mono-clonal antibody –UMass Biologics Lab -2

- Is this a great opportunity? Ask yourself:
 - Is there a huge need and demand for this product by a group that is willing to BUY it?
 - Does that identified market represent enough economic incentive to create a business and justify the investment?
 - What investment would be needed to bring this to market?

- The market:
 - The market in the U.S. is very small. Very few persons are treated for rabies each year. The few patients are generally treated by public health organizations.
 - The cost of doing animal and human clinical trials is huge.
 - Pre-clinical, Phase 1,2,and 3
 - Cost of bringing a drug to market \$1.2 Billion (Tufts -1990-2003)
 - It takes an average of over 8 years to bring that drug to market.

Example: Rabies Mono-clonal antibody–UMass Biologics Lab -3

- Conclusion: there is no viable US market to justify the investment. There is no (immediate) U.S. opportunity.
 - It is too expensive and takes too long to reach a very small market.
 - That is agonizingly sad, but absolutely true
 - It is also not that unusual in the medical field.
- Is there an alternate strategy to convert this IDEA into an OPPORTUNITY?
 - Rabies is endemic in India and tens of thousands die each year
 - The cost and duration of treatment is unsustainable for so many victims in very poverty stricken regions..
 - The cost (and regulatory burdens) of clinical trials and development in India is much lower
- Solution: license monoclonal to an Indian company for development.
- Future strategy? Bring it back to the US after it is established in the market in India and other regions with more patients.

The strategy appears to be working!

- First monoclonal antibody replacement for RIG launched

<https://rabiesalliance.org/resource/first-monoclonal-antibody-replacement-rig-launched#:~:text=Rabishield%20is%20a%20human%20monoclonal,as%20effective%20as%20human%20RIG.>

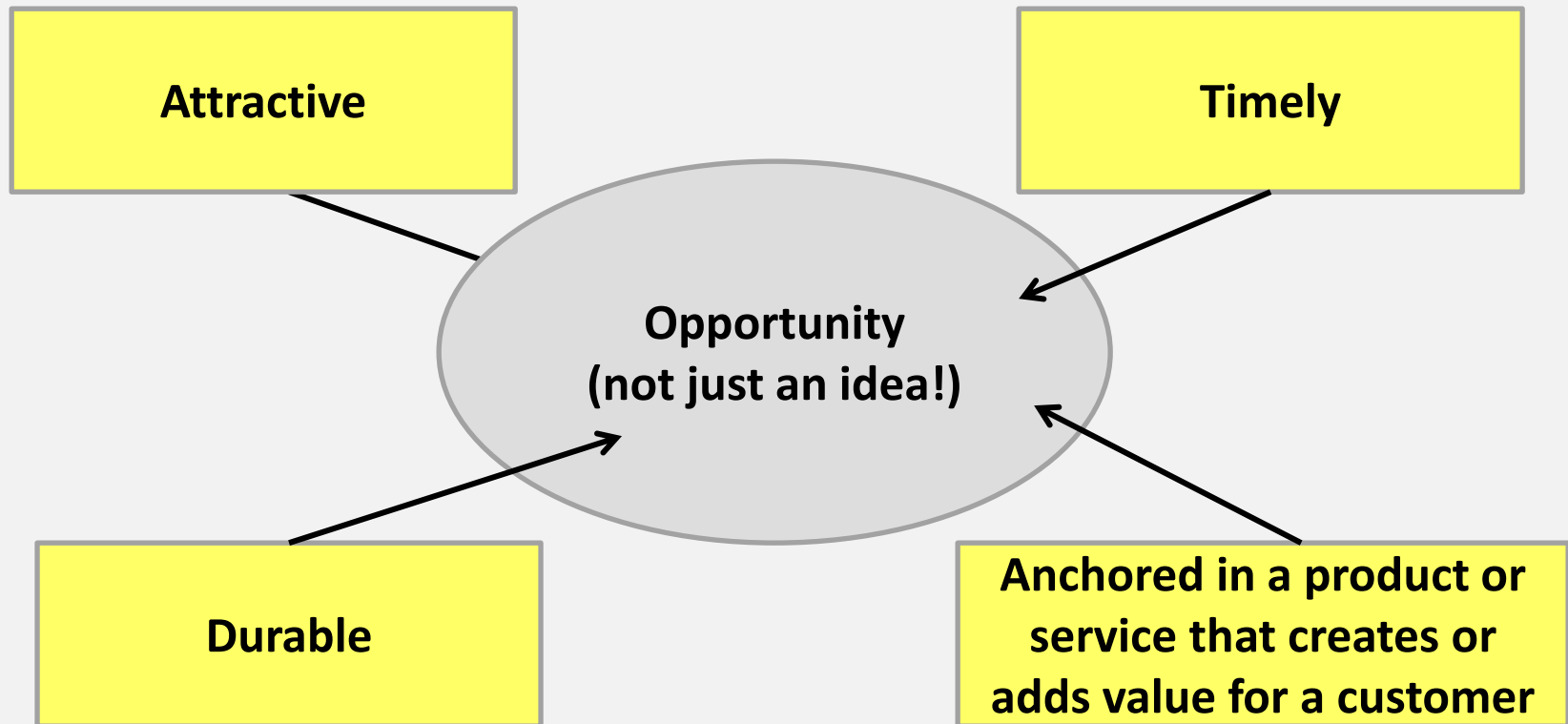
(18 Jan 2018) *The first monoclonal antibody product developed to replace the rabies immunoglobulin (RIG) component of rabies post exposure prophylaxis (PEP) is now available across India. [Rabishield](#) is manufactured by the Serum Institute of India, in partnership with Mass Biologics, of the University of Massachusetts Medical School in the US, which developed the technology and was launched in late October after much anticipation.*



