**Case: 3M’s Post-it Note Pads\***

\*Source: Background on 3M was drawn from “Masters of Innovation,” *BusinessWeek* (April 10, 1989), pp. 58–63, and the corporate website, <http://solutions.3m.com/wps/portal/3M/en_US/our/company/>. This case is a shorter and modified version of “3M’s Little Yellow Note Pads: Never Mind I’ll Do It Myself,” in P. R. Nayak and J. M. Kerrengham (eds.), *Breakthroughs!* (New York: Rawson Associates, 1988), pp. 50–73. Used by permission.

Invention has been a way of life at Minnesota Mining and Manufacturing (3M) throughout most of the company’s history. While many of the original investors left this would-be mining company at the turn of the 20th century when their plan to mine corundum, an abrasive used in sandpaper manufacturing, failed to yield a mineral of any value, those who stayed turned to inventing new products. Their first success was an abrasive cloth used widely in the auto industry. Another staple of the auto industry, waterproof sandpaper, would never have been invented if 3M inventor Francis Okie had not been dreaming up new ways to increase sandpaper sales. In 1922, a novel thought struck him: why not sell sandpaper as a replacement for razor blades? People could simply rub their cheeks smooth. Obviously this was not an idea that caught on, but this failure led to the successful wet–dry sandpaper. Today, most of us know 3M for astoundingly successful inventions such as scotch tape, masking tape, and, especially, the Post-it Note.

With over 50,000 products, and an average of 500 new products each year, invention has always been the 3M way. Surveys show that executives consider Apple Computer, Google, 3M, Toyota Motor, and Microsoft the world’s most innovative companies. The management theories of William K. McKnight, 3M’s first chairman of the board, are the company’s guiding principles. He created a corporate culture that encourages employee initiative and innovation. His basic rule of management was laid out in 1948:

As our business grows, it becomes increasingly necessary to delegate responsibility and to encourage men and women to exercise their initiative. This requires considerable tolerance. Those men and women, to whom we delegate authority and responsibility, if they are good people, are going to want to do their jobs in their own way.

Mistakes will be made. But if a person is essentially right, the mistakes he or she makes are not as serious in the long run as the mistakes management will make if it undertakes to tell those in authority exactly how they must do their jobs.

Management that is destructively critical when mistakes are made kills initiative. And it’s essential that we have many people with initiative if we are to continue to grow.

In addition to encouraging initiative and tolerating mistakes, the 3M approach includes rarely hiring from the outside, especially at the management and professional levels; small divisions so that division managers can be on a first name basis with their staff; and an annual budget of at least one billion dollars for research and development.

**New-Product Development**

A 3Mer comes up with an idea for a new product. He or she forms an action team by recruiting full-time members from technical areas, manufacturing, marketing, sales, and finance. The team designs the product and figures out how to produce and market it. Then the team develops new uses and line extensions. All members of the team are promoted and receive raises as the project develops. As sales grow, the product’s originator can go on to become project manager, department manager, or division manager. There’s a separate track for scientists who don’t want to manage. The result is that there are 42 divisions. Each division must follow the 25 percent rule: A quarter of a division’s sales must come from products introduced within the past five years. In addition, there is a 15 percent rule. Virtually anyone at the company can spend up to 15 percent of the workweek on anything he or she wants to as long as it’s product related. Managers do not carefully monitor their scientists’ use of this 15 percent rule. If this policy were enforced rigidly, such action would undermine its intent and inhibit the creative energy of researchers. This practice (called “bootlegging” by members of the company) and the 25 percent rule are at the heart of one of 3M’s most famous innovations, the yellow Post-it Note.

**The Post-it Note**

Unlike many of the incremental improvements and innovations made in product lines, the Post-it Note pad was unique, a product entirely unrelated to anything that had ever been developed or sold by 3M. Post-it Notes are ubiquitous in modern business because they do something no product ever did before. They convey messages in the exact spot where people want the messages, and they leave no telltale sign that the message was ever there at all. This small but powerful idea was begun by a 3M chemist, Spencer Silver, refined by two scientists named Henry Courtney and Roger Merrill, and nurtured from embryo to offspring by Arthur L. Fry. Post-it revenues are estimated at as much as $300 million per year.

Post-it Notes started out as another oddball idea—an adhesive that didn’t form a permanent bond—with no perceptible application. In 1964, Silver was working in 3M’s central research labs on a program called Polymers for Adhesives. 3M regularly sought ways to improve its major products. Tapes and adhesives were 3M’s primary product lines, and adhesives that created stronger bonds were actively sought. Silver found out about a family of monomers that he thought might have potential as ingredients for polymer-based adhesives, and he began exploring them.

In the course of this exploration, Silver tried an experiment, just to see what would happen with one of the monomers, and then to see what would happen if a lot more of the monomer was added to the reaction mixture, rather than the amount dictated by conventional wisdom. This in itself was irrational, as in polymerization catalysis, the amounts of interacting ingredients were controlled in tightly defined proportions according to theory and experience. Silver says, “The key to the Post-it adhesive was doing the experiment. If I had sat down and factored it out beforehand, and thought about it, I wouldn’t have done the experiment. If I had really seriously cracked the books and gone through the literature, I would have stopped. The literature was full of examples that said you can’t do this.” To Silver, science is one part meticulous calculation and one part fooling around.

