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LOONSHOTS

How to Nurture the Crazy Ideas That Win Wars, Cure Diseases, and Transform Industries

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MAIN IDEA

How do you consistently come up with "loonshots" – the crazy big ideas that change the world but which most scientific and/or business leaders think won't work at first?

The most important breakthroughs in any field are almost always the ideas which challenge conventional wisdom and therefore are most likely to be shot down at first. That's because they often start on the lunatic fringe before they reach mainstream credibility. They challenge conventional wisdom and have effects that are impossible to predict or forecast. Loonshots are disruptive but that usually only becomes obvious in hindsight.

So how do you spark more loonshots? Set up a nursery and let lots of loonshots take seed and grow. Then let the best ideas take on a life of their own rather than deliberately trying to pick the winners yourself. Act more like a gardener and less like judge and jury. Also never lose sight of the fact loonshots can change the world for the better so get onboard for the ride.

"A loonshot challenges conventional wisdom. Whether a change is "disruptive" or not, on the other hand, refers to the effects of an invention on a market. Loonshots flourish in loonshot nurseries, not in empires devoted to franchises. Being good at loonshots and good at franchises are phases of an organization. That's what the science of emergence tells us."

– Safi Bahcall

Four rules for nurturing loonshots

1. Separate the phases
2. Create a dynamic equilibrium
3. Spread a system mindset
4. Create critical mass

What exactly is a loonshot? . . . . . Page 2

The most important breakthroughs never come fully formed. Instead, they are typically fragile ideas which readily get dismissed as crazy. If you're not careful, you can bury them and forget them which can be a big mistake. Loonshots can change the world.

Rule #1 – Separate the phases . . . . . Page 3

People who are responsible for developing your high-risk early-stage ideas are like artists. You have to separate them from the soldiers who are responsible for the already-successful steady-growth parts of your organization. You have to create a nursery where loonshots can grow, flourish and shed their warts.

Rule #2 – Create a dynamic equilibrium . . . . . Page 4

You have to maintain a healthy balance between your artists and your soldiers. Both are important to the long-term future of your firm. Have equal-opportunity respect and provide both with the tools and resources they need to win. Focus on managing the transfer of new ideas between loonshots and franchises.

Rule #3 – Spread a system mindset . . . . . Page 5

Keep asking why your organization makes the choices it does. Analyze both your success and your failures and ask how your decision-making process can be improved in the future. Analyze the quality of decisions, not just the quality of eventual outcomes.

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You have to make it possible for loonshots to attract enough resources to reach critical mass. That often means getting more people involved. To bring more people onto projects successfully, you have to reduce the return on politics and increase the fit of incentives. If you can do this, you then are in position to bring a gun to a knife fight.

How to champion a loonshot . . . . . Pages 7 - 8

If you are called on to champion a loonshot, take heart from the fact loonshots always flourish in a loonshot nursery and not in empires dedicated to established franchises. Nurture your loonshots and use them to test established beliefs. Use disruptive innovation to move forward boldly into the future. It can be done.

What exactly is a loonshot?

The most important breakthroughs never come fully formed. Instead, they are typically fragile ideas which readily get dismissed as crazy. If you're not careful, you can bury them and forget them which can be a big mistake. Loonshots can change the world.

At the outbreak of the Second World War, the odds would have favored Nazi Germany by a substantial margin. As the war progressed, Germany was unable to bomb Britain into submission so it was decided U-boats would be used to cut off supplies flowing into Britain from the United States. In 1941, 4.3 million tons of cargo were sunk and Allied shipping losses reached 7.8 million tons in 1942. Radar had been developed and used in the Battle of Britain by that time but it was still too big and bulky to install on ships or planes.

Fortunately just before World War II had broken out, Vannevar Bush, dean of engineering at MIT, had approached President Franklin Roosevelt and pointed out the US military's approach was always to make more guns rather than to try and figure out how to make better weapons. Bush proposed setting up a science and technology group within the federal government to explore new technologies that would be critical to winning the coming war. Roosevelt agreed and the Office of Scientific Research and Development (OSRD) was established. Vannebar Bush headed up the OSRD and he set about exploring all the longshot ideas and unproven technologies which the military were unwilling to fund.

Within 6 months the OSRD had 126 research contracts underway with 19 industrial labs and 32 universities. One of those was with Alfred Lee Loomis, a wealthy investment banker who built his own private research lab. Loomis gathered dozens of the country's best engineers and physicists and went to work on developing a microwave radar system. It would be far more powerful than the early radar systems which used long wavelength radar. The new system would also be portable enough to carry on a ship or plane.