Rabishield is a human monoclonal antibody manufactured by recombinant DNA technology. It has been tested in vivo and in silico against a large number of street rabies isolates and passed clinical trials in India showing that it is as effective as human RIG. According to the manufacturer, the product offers passive immunization against all rabies serotypes found in India. It is described as more potent, requiring a lower dose (3.33 IU/kg body weight) than current rabies immune globulins (20 or 40 IU/kg of body weight for HRIG or ERIG, respectively), which the manufacturer claims makes it much more cost-effective.

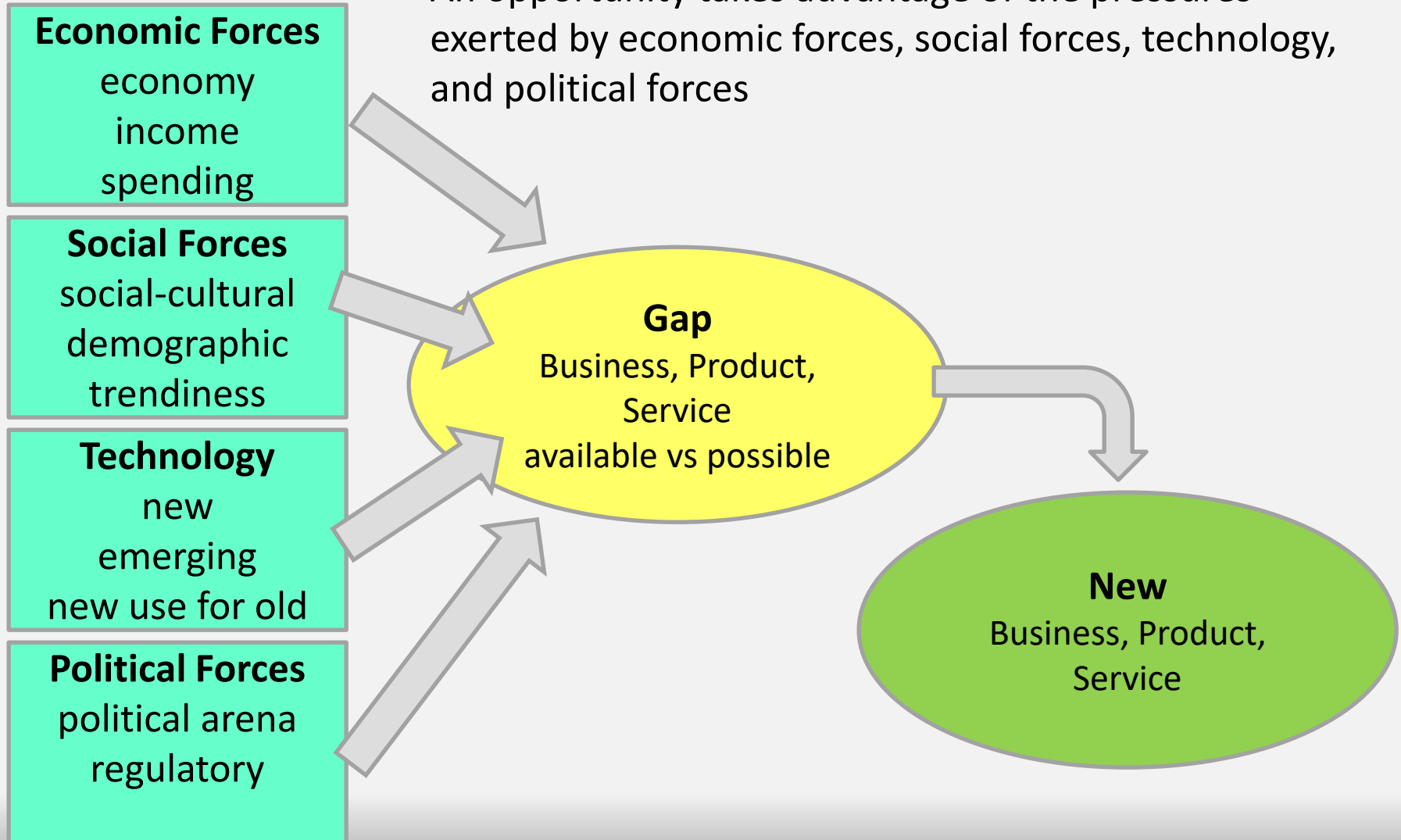
Four Essential Qualities or Dimensions to an Opportunity

- An opportunity needs to be attractive, timely, durable, and anchored in a product or service that creates or adds value to a customer.



From Trends to Opportunity

- An opportunity takes advantage of the pressures exerted by economic forces, social forces, technology, and political forces



Economic forces -examples

Here are some examples of economic forces:

- A rising economy – more discretionary income
 - Until recently the growing China market has been one of the key factors driving the world economy.
- A falling economy – products that cut costs or expenses
- Increasing or decreasing energy prices
 - Gas prices are falling. Hybrid sales are down and truck sales are up.
- Increasing income disparity between groups.
- Interest rates are rising or falling, are low or high.
- Access to less expensive labor for products
- There are many others. Can you think of some?

Social forces

- This is the biggie for the last four decades: the **baby boomers** have changed every part of society as they have gone through the many stages of life from birth to retirement!
- The increasing diversity in the workforce has created many new opportunities.
- The formation of online communities and popularity of social networks
- The change from wired phones to mobile phones as the dominant communication device.
- An interest in healthy living (see boomers above!)
- Increasing use of alternative energy –especially “clean” energy.
 - Popularity fluctuates wildly with variation in energy cost.
 - As oil and gas prices decrease –alternative energy is less economical
- Educational need –continuing education. We are living in a learning economy in which a large premium is paid for education and skills.
- Income disparity is also a social force as well as an economic force.

Technology advances

Here a few technology advances that have helped to define the economy we live in today:

- Personal computing
- The Internet
- Mobile phones.
- Medical Imaging
- Pharmacology
- Biologics
- RNAi – microRNA- gene silencing
- Genomics –personal medicine

Take a few moments to reflect and consider some of the new products, services, and companies that have been enabled by these advances.

