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

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Dave's Reading Highlights

And then we'll see how small changes in structure, rather than culture, can transform the behavior of groups, the same way a small change in temperature can transform rigid ice to flowing water.

I've always appreciated authors who explain their points simply, right up front. So here's the argument in brief: 1. The most important breakthroughs come from loonshots, widely dismissed ideas whose champions are often written off as crazy. 2. Large groups of people are needed to translate those breakthroughs into technologies that win wars, products that save lives, or strategies that change industries. 3. Applying the science of phase transitions to the behavior of teams, companies, or any group with a mission provides practical rules for nurturing loonshots faster and better.

Drugs that save lives, like technologies that transform industries, often begin with lone inventors championing crazy ideas. But large groups of people are needed to translate those ideas into products that work.

Useful lessons from Amgen's story include picking up the check for dinner and hiring good lawyers. But otherwise, extracting culture tips,

after the fact, from its terrific stock price performance is like asking the guy who just won the lotto to describe the socks he was wearing when he bought the winning ticket.

In physics, you identify clues that reveal fundamental truths. You build models and see if they can explain the world around you. And that's what we will do in this book. We will see why structure may matter more than culture.

When people organize into a team, a company, or any kind of group with a mission they also create two competing forces—two forms of incentives. We can think of the two competing incentives, loosely, as stake and rank.

As teams and companies grow larger, the stakes in outcome decrease while the perks of rank increase. When the two cross, the system snaps.

Leaders spend so much time preaching innovation. But one desperate molecule can't prevent ice from crystallizing around it as the temperature drops. Small changes in structure, however, can melt steel.

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.

Bush changed national research the same way Vail changed corporate research. Both 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.

There is a pervasive myth of the genius-entrepreneur who builds a long-lasting empire on the back of his ideas and inventions. (We will explore this myth, and the trap it creates, over the next several chapters.) 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.

1. SEPARATE THE PHASES Separate your artists and soldiers People responsible for developing high-risk, early-stage ideas (call them “artists”) need to be sheltered from the “soldiers” responsible for the already successful, steady-growth part of an organization. Early-stage projects are fragile.

The goal of phase separation is to create a loonshot nursery. The nursery protects those embryonic projects. It allows caregivers to design a sheltered environment where those projects can grow, flourish, and shed their warts.

2. DYNAMIC EQUILIBRIUM Love your artists and soldiers equally Maintaining balance so that neither phase overwhelms the other requires something that sounds soft and fuzzy but is very real and often overlooked. Artists working on loonshots and soldiers working on franchises have to feel equally loved.

Both Bush and Vail saw their jobs as managing the touch and the balance between loonshots and franchises between scientists exploring the bizarre and soldiers assembling munitions; between the blue-sky research of Bell Labs and the daily grind of telephone operations. Rather than dive deep into one or the other, they focused on the transfer between the two.

As we will see over the coming chapters, managing the touch and the balance is an art. Overmanaging the transfer causes one kind of trap. Undermanaging that transfer causes another.

No product works perfectly the first time. If feedback from the field is ignored by inventors, initial enthusiasm can rapidly fade, and a promising program will be dropped. Early aircraft radar, for example, was practically useless; pilots ignored it. Bush made sure that pilots went back to the scientists and explained why they weren't using it. The reason had nothing to do with the technology: pilots in the heat of battle didn't have time to fiddle with the complicated switches on the early radar boxes. The user interface was lousy. Scientists quickly created a custom display technology—the sweeping line and moving dots now called a PPI display. Pilots started using radar.

Bush and Vail succeeded in bringing stagnating organizations straight to the top-right quadrant: well-separated and equally strong loonshot and franchise groups (phase separation) continuously exchanging projects and ideas in both directions (dynamic equilibrium). Many companies, however, especially when faced with a crisis, try to legislate creativity and innovation everywhere ("The CEO must be the CIO—the Chief Innovation Officer!"). This usually results in chaos, the top-left quadrant. Not every phone operator has to be a champion innovator. Sometimes you just need them to answer the phone. The most common trap, however, is to head straight to the bottom-right quadrant. As mentioned earlier, leaders proudly draw a box on an org chart, rent a new building, and hang a shingle advertising a new research lab.

Later, Folkman would say, "You can tell a leader by counting the number of arrows in his ass."