As they did their research, they discovered the US Navy had in fact been sitting on an idea first discovered in 1922 for "radio wave interference" which provided a working model for how a microwave radar could operate. The Navy had never progressed the idea because it would take too long to develop and there was not any funding available for untried ideas.

By 1943 Loomis and his team of scientists had a microwave radar installed in an Air Force B-24 bomber for testing. When a convoy of ships crossing the Atlantic were attacked by German submarines, the B-24 crew using the new microwave radar prototype were quickly able to locate the subs and attack them with depth charges and guns. In May 1943 alone the Allies sunk 41 German U-boats using the new radar which was more than had been sunk in the first three years of the war combined. Within three months, Allied shipping losses decreased by 95 percent and the German High Command withdrew the U-boats from the Atlantic. That, in turn, meant the United States could then send enough equipment to Britain for the Allies to ultimately launch the invasion of Europe.

"Radar had a far greater impact on the course of the war than is usually appreciated, extending well beyond the battle with the U-boats. Radar sighting from planes allowed the Allies to destroy enemy supplies, bridges, and transport with targeted bombing raids day and night, regardless of weather. Radar-controlled antiaircraft guns were essential to defending aircraft carriers, which created a decisive advantage in the Pacific War."

– Safi Bahcall

As impressive as its success with radar was, Bush's OSRD also pioneered blood plasma transmissions which saved thousands of lives in the battlefield. The OSRD also did work on penicillin, malaria and tetanus which lowered deaths from infectious diseases by a factor of twenty compared to the First World War. And most significantly, when word came that Nazi Germany was close to developing nuclear bombs, Bush and the OSRD made the case to President Roosevelt that the US had to develop the bomb first. The OSRD launched a research program, assembled the team and then handed the Manhattan Project over to the military to manage.

So how did Bush and the OSRD manage to nurture so many loonshots? It was widely acknowledged at the end of the war the OSRD had certainly shortened the war and made victory for the Allies possible. There was considerable pressure to come up with a national plan for supporting science and the OSRD would morphed into DARPA (Defense Advanced Research Projects Agency). DARPA would eventually give to the world technologies like GPS, personal computers, the biotechnology industry, carbon nanotubes, drones, the internet, pacemakers, artificial hearts, magnetic resonance imaging, chemotherapy and more. It has been conservatively estimated that DARPA has generated roughly half of the trillions of dollars which have been added to the GDP of the United States of America since the end of World War II.

Vannevar Bush would later team up with Theodore Vail who had been appointed as CEO of AT&T in 1907 when a banking group led by J.P. Morgan took control of the company. Vail established Bell Telephone Laboratories to work on fundamental research. It was essentially a department where loonshots run by loons were allowed to explore radical ideas that were not necessarily related to current products. Over the next 50 years, Bell Labs would produce the transistor, solar cells, CCD chips (now used in digital cameras), lasers, the C programming language and eight Nobel Prizes. Bush also worked closely with Frank Jewett who was a Vail protege and president of Bell Labs.

"Although neither Bush nor FDR could have foreseen the growth that would be created from "profitably employing" Bush's ideas in times of peace, both did have practical business experience. Bush's system, in fact, came from the business world. Bush recognized that the big ideas—the breakthroughs that change the course of science, business, and history—fail many times before they succeed. Sometimes they survive through the force of exceptional skill and personality. Sometimes they survive through sheer chance. In other words, the breakthroughs that change our world are born from the marriage of genius and serendipity. The magic of Bush and Vail was in engineering the forces of genius and serendipity to work for them rather than against them. Luck is the residue of design."

– Safi Bahcall

Four rules for nurturing loonshots

1 Separate the phases

People who are responsible for developing your high-risk early-stage ideas are like artists. You have to separate them from the soldiers who are responsible for the already-successful steady-growth parts of your organization. You have to create a nursery where loonshots can grow, flourish and shed their warts.

"There is a pervasive myth of the genius-entrepreneur who builds a long-lasting empire on the back of his ideas and inventions. But the ones who truly succeed—the engineers of serendipity—play a more humble role. Rather than champion any individual loonshot, they create an outstanding structure for nurturing many loonshots. Rather than visionary innovators, they are careful gardeners. They ensure that both loonshots and franchises are tended well, that neither side dominates the other, and that each side nurtures and supports the other."

– Safi Bahcall

Loonshots are always fragile and the first versions will generally have lots of "warts" – limitations which make them appear impractical. They will arrive looking like failures at first because they are so far out there nobody even knows what they are seeing. That's okay because you'll be expecting this to be the case.