Three technology advances that defined our present

- The incredible advances that we have seen in computing, communication, and cognition have been driven by three rules:
- Moore's Law
 - The number of components on a chip, and hence the computing power, doubles every 18 months.
- Metcalfe's Law (Network Economics)
 - The Value of a network scales as the square of the number of those connected to it.
 - Value: economic, personal, societal,....
 - Double the network = four times the value!
 - "network economics" or "network externalities"
 - Social media depends upon capturing the largest network. If you double your network, you quadruple the desirability of your social media network.
- Gilder's Law (Bandwidth deployment)
 - Bandwidth deployment doubles every 6 months (three times as fast as computing power doubles).
- More details on these three can be found at:
<http://www.jackmwilson.net/Entrepreneurship/Cases/Moores-Meltcalfes-Gilders-Law.pdf>

Political and Regulatory Changes

- Tax policy –gasoline, cigarettes, oil depletion allowances
 - Taxes do 2 things:
 - 1. raise revenue
 - 2. decrease the use of the thing being taxed
- Health and safety regulation –OSHA, EPA
- Energy policies –alternative energy tax credits etc.
 - Solar energy credits
 - Net metering –forcing utilities to buy energy back from homeowners solar panels.
- Cyber-security
- National Health Policy –Medicare, Medicaid, Obamacare, Drug coverage, etc.
- Education policies –financial aid, standards, compliance, Clery Act, FERPA, Deemed Exports,

Tesla Motors -all electric high-performance cars

- Economic Trend – increasing gas prices
- Social Trend –desire to be green
- Technology Advances –Battery and motor improvements
- Political Regulatory Trend – favorable treatment and support for alternative energy systems.



Opportunity Recognition

- Solving a problem
 - Every problem is a brilliantly disguised opportunity –Gardner
- A major problem in the 90's: The Learning Corporation
 - Rapid changes in technology, computers, the internet, globalization, and intense economic competitiveness were forcing companies to adapt. To adapt, their employees had to learn many new things.
 - Employee training is expensive –especially for large geographically distributed firms.
 - How could they provide rapid learning opportunities to employees without breaking the bank at a time when economic competition was ferocious?
- The case study of ILinc LearnLinc is an example of one solution to this large-scale problem.

Problems and Solutions

Here are some examples of problems and simple solutions that have been offered:

- Waiting in an elevator is boring
 - Add mirrors to allow grooming checks
 - Run advertisements and news on small LCD TV screens.
- Children are going online and being preyed upon
 - parental controlled safety software.
- Cell phone battery life is limited, and charging is annoying
 - –solar chargers, crank phones, etc.
- Hospital sanitation –the most important action is hand washing and it is not being done consistently
 - Electronic hand washing monitors, anti-microbial materials, clothing that kills microbes.
- Men's undershirts become un-tucked
 - Tommy John markets longer undershirts in a better fitting material
- COVID-19 is spread by droplets in the air
 - The population is encouraged to wear masks indoors and in proximity to other human beings.

Opportunities need to be *Recognized*.

- People recognize opportunities. Some are good at it. Others?
- Characteristics of those who are better at recognizing opportunity:
 - Prior Experience
 - Many entrepreneurs have prior experience in an industry and are able to spot the market gaps and find solutions that others have missed.
 - Cognitive Factors –**entrepreneurial alertness**
 - A major key factor is market awareness and sensitivity.
 - Social Networks –solo entrepreneurs and network entrepreneurs
 - Strong tie relationships are ones in which there are frequent interaction among persons with common interests.
 - They often tend to see problems in the same way
 - Weak tie relationships are ones in which interactions are more in-frequent and among those with different experiences.
 - Weak ties are shown to lead to more ideas –different perspectives.
 - Creativity – the process of generating new, often unique, and useful, ideas.