When someone challenges the project you've invested years in, do you defend with anger or investigate with genuine curiosity? I find it's when I question the least that I need to worry the most.

In the previous two chapters, we saw the needs behind the Bush-Vail system. We need to protect and nurture loonshots, because of their surprising fragility. We need to balance loonshots and franchises, because they strengthen each other. Those needs gave rise to the first two rules: phase separation and dynamic equilibrium. In this chapter and the next two, we will see a third need: the need to distinguish between two types of loonshots. Missing one kind of loonshot brought down the world's most exciting airline company. Missing the other kind brought down the world's most exciting consumer technology company. Both companies learned, irreversibly, what Vannevar Bush and Theodore Vail already knew. Missing loonshots can be fatal.

Moses Trap: When ideas advance only at the pleasure of a holy leader, who acts for love of loonshots rather than strength of strategy

Each of those visionary leaders created a brilliant loonshot nursery; they achieved Bush-Vail rule #1: phase separation. But they remained judge and jury of new ideas. Unlike Bush and Vail, who saw their role as gardeners tending to the touch and balance between loonshots and franchises, encouraging transfer and exchange, those three master P-type innovators saw themselves as Moses, raising their staffs, anointing the chosen loonshot. In other words, they failed on Bush-Vail rule #2: dynamic equilibrium.

You can analyze why you argued with your spouse. It was, let's say, your comment about your spouse's driving. But you may improve marital relations even more if you understand the process by which you decided it was a good idea to offer that comment. What state were you in and what were you thinking before you said it? Are there some different things you might do when you are in that state and think those thoughts? How good would it feel to sleep in your own bed?

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. There are good decisions with bad outcomes. Those are

intelligent risks, well taken, that didn't play out. For example, if a lottery is paying out at 100 to 1, but only three tickets are sold, one of which will win, then yes, purchasing one of those three tickets is a good decision. Even if you end up holding one of the two that did not win. Under those same conditions, you should always make that same decision.

Elevating Jobs first to interim CEO in mid-1997 and then to full-time CEO in early 1998 was viewed as a Hail Mary play, and one with a particularly small chance of saving the company. The many failed promises of NeXT had reduced Jobs's credibility as a technology leader in the eyes of industry analysts and observers. When Jobs finally took over, gone was the dismissive attitude toward soldiers. In March 1998, he hired Tim Cook, known as the "Attila the Hun of inventory," from Compaq to run operations. Also gone were the blinders to S-type loonshots. For example, by 2001 music piracy on the internet was rampant. The idea of an online store selling what could easily be downloaded for free seemed absurd. And no one sold music online that customers could keep on their own computers (online music, at the time, was available only through subscription: monthly fees for streaming songs). Plus one more nutty thing: no one sold individual songs, at 99 cents each, rather than whole albums. "You're crazy," anyone could have told Jobs. "There's no way that could make any money." The idea didn't seem so crazy after one million songs were downloaded from the iTunes store in the first six days. There were no new technologies. Just a change in strategy that no one thought could work.

In rescuing Apple, Jobs demonstrated how to escape the Moses Trap. He had learned to nurture both types of loonshots: P-type and S-type. He had separated his phases: the studio of Jony Ive, Apple's chief product designer, who reported only to Jobs, became "as off-limits as Los Alamos during the Manhattan Project." He had learned to love both artists and soldiers: it was Tim Cook who was groomed to succeed him as CEO.

In 1988, a fire in Yellowstone National Park burned 800,000 acres, 36 percent of the total park area—the largest fire in the park's history.

Analyzing park policy is where percolation theory first showed what it can do. Until 1972, Yellowstone policy required rangers to put out every small fire immediately, whether it was caused by humans (a carelessly tossed cigarette) or by nature (a lightning strike). The frequency of small fires in a forest is sometimes called the sparking rate. The park managers' policy of reducing the sparking rate, although well intentioned, had allowed the forest to grow dense with old trees. They had inadvertently pushed the forest across the dashed line in the diagram above. Their policy had made contagion—a massive outbreak like the 1988 fire inevitable. Today most forestry services recognize the "Yellowstone effect" of artificially low sparking rates. They allow small- or medium-sized fires to burn under watch, called a controlled-burn policy. In some cases, if the forest is getting too close to the contagion threshold (the dashed line in the phase diagram), fire managers will initiate small burns, called prescribed burns, to back the forest away from the threshold.