To make sure you capture the loonshots which are available to you, apply some general rules:

- *Always separate your soldiers from your artists* – because they are markedly different. Your soldiers are focused on optimizing the already-successful parts of the organization and aim to do more of what already works. They will be appalled by the warts of the early generations of your loonshots. Your artists on the other hand will be intrigued by the new possibilities of those same loonshots. Make sure your artists and your soldiers are clearly differentiated and handled appropriately.
- *Tailor the tools you use to the phase* – which in practice means you run a tight organization for the soldiers and loosen up things considerably for the artists. Physical separation in a skunkworks building is helpful but it's the separate systems you use that matters most. There's no point saying to creatives or artists: "You're behind on your quota of inventions. Come up with three creative ideas by Wednesday and another two by next Friday".
- *Always watch your blindspot* – by watching out for both product (P-type) and strategy (S-type) loonshots. The invention of the telephone was a P-type loonshot that worked and ultimately made AT&T the most valuable company in America at one time. Sam Walton, by contrast, championed a S-type loonshot. He located Wal-Marts far from major cities in small towns, supersized them and then made all his money from selling $1.20 items of women's underwear for $1.00. Wal-Mart had no new technology, just a different way of delivering the same product slightly cheaper.

- ✓ Separate artists and soldiers.
- ✓ Tailor the tools to the phase.
- ✓ Always watch your blindspot – nurture both P-type (Product) and S-type (Strategy) loonshots.

This last point about S-type vs. P-type innovations played out quite dramatically in the airline industry. PanAm was founded by Juan Trippe and by the time he retired in 1968, PanAm was the world's largest and most profitable airline. Trippe was a pilot who loved engines, flying and planes. He started Long Island Airways in 1922 and used modified war-surplus planes to fly customers from New York to Long Island. Trippe then formed PanAm airways to fly passengers from Key West Florida to Havana Cuba. He met and became friends with famed aviator Charles Lindbergh.

Trippe and Lindbergh went to Igor Sikorsky and asked him to develop what became the S-38 flying boat so PanAm could fly to Latin American countries. They then won US postal contracts to each country which in effect paid all their running costs. Trippe's competitors didn't have this and subsequently folded. Trippe then went to Boeing and actively lobbied them to develop the 707 and ultimately the 747 by placing large advance orders for the new models. PanAm grew rapidly and quickly became Boeing's biggest customer.

PanAm's strogest competitor was American Airlines headed by Robert Lloyd Crandall. He was an MBA and a finance guy and he excelled at using systems to his advantage. Crandall would come up with the first frequent flier program, SuperSaver airfares and a two-tier employment strategy where new employees were paid less than existing employees – all S-type innovations. But Crandall's masterstroke was Sabre.

"Although American was not the first to develop a computerized reservation system, it developed the most functional one, which listed all fares, and then gave that system, Sabre, to travel agents all over the country. One study showed that American got at least 50 percent more business from travel agents who used Sabre than from other bookings. In an industry where one percentage point can make the difference between meeting payroll and bankruptcy, this really matters."

– Safi Bahcall

The most crucial advantage of Sabre was something not even Bob Crandall had anticipated. Using Sabre, American Airlines had access to data nobody had ever seen before about patterns in customer bookings. This was before big data came along and American Airlines used that Sabre data to develop the industry's first yield-management system. Crandall set up an entire division dedicated to using data to extract maximum dollars per seat giving American Airlines a massive competitive advantage.

Eventually PanAm would decline and go out of business altogether. That's what happens when a P-type innovator gets blind-sided. The S-type innovations Crandall introduced were more long lasting and can continue to drive the growth of American Airlines. That's certainly how things have played out in the airline industry post deregulation.

Four rules for nurturing loonshots

2 Create a dynamic equilibrium

You have to maintain a healthy balance between your artists and your soldiers. Both are important to the long-term future of your firm. Have equal-opportunity respect and provide both with the tools and resources they need to win. Focus on managing the transfer of new ideas between loonshots and franchises.

Whenever a company has some initial success, there's a tendency for that success to go to the CEO's head. This is particularly true if the CEO makes the covers of all the business magazines and is hailed as the next Moses. Unfortunately, this is a trap when it comes to generating more loonshots in the future.

For example, Edwin Land's first stunning success was to develop Polaroid lenses. He didn't know it at the time but the same technology would in the future be used to develop LCD screens now in widespread use. Land is also well known as the creator of instant photography with his iconic Polaroid camera.

Unfortunately, Land start believing his own press releases and began to believe he was infallible. He committed ten years and half-a-billion-dollars to the development of Polavision – a 35-millimeter movie camera. His company produced 200,000 Polavision cameras before it established that customers would not buy it. Land eventually resigned as Polaroid's CEO and cut all ties to the company he had founded.