Entrepreneurial Orientation (Lumpkin & Dess -1996)

- **Environmental Factors**

Dynamism, Munificence, Complexity, Industry Characteristics

- **Entrepreneurial Orientation**

Autonomy, Innovativeness, Risk taking, Proactiveness, Competitive Aggressiveness

- **Performance**

Sales growth, Market share, Profitability, Overall performance, Stakeholder satisfaction

- **Organizational Factors**

Size, Structure, Strategy, Strategy making processes, Firm resources, Culture, Top management team characteristics

Creativity Components

What are the components of the process of creativity?

- Preparation
 - most business ideas stem from previous experience –often at work.
 - Malcolm Gladwell has popularized his “10,000 hour rule” in his book **Outliers**. He contends that those who work on any activity for 10,000 hours are far more likely to be successful than those with less exposure.
- Incubation
 - Pondering or ruminating an idea just below the surface.
- Insight –“Eureka” -“Aha!”
 - Sometimes an idea just hits us out of the blue.
- Evaluation
 - Viability –find the weak spots. Don’t be blinded by a dream
- Elaboration
 - Working out all the details –doing the business plan

Note that creativity goes beyond the “Aha” moment and requires evaluation and elaboration.

Idea Generation Techniques

According to the excellent text, “*Entrepreneurship: Successfully Launching New Ventures*,” by Bruce Barringer and R. Duane Ireland these are some key ways to generate ideas.

- Brainstorming
 - No criticism
 - Freewheeling crazy ideas
 - Fast pace –no pontificating or arguing
 - Leapfrogging
- Focus groups
- Library and internet research
- Other: customer advisory boards, day-in-the-life research
- Create an idea bank on your intranet.

All of these can be useful but are generally more successful in generating incremental innovations rather than radical innovations or truly new ideas.

Scott Berkun: Myths of Innovation (www.scottberkun.com)

Scott Berkun (Microsoft programmer/project manager-IE,Windows -Author) takes a much more skeptical view of how innovation occurs.

- The myth of epiphany
 - Innovation occurs from a prepared mind –not a sudden random insight
- We understand the history of innovation
 - He contends we do not.
- There is a proven method
 - Innovation happens in many ways and there is no proven method.
- People love new ideas
 - Many people dislike and resist new ideas. Hostility often has to be overcome.
- The lone inventor
 - Most innovations come from groups working on ideas together and picking apart and refining ideas.
- Good ideas are hard to find
 - There are lots of good ideas, but they are hard to develop.
- Your boss knows more about innovation than you
 - Innovation does not depend upon a hierarchy.
- The best idea wins
 - History is replete with examples of weaker technologies winning over stronger technologies.
 - In video tapes, Betamax was better than VHS but VHS won the market wars.

All WRONG!!!

Creativity

Inhibitor	Facilitators
Fail to hire creative	Hire creative
Stifling culture	Reward creativity
Pigeonhole people for years	Give employees varied experiences
“Tried it-didn’t work” all ideas already known	Tolerate challenges to established ideas
Hire like minded people	Hire diverse skills, experiences, and viewpoints

Supervisory approaches to creativity

Inhibitor	Facilitators
Pessimistic- judgmental -critical	Be supportive of early ideas
Punish failure	Learn from failure
Force certainty and precision too early	Protect honest mistakes as long as learning occurs
Remain distant and inattentive to employees ideas	Treat employees as equals –non-hierarchical

Protect Ideas –Intellectual Property

And finally, when a good idea is found and developed, please protect it from being lost to you and taken by others.

- Put into tangible form with dates and key ideas. An idea can be protected as a
 - Trade secret
 - Patent –
 - Note: until recently, the patent went to the first to invent, so many older texts give the incorrect information. Today the patent goes to the first to file. So do not delay.
- Keep it in secure manner
 - Industrial cyber-espionage has been an epidemic and large countries have even been accused of being involved on behalf of key industries.
- Avoid prior disclosure
 - If you disclose an idea publically –either in a talk or paper –you forfeit the right to patent it.
- We will return to Intellectual Property in more detail later in this class.