Silver describes what happened with the unusual concoction as a “Eureka moment”—the emergence of a unique, unexpected, previously unobserved and reliable scientific phenomenon. “It’s one of those things you look at and you say, This has got to be useful! You’re not forcing materials into a situation to make them work. It wanted to do this. It wanted to make Post-it adhesive.”

The adhesive became Silver’s baby. Silver started presenting this discovery to people who shared none of his perceptions about the beauty of his glue. Interested in practical applications, they had only a passing appreciation for the science embodied in Silver’s adhesive. More significantly, they were “trapped by the metaphor” that insists that the ultimate adhesive is one that forms an unbreakable bond. In addition, Silver was immersed in an organization whose lifeblood was tape of all kinds. In this atmosphere imagining a piece of paper that eliminated the need for tape is an almost unthinkable leap into the void.

Silver couldn’t say exactly what it was good for. “But it has to be good for something,” he would tell them. “Aren’t there times,” Silver would ask people, “when you want a glue to hold something for a while but not forever? Let’s think about those situations. Let’s see if we can turn this adhesive into a product that will hold tight as long as people need it to hold but then let go when people want it to let go.”

From 1968 to 1973, support for Silver’s idea slipped away. The Polymers for Adhesives program ran out of funding and support, and the researchers were reassigned. Silver had to fight to get the money to get the polymer patented because there was no commercial application immediately present.

Silver was a quiet, well-behaved scientist with an amazing tolerance for rejection. Spencer Silver took his polymer from division to division at 3M, feeling that there was something to be said for such a product. He was zealous in his pursuit because he was “absolutely convinced that this had some potential.” The organization never protested his search. At every in-house seminar no one ever said to Silver, “Don’t try. Stop wasting our time.” In fact, it would have violated some very deeply felt principles of the company to kill Silver’s pet project. As long as Silver never failed in his other duties, he could spend as much time as he wanted fooling around with his strange adhesive.

The best idea Silver could come up with on his own was a sticky bulletin board, not a very stimulating idea even to Silver. But 3M did manufacture them, and a few were sold, though it was a slow-moving item in a sleepy market niche. Silver knew there had to be a better idea. “At times I was angry because this stuff is so obviously unique,” said Silver. “I said to myself, Why can’t you think of a product? It’s your job!”

Silver had become trapped by a metaphor. The bulletin board, the only product he could think of, was coated with adhesive—it was sticky everywhere. The metaphor said that something is either sticky or not sticky. Something “partly sticky” didn’t occur to him.

Silver and Robert Oliveira, a biochemist whom Silver met in his new research assignment, continued to try selling the idea. Geoff Nicholson, who was leading a new venture team in the commercial tapes division, agreed to see them. Nicholson knew nothing about adhesives and had just taken the position in commercial tapes. Silver and Oliveira were literally the first people to walk through his door. Nicholson says that he was “ripe for something new, different, and exciting. Most anybody who had walked in the door, I would have put my arms around them.” Nicholson recruited a team to work on an application for the five-year-old discovery. One of these people, Arthur Fry (a chemist, choir director, and amateur mechanic), would make the difference. Fry had “one of those creative moments” while singing in the choir of his church. “To make it easier to find the songs we were going to sing at each Sunday’s service, I used to mark the places with little slips of paper. Inevitably the little slips would flutter to the floor.” The idea of using Silver’s adhesive on these bookmarks took hold of him at one of these moments. Fry went to 3M, mixed up some adhesive and paper, and invented the “better bookmark.” Fry realized that the primary application for the adhesive was not to put it on a fixed surface, such as the bulletin board, but on the paper itself. It was a moment of insight that contemplation did not seem to generate. Fry now has his own lab at 3M and often speaks to large groups of businesspeople about the climate for creativity at 3M. Silver is still in 3M’s basement, working out of a cramped, windowless office in a large lab—a place where experimental ferment and scientific playfulness still reign.

The product was not perfected at the moment of Fry’s discovery. It still took two more scientists on the Nicholson team—Henry Courtney and Roger Merrill—to invent a paper coating that would make the Post-it adhesive work. Silver said, “Those guys actually made one of the most important contributions to the whole project, and they haven’t got a lot of credit for it. The Post-it adhesive was always interesting to people, but if you put it down on something and pulled it apart, it could stay with either side. It had no memory of where it should be. It was difficult to figure out a way to prime the substrate, to get it to stick to the surface you originally put it on. Roger and Hank invented a way to stick the Post-it adhesive down. And they’re the ones who really made the breakthrough discovery because once you’ve learned that, you can apply it to all sorts of different surfaces.”

To get the product to manufacturing, Fry brought together the production people, designers, mechanical engineers, product supervisors, and machine operators and let them describe the many reasons why something like that could not be done. He encouraged them to speculate on ways that they might accomplish the impossible. A lifelong gadgeteer, Fry found himself offering his own suggestions. “Problems are wonderful things to have, especially early in the game, when you really should be looking for problems,” said Fry.

In trying to solve the problem of one difficult phase of production, Fry assembled a small-scale basic machine in his own basement, which was successful in applying adhesive to paper in a continuous roll. The only problem was that it wouldn’t fit through his basement door. Fry accepted the consequences and bashed a hole through the basement wall. Within two years, Fry and 3M’s engineers had developed a set of unique, proprietary machines that are the key to Post-it Notes’ consistency and dependability.