So how do you avoid the Moses trap? There are several things you can and should do:

- *Learn to love both your artists and your soldiers equally* – and treat them in an even-handed way. Business leaders who are artists naturally favor the artists in their organizations and vice-versa. That's a problem because to succeed and thrive, you need both. Make sure you value both artists and soldiers equally and that they all feel appreciated and valued.
- *Never forget your job as a leader is to manage the transfer, not the technology* – and therefore it's not your job to appoint yourself as judge and jury. Remind yourself it's the marketplace that designates winners and losers. Therefore, you can and should act more like a gardener and less like a Moses. Create a natural process for promising loonshots to move from the laboratory to the field and for feedback to cycle back the other way. Manage with a gentle touch and allow projects enough time to come to fruition.
- *Appoint and train project champions* – who will help technology bridge the divide. Train leaders to be bilingual so they can talk to both the artists and the soldiers. Soldiers will draw attention to the warts of emerging technologies. Artists will naturally expect everyone to see the underlying magic. Smooth the waters and keep everyone working hard.

- ✓ Love both your artists and your soldiers equally.
- ✓ Manage the transfer rather than the technology.
- ✓ Be a gardener, not a Moses.
- ✓ Appoint and train up project champions who can bridge the divide.

Another great example of a CEO who managed to escape the Moses trap was Apple co-founder Steve Jobs. In his first act as Apple CEO, Jobs brilliantly established the company and marketed the Apple I and II products. After some impressive initial success, Jobs then orchestrated the development of the Apple III and the Lisa projects which were high profile flops. When Jobs refused to fix the more obvious problems with the Macintosh, the Apple Board of Directors were forced to strip Steve Jobs of his operational responsibilities. Jobs resigned officially from Apple in September 1985.

In a blaze of publicity, Steve Jobs established NeXT to build a superpowerful graphics computer and invested in acquiring the Lucasfilm Computer Division from moviemaker George Lucas. NeXT failed to gain any traction in the marketplace due to the high sticker price of the computer. The Lucasfilm company also had a graphics computer called the PIC which Jobs wanted to sell. Once again, the PIC proved to be too expensive to sell at $100,000 each. Jobs was a big fan of P-type innovations but he wasn't doing so well at picking the winners from the losers and was firmly stuck in the Moses trap.

Once the Lucasfilm company was renamed Pixar and it pivoted from selling hardware to making movies, everything came together. Pixar's first movie was *Toy Story* and it was a huge commercial success. Jobs took that as an opportunity to do an IPO and soon Pixar was valued at $1.5 billion with Steve Jobs owning 80 percent of the company.

While Steve Jobs's success with Pixar was impressive, his second stint at Apple was awe inspiring. In December 1996, Apple announced it had acquired NeXT and Steve Jobs would be an advisor to Apple. This time around Steve Jobs II loved both his soldiers and his artists. He had always loved taking P-type loonshots but now he was willing to go after S-type loonshots as well.

For example, music piracy was rampant in 2001. Apple set up iTunes as an online store that not only sold what could easily be acquired illegally but users could buy individual songs at 99 cents each rather than buy entire albums. Everyone though this was crazy until iTunes sold more than one million songs within six days of opening. And even more impressively this did not involve any new technology. Just a change to a strategy that nobody else thought would work.

Steve Jobs also had Apple undertake some audacious P-type loonshots which ended up transforming industries: the iPod, the iPhone and the iPad. Within a relatively short time period, Apple went from being a company which nobody was willing to acquire in the late-1990s (when the Board tried unsuccessfully to find a buyer six times) to the most valuable company in the world.

"The whole notion of how you build a company is fascinating. I discovered that the best innovation is sometimes the company, the way you organize."

– Steve Jobs

Four rules for nurturing loonshots

3 Spread a system mindset

Keep asking why your organization makes the choices it does. Analyze both your success and your failures and ask how your decision-making process can be improved in the future. Analyze the quality of decisions, not just the quality of eventual outcomes.

Garry Kasparov reigned as world chess champion for fifteen years, the longest span of time in the history of the game. When asked for the secret of his success, Kasparov said it was his ability to distinguish between a system mindset and an outcome mindset. He describes it this way:

- When a bad move costs him a game, Kasparov analyzes why that move was bad. This is using Level 1 thinking or an outcome mindset.
- After the game ends, Kasparov also analyzes the decision process behind choosing that move. This is Level 2 thinking or a system mindset. He then figures out how to change his system so as not to repeat that flawed move in the future.

The same approach applies to teams and organizations as well. Weak teams don't analyze failures at all but just keep going. That's Level 0 strategy. Teams with a Level 1 or outcome mindset analyze why a project failed and then resolve to do better next time. Teams with a Level 2 or systems mindset probe the decision-making process behind the failure and make adjustments so there is no repeat next time around.

