

3M's Post-it Notes: A Managed or Accidental Innovation?

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In late 1978, the bleak reports from the four-city market tests came back to the 3M Corporation. The analyses were showing that this "Post-it Note Pads" idea was a real stinker. Such news came as no surprise to a large number of 3M's most astute observers of new product ideas, for this one had smelled funny to them right from the beginning! From its earliest days, Post-it brand adhesive had to be one of the most neglected product notions in 3M history. The company had ignored it before it was a notepad, when the product-to-be was just an adhesive that didn't adhere very well. The first product to reach the marketplace was a sticky bulletin board whose sales were less than exciting to a company like 3M.

But why was this adhesive still around? For five years, beginning before 1970, this odd material kept coming around, always rattling in the pocket of Spencer Silver, the chemist who had mixed it up in the first place. Even after the adhesive had evolved into a stickum-covered bulletin board, and then into notepad glue, there was manufacturing saying that it couldn't mass-produce the pads and marketing claiming that such scratch pads would never sell. So by 1978, when the reports came in from the test markets, it seemed everyone who'd said disparaging things about the Post-it Note Pad was right after all. 3M was finally going to do the merciful thing and bury the remains. At that critical moment, it was only one last try by two highly placed executives, Geoffrey Nicholson and Joseph Ramey, that kept "those little yellow sticky pads" from going the way of the dinosaur.

To understand Silver's persistence with his innovative commercial challenge, it is necessary to go back to his moment of discovery. Silver's role in the development of Post-it Note Pads began in 1964 with a "Polymers for Adhesives" program in 3M's Central Research Laboratories. The company has always had a tradition of periodically reexamining its own products to look for ways to improve them. "Every so many years," said Silver, "3M would put together a bunch of people who looked like they might be productive in developing new types of adhesives." In the course of that "Polymers for Adhesives" research program, which went on for four years, Silver found out about a new family of monomers developed by Archer-Daniels Midland, Inc., which he thought contained potential as ingredients for polymer-based adhesives. He received a number of samples from ADM and began to work with them. This was an open-ended research effort, and Silver's acquisition of the new monomers was the sort of exploration the company encouraged. "As long as you were producing new things, everybody was happy," said Silver. "Of course, they had to be new molecules, patentable molecules. In the course of this exploration, I tried an experiment with one of the monomers to see what would happen if I put a lot of it into the reaction mixture. Before, we had used amounts that would correspond to conventional wisdom." Silver had no expectation whatsoever of what might occur if he did this. He just thought it might be interesting to find out.

In polymerization catalysis, scientists usually

This article is a modified, shortened version of a chapter from P. R. Nayak and J. M. Kettingham's book *Breakthroughs*, an Arthur D. Little international study of 16 major innovations (Rawson Press, 1986). Published with permission of ADL with additions and modifications made by Professor Ralph Katz, based on his 1996 interviews with Art Fry of 3M.

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control the amounts of interacting ingredients to very tightly defined proportions, in accordance with prevailing theory and experience. Silver said with a certain measure of glee, "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 limited my thinking only to what the literature said, I would have stopped. The literature was full of examples that said you can't do this." Highly regarded publications and experts would have told Silver there was no point in doing what he did. But Silver understood that science is one part meticulous calculation and one part fooling around. "People like myself," said Silver, "get excited about looking for new properties in materials. I find that very satisfying, to perturb the structure slightly and just see what happens. I have a hard time talking people into doing that—people who are more highly trained. It's been my experience that people are reluctant just to try, to experiment—just to see what will happen!"

When Silver went ahead with the "wrong" proportions of the ADM monomers, just to see what would happen, he got a reaction that departed from the predictions of theory. It was what some call an "accident" and what Silver called a "Eureka moment." What Silver experienced was the appearance of what would become the Post-it adhesive polymer. It was the moment for which all scientists become scientists—the emergence of a unique, unexpected, previously unobserved and reliable scientific phenomenon. Each time Silver put those things together, they fell into the same pattern—every time. "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," Silver said.