To spread a systems mindset:

- *Keep asking why* – your organizations makes the decisions it makes. Be careful to analyze both your failures and your successes with equal fervor. Good outcomes don't always imply that good processes were followed because the reality is sometimes you just get lucky. Similarly, bad outcomes don't necessarily imply bad decisions were made or bad processes were involved. Always analyze the quality of your decisions and not just the metrics of the outcomes derived.
- *Always be on the lookout for ways to improve your systems* – by looking at anything and everything. Identify key influencers. Look closely at the incentives which were provided for individuals and teams. Analyze how those factors can be changed to enhance future decision-making.
- *Identify teams with outcome mindsets and train them to use a systems mindset instead* – so you raise overall performance. Encourage teams to be self-aware and to have the self-confidence to admit their mistakes and learn from them. Bring in a neutral expert from outside the team to help facilitate this.

✓ Always ask why your organization made the decisions it did.

✓ Keep asking how the decision-making process can be improved.

✓ Identify teams with an outcome mindset and help them adopt a systems mindset.

Systems thinking is vital to having dynamic equilibrium between your soldiers who execute and your artists who create. A good way to visualize how this woks in practice is to think of a bucket of water.

As everyone knows, water freezes at 32° Fahrenheit or 0° Celsius. At the point of freezing, there will be small blocks of ice which coexist with pockets of liquid. Molecules will be cycling back and forth between being ice and water. That's a great metaphor for how great organizations work. You need your production people to be like the ice and solid in how you fulfill orders and meet obligations but at the same time you also need some room for fresh creative ideas to be circulating as well. Systems thinking enables this to happen.

In practice, the aim of systems thinking is simple – you want to capture the benefits that large groups can bring to big goals while reducing the risks that those same groups will crush valuable and fragile loonshots. History is full of examples of companies which let some amazing loonshots slip through their fingers to be commercialized by others. Systems thinking is a way to avoid that fate.

"System mindset means carefully examining the quality of decisions, not just the quality of outcomes. A failed outcome, for example, does not necessarily mean the decision or decision process behind it was bad. Evaluating decisions and outcomes separately is equally important in the opposite case: bad decisions may occasionally result in good outcomes. You may have a flawed strategy, but your opponent made an unforced error, so you won anyway. Failing to analyze wins can reinforce a bad process or strategy. You may not be lucky next time. You don't want to be the person who makes a poor investment, gets lucky because of a bubble, concludes he is an investment genius, bets his fortune, and then loses it all next time around."

– Safi Bahcall

"The weak link is not the supply of ideas. It is the transfer to the field. And underlying that weak link is structure—the design of the system—rather than the people or the culture."

– Safi Bahcall

"Being good at nurturing loonshots is a phase of human organization, in the same way that being liquid is a phase of matter. Being good at developing franchises (like movie sequels) is a different phase of organization, in the same way that being solid is a different phase of matter."

– Safi Bahcall

Four rules for nurturing loonshots

4 Create critical mass

You have to make it possible for loonshots to attract enough resources to reach critical mass. That often means getting more people involved. To bring more people onto projects successfully, you have to reduce the return on politics and increase the fit of incentives. If you can do this, you then are in position to bring a gun to a knife fight.

In 2000 Malcolm Gladwell published *The Tipping Point* in which he highlighted research which showed 150 people is the upper limit for headcounts in effective organizations. It has now been shown in a number of settings that below 150 people, incentives encourage people to focus on collective goals. Once you get above that 150 headcount, people start worrying more about their careers and promotion.

That magic number of 150 is what can be termed a "phase transition". Think of it this way:

- When you're in a large company, loonshots look like more trouble than they are worth. Even if you beat the odds and succeed, a new loonshot won't move the needle on the organization's overall revenues. You're far safer to look for franchise improvements in existing systems than to back breakthrough ideas.
- When you're in a small company, betting on a loonshot makes sense. If you don't do something, your company might not even be around next year so what have you go to lose?

To raise that magic number of 150, there are a few things you can try:

- *Reduce the return-on-politics* – by making lobbying for compensation and promotions more difficult. If you set up systems where those decisions are less dependent on a manager's opinions and more independently assessed and calibrated across the company, then there is less incentive to wasting time trying to get your manager's attention.
- *Use soft equity* – provide lots of nonfinancial rewards. Often peer recognition and other intrinsic motivators are more powerful than money rewards. Use them.
- *Fix the middle* – check that there are not any unintended consequences of your reward and incentive systems. Specifically, make sure that middle managers have more incentives to make loonshots succeed and less incentives to go to battle with each other for promotions.
- *Increase general project-skill fit* – go out of your way to identify any mismatches between employees and projects. If people are comfortable with their roles, they will spend less time lobbying for change and more time being productive.
- *See if you can bring a gun to a knife fight* – appoint a chief incentives officer and let him or her put into place a new incentive system that supercharges employee interest. Fire your people up.

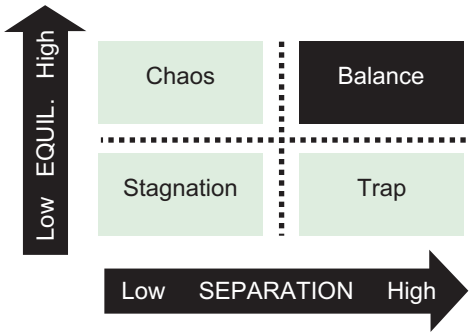
- ✓ Reduce the benefits of politics.
- ✓ Use lots of nonfinancial rewards.
- ✓ Reduce incentives for middle managers to go in the wrong direction.
- ✓ Increase project-skill fit.
- ✓ Look for ways to bring a gun to a knife fight.

In the 1970s Nokia was a hugely successful industrial conglomerate. It took the money it made selling rubber boots and toilet paper and pioneered the world's first cellular network, the first car phone and the first GSM phone. In the early 2000s, Nokia sold half the smartphones on the market making it the most valuable company in Europe.

In 2004, a handful of Nokia engineers had created a new kind of smartphone which was internet-ready, had a high-resolution camera and a big color touchscreen. They also proposed setting up an online store to sell smartphone apps. However, Nokia's much-lauded management team vetoed both projects and watched on as three years later Apple launched its i-Phone and iTunes to much acclaim. Within five years Apple was on its trajectory to becoming the most valuable company on the planet and Nokia quietly sold its mobile business for a price which was around $250 billion less than the business was valued at its peak.

What's the lesson from Nokia? Loonshots work and loonshots matter. If your organization stays focused on business-as-usual, you can miss out on large opportunities as new ideas take shape and gain market acceptance. And equally, to take advantage of loonshots, there needs to be an internal mechanism whereby loonshots can attract enough resources to gain critical mass.

Smart organizations create a balance between equilibrium (maximizing revenues from existing products) and innovations. There needs to be both separation and equilibrium between the franchise (your existing business) and some loonshots (innovations and new ideas).



"Teams and companies or any large organization develop deeply held beliefs, sometimes consciously, often not, about both strategies and products—and loonshots are contrarian bets that challenge those beliefs. Perhaps everything that you are sure is true about your business model is right, and the people telling you about some crazy idea that challenges your beliefs are wrong. But what if they aren't?"

– Safi Bahcall

How to champion a loonshot

If you are called on to champion a loonshot, take heart from the fact loonshots always flourish in a loonshot nursery and not in empires dedicated to established franchises. Nurture your loonshots and use them to test established beliefs. Use disruptive innovation to move forward boldly into the future. It can be done.

The prevailing business mantra of the digital age has typically been: "Fail Fast and Pivot". That mantra works much of the time but it doesn't work for loonshots which are by definition ideas or projects that most business leaders think won't work or won't matter. Loonshots challenge conventional wisdom so you'll never pivot to one because it won't make sense.

Loonshots are always fragile at first and nurturing them will require the gentle touch of a gardener rather than the strong strokes of a visionary leader. If you're called on to champion a loonshot, here's what you should expect:

1 Expect your idea to die two or three times in its early days

All successful loonshots get dismissed in their early stages as being "crazy". In the 1920s, Robert Goddard described the principles of jet propulsion and rocket flight as the way to get to the moon and he was dismissed as a lunatic and ridiculed. It wasn't until 1961 when President John F. Kennedy announced to Congress his goal of putting man on the moon that rockets became sexy.

Why the change? During World War II, the US military ignored Goddard but the German scientists did not. They used rockets for their long-range missiles which reigned terror on London. They also developed the first jet aircraft which flew more than 100 miles per hour faster than any Allied plane. Fortunately, these breakthroughs came too late in the war to make a difference but proof-of-concept was there for everyone to see.

2 Pay careful attention to the "false fails" of your loonshot

In the 1970s, Akira Endo discovered statins which lower cholesterol and which now help prevent heart attacks. The standard procedure for testing new drugs at that time was to test it in rodents. Endo's team gave a statin to rats and saw nothing at all. For most new drugs, that is the kiss of death.