Technically the material was what the research program called for, a new polymer with adhesive properties. But in examining it, Silver noticed among its other curious properties that this material was not "aggressively" adhesive. It would create what scientists call "tack" between two surfaces, but it would not bond tightly to them. Also, and this was a problem not solved for years, this

material was more "cohesive" than it was "adhesive." It clung to its own molecules better than it clung to any other molecules. So if you sprayed it on a surface (it was sprayable, another property that attracted Silver) and then slapped a piece of paper on the sprayed surface, you could remove all or none of the adhesive when you lifted the paper. It might "prefer" one surface to another, but not stick well to either. Someone would have to invent a new coating for paper if 3M were to use this as an adhesive for pieces of paper. But paper? Not very likely, thought Silver, and on this point, at least, everyone agreed with him.

What Silver had done was more than the usual 3M lab synthesis; it was a discovery—the sort of thing a scientist can put his or her name on. When he watched the reaction, Silver was achieving fatherhood, and he was falling in love. He knew he might never again be responsible for so pure and simple a phenomenon. Almost instantly, he personified this viscous goo, calling the stuff "my baby." It may not have been very sticky, but Spencer Silver got very attached to it. As he started to present this discovery to other 3Mers, however, he soon realized that few people shared his views about the beauty of this 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! The whole world in which they lived was looking for a better glue, not a worse glue. And like any other sensible adhesives manufacturer, 3M's sights had never wavered from a progressive course of developing stronger and stronger adhesives. Suddenly, here was Spencer Silver, touting the opposite of what was considered normal product virtue.

Although he couldn't say exactly what it was good for, "it had 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 through 1973, com-

pany support systematically slipped away from him. First, the Polymers for Adhesives Program disappeared. 3M had given its researchers a specified time and a limited budget to conduct that program. When the time and money were used up, the researchers were reassigned even though some, like Silver, were just starting to have fun.

"The adhesives program died a natural death," Silver recalled. "The company's business went off, and, in the usual cycle of things, the longer-range research programs were cut. So the emphasis was diminished and we still had invented some interesting materials that we wanted to push." The members of the Polymers for Adhesives group were assigned to new research projects. Left as a team, they might have fought together to keep alive a number of their odd little discoveries. But all those discoveries were shelved, with Silver's one glaring exception, and he got little assistance from his teammates in promoting the survival of his oddball adhesive. So he did what seems to happen frequently at 3M. He shrugged at the organization and he did it himself. He had to wage a battle to get the money just to patent his unique polymer. 3M eventually spent the minimum money possible. Post-it adhesive was patented *only* in the United States. "We really had to fight to get a patent," said Silver, "because there was no commercial product readily apparent. It's kind of a shame. I wish it would change. If 3M commits itself to millions of dollars for research, it ought to allow you to follow up with the money for a patent."

People at 3M, when they fight for something, seem to do it with an understated grace, a politeness that conceals their tenacity. This is true of Silver, who quietly began the arduous struggle to capture the imagination of his colleagues and superiors. Silver's only advantage was that he was, after all, in love. "I was just absolutely convinced that this had potential," Silver said. "There are some things that have a little spark to them—that are worth pursuing. You have to be almost a zealot at times in order to keep interest alive, otherwise it will die off. It seems like the pattern always goes like this: In the fat times, R&D groups appear and we do a lot of interesting research. And then the lean times come just about at the point when you've

developed your first goody, your gizmo. And then you've got to go out and try to sell it. Well, everybody in the divisions is so busy that they don't want to touch it. They don't have time to look at new product ideas with no end product already in mind."

Silver went door-to-door to every division at 3M that might be able to think up an application for his adhesive. The organization never protested his search. When he sought slots of time at in-house technical seminars, he always got a segment to show off his now-it-works, now-it-doesn't adhesive. At every seminar, some people left, some people stayed. Most of them said, "What can you do with a glue that doesn't glue?" But *no one* said to Silver, "Don't try. Stop wasting our time." In fact, it would have violated some very deeply felt principles of the 3M Company to have killed Silver's pet project. Much is made of 3M's "environment for innovation," but 3M's environment is, more accurately, an environment of nonintervention, of expecting people to fulfill their day's responsibilities, every day, without discernible pressure from above. Silver, no matter how much time he spent fooling around with the Post-it adhesive, never failed in his other duties, and so, at 3M, there was no reason whatsoever to overtly discourage his extracurricular activities. The positive side of this corporate ethic is the feeling of independence each worker experiences in doing his job. The disadvantage is that, when you have a good idea that requires more than one person to share the work and get the credit, it can be hard to convince people to postpone their chores and help with yours.