In a fortunate twist of fate, Endo ran into a colleague in a bar who used chickens in his research of other new drugs. His friend mentioned to Endo over drinks he was planning on turning his chickens into yakitori when his project ended. It occurred to Endo that since eggs have lots of cholesterol, it stood to reason chickens might have high blood cholesterol as well. Endo convinced his friend to hold off making yakitori so he could test his new statin on some spare hens.

The results were spectacular. Statins decreased cholesterol by nearly a half and also lowered triglycerides in those chickens. It wasn't until years later that researchers found rats have mostly HDL ("good" cholesterol) and very little LDL ("bad" cholesterol) making them a rather poor choice for evaluating statins which lower just the LDL. Chickens have both types, just like humans.

The failure of statins to work in rats was a "false fail". People thought it was the loonshot that was at fault but actually it was a flaw in the test itself. Endo caught it and statins like Liptor, Crestor, Zocor and others have now generated more than $300 billion in cumulative revenues. Another company which was developing statins at the same time as Endo was Beecham Pharmaceuticals. They didn't catch the false fail and killed their research program and missed out.

3 Listen to those who say your loonshot "sucks" with curiosity

When Facebook launched in 2004, Mark Zuckerberg met with potential investors. They declined to provide the company with any funds because Facebook just seemed like another social network following in the footsteps of Friendster, MySpace and others. Everyone assumed users would always keep switching from whatever social media network was trendy to the next big thing.

Peter Thiel didn't do that. He reached out to some techos he knew who worked behind the scenes at Friendster and got their user retention data. He was stunned to find that people stayed even though the Friendster site crashed often because it was not built to handle millions of users simultaneously. Thiel concluded that users were not leaving social networks because of a fault in their business model but because of early software glitches.

Therefore, Thiel wrote Zuckerberg a check for $500,000. Eight years later, he sold most of his stake in Facebook for around a billion dollars. The lesson? When your loonshot fails after pouring your heart and soul into it, it might be hard but keep asking "Why?" You may find a contrarian answer hidden in the data that will point to what is an enormous commercial opportunity in the future.

4 Don't worry about culture, focus on creating an innovative structure

During the Second World War, Vannevar Bush structured the federal government's OSRD so there was a dedicated group of scientists who exchanged ideas quickly with soldiers in the field and got immediate feedback. That structure was a vital element in helping the Allies to develop the new technologies which ultimately created a winning advantage.

Importantly, Vannevar Bush didn't get involved in the day-to-day details of any one new technology. Nor did he try and pick the winners from the losers. Instead, Bush realized the weak link had historically been the transfer of new ideas to the field and so he focused on managing and facilitating the transfer not the technology itself.

For example, when the first version of aircraft radar was installed, pilots weren't using it. Bush insisted the scientists had to go on some sorties to see why not. They soon realized in the heat of battle, pilots did not have time to operate the complicated switches on the early versions of radar. Scientists quickly developed a custom display which had a sweeping line and moving dots which are now a familiar part of radar. Within four weeks of this change, the Allied planes had sunk

one-third of the German U-boat fleet in the Atlantic. Six weeks later, the German Navy withdrew all U-boats from the Atlantic and the lanes were cleared for the invasion of Europe to take place. That transfer of information (both ways) is critical.

5 Aspire to be a gardener, not a Moses

At the end of World War II, the United States Congress declared in October 1945 that without Bush's OSRD, "it is safe to say that victory still would await achievement". President Roosevelt asked Bush to summarize how the US could use his system to identify new treatments for diseases, to improve national well-being and to grow the economy.

Vannevar Bush published a report called *Science: The Endless Frontier.* Many media outlets hailed it although the *New York Times* stated: "Soviet Russia has approached this task more realistically". Nonetheless, Congress changed the OSRD into the National Science Foundation, the National Institutes of Health, DARPA and other research agencies.

The flow-on effect of that has been many industry-creating innovations have been the offspring of public and private research. Vannevar Bush's suggestion that creating a nursery of loonshots which get cultivated is a far better approach than trying to have someone try and pick the winners from the losers.

- ✓ Expect all good ideas to have two or three near-death experiences.
- ✓ Mind the "False Fails".
- ✓ Listen to the "Suck" with Curiosity.
- ✓ Focus on innovative structures rather than obsessing over culture.
- ✓ Aspire to be a great gardener, not a Moses.

Another great example of the importance of nurturing loonshots is to ask why the Scientific Revolution started in Great Britain rather than In China and India. In the 1500s, China and India dominated the world's economy and between them accounted for half of the world's GDP. China's merchant fleet of that era numbered 28,000 men and 300 ships.

So what happened? The Chinese turned inwards and started building a new capital, the Great Wall, the Grand Canal, etc. When the British approached China in the 1800s to initiate trade, the Chinese refused. The Chinese emperor wrote to King George III: "There is nothing we lack. We have never set much store on strange or ingenious objects, nor do we need any more of your country's manufactures."

Within a matter of months, British warships arrived in China instead. The British fleet powered by steam engines completely destroyed the wooden sailing junks of the Chinese navy and the Chinese empire never recovered. Similarly, in 1764 a private British trading company seized control of India and in 1857 India became a British colony.

The lesson? England had broken free of the idea that religious authorities or kings should decree what was right or wrong and had instead decided that universal truth could be determined by measurement and experiment. Or in other words, the scientific method had taken root in Western Europe and that tolerance for loonshots enabled these underdogs to outperform China and India, the Goliaths of that era.

So why is the global language of business today English rather than Chinese, Hindi or even Arabic? The simple fact was England established the earliest example of a successful loonshot nursery inside one country. Thanks to a long succession of inventors, the Royal Society of London was created in 1660 to carry out basic research in the sciences. "Science was to be fostered and nurtured as leading to the improvement of men's lot on earth by facilitating technological invention".

The Royal Society of London brought together all the scientists who would later become founders of branches of modern science – including Robert Boyle, Robert Hooke, Sir Isaac Newton and others. The Royal Society's publications would spur many practical inventions including the steam engine which led to the obliteration of the Chinese navy.

"The Royal Society of London; Vannevar Bush's wartime loonshot nursery, the OSRD; and Theodore Vail's Bell Labs—all three had something in common. They were the greatest loonshot nurseries of their time. They were, arguably, the three greatest loonshot nurseries in history. They produced the Scientific Revolution, victory in a world war, and the transistor. Why did the empires of China, Islam, and India miss the Scientific Revolution despite their wealth and historical advantages? For the same reason that Microsoft missed mobile, Merck missed protein drugs, and the film Majors missed My Big Fat Greek Wedding. Loonshots flourish in loonshot nurseries, not in empires devoted to franchises. Being good at loonshots and good at franchises are phases of an organization—whether that organization is a team, a company, or a nation. That's what the science of emergence tells us."

– Safi Bahcall

"New frontiers of the mind are before us, and if they are pioneered with the same vision, boldness, and drive with which we have waged this war we can create a fuller and more fruitful employment and a fuller and more fruitful life."

– Franklin D. Roosevelt

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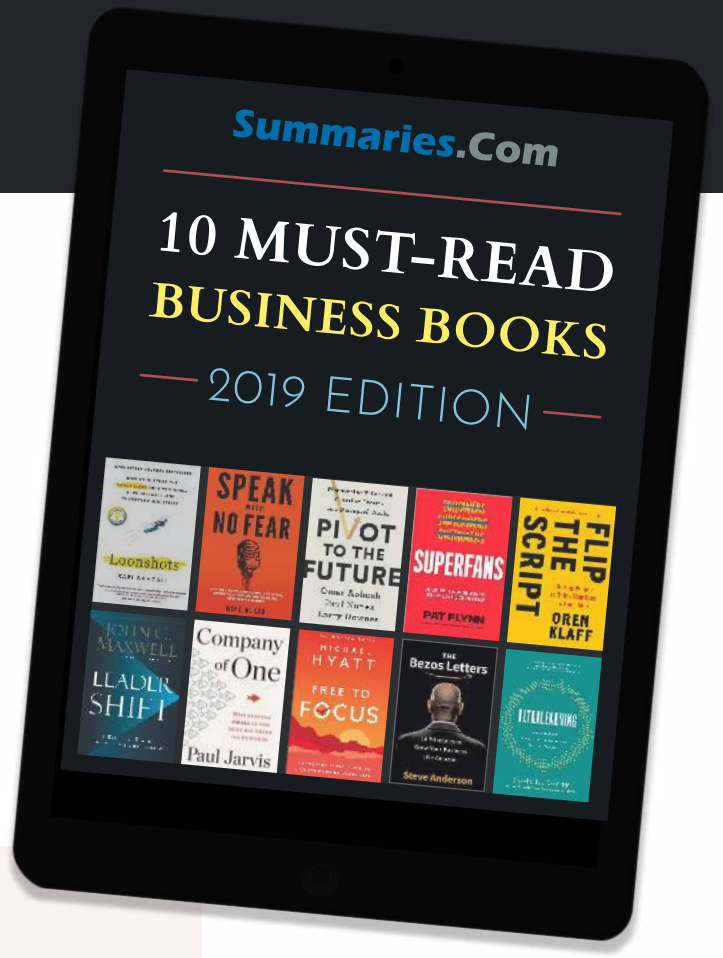

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