As Silver pursued his lonely quest, his best inspiration for applying his adhesive was a sticky bulletin board, a product that wasn't especially stimulating even to its inventor. He got 3M to manufacture a number of them—through a fairly low-tech and inexpensive process—and they were sent out to the company's distribution and retail network. The outcome was predictable. 3M sold a few, but 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!'"

Although Silver had overcome the metaphor-

ical trap of always striving for stickier stickum, he, too, became trapped, albeit by a different metaphor. The bulletin board, the only product he could think of, was totally coated with adhesive—it was sticky everywhere. The metaphor said that something is either sticky or not sticky. Something *partly sticky* did not occur to him. More constraining was the fact that, until Silver's adhesive made it possible, there had been no such thing as a self-adhesive piece of note paper. Note paper was cheap and trivial, and the valuable elements used with these bits of paper were their durable fasteners of pins, tacks, tapes, and clips. So silver was immersed in an organization whose lifeblood was tape: Scotch brand tapes like magic tape, cellophane tape, duct tape, masking tape, electrical tape, caulking tape, diaper tape, and surgical tape, to name a few. In this atmosphere, imaging a piece of paper that eliminates the need for tape is almost unthinkable.

In the early 1970s, 3M transferred Silver to its System Research group within the Central Research labs. There he met Oliveira, a biochemist who shared Silver's fascination with things that did stuff you didn't think they could do. Silver and Oliveira kept each other from getting discouraged; they were a duo that eventually presented the adhesive technology to Geoff Nicholson, which in the course of the seemingly accidental nature of Post-it notes, may have been the biggest accident of all. Nicholson was, in 1973, appointed the leader of a new venture team in the Commercial Tape Division laboratory. Now venture teams were opened research and development groups formed, when funds are available, to explore new directions in one of 3M's many lines of business and technology. Nicholson had been given a fresh budget and a free hand to develop new products in the company's Commercial Tape Division, whose new product development had grown sluggish. It is a standing policy at 3M that each division must generate 25 percent of its annual revenue from products developed in the last five years, a tall order for any division, especially those in the old, established product lines, and one on which Commercial Tape consistently had been coming up short.

Silver had been to see the people in Com-

mercial Tape at least twice before. Both times they had rejected his adhesive. Two days before Nicholson arrived in Commercial Tape, Silver and Oliveira had been around again, trying to sell the idea to the division's technical director, James Irwin. Irwin sidestepped them by saying there would be a new guy running research projects there in a couple of days. Two days later, Silver and Oliveira were almost the first people in Nicholson's new office. "Here I am, brand-new to the division, and I don't know a lot about adhesives. And here they were talking to me about adhesives," Nicholson recalled. "I'm ripe for something new, different, and exciting. Most anybody who had walked in the door, I would have put my arms around them."

Silver explained his adhesive discovery for the umpteenth time, and Nicholson, who didn't understand half of what he was saying, was intrigued. "It sure sounded different and unique to me," said Nicholson. "I was ripe for the plucking." Finally, Silver's unloved, uncommitted adhesive had a home. Nicholson went about recruiting people for the new venture team; Silver hoped that one of those people would arrive with a *problem* to match his five-year-old *solution*. The one who had the problem was a chemist, a choir director, and an amateur mechanic named Arthur Fry. It was Fry who eventually took the baton from Silver's weary grasp and carried it over a host of discouraging hurdles. Even before joining the new venture team in Commercial Tape, Fry had seen Silver show off his adhesive and had kept the idea turning slowly in the back of his mind. He agreed with Silver that this adhesive was special, although he too wondered what to do with it.

"Then one day in 1974, while I was singing in the choir of the North Presbyterian Church in north St. Paul, I had one of those creative moments," Fry explained. "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, when everyone in the church stood up, or when Fry had to communicate through gestures with other members of the choir, he would divert his attention from the placement of his array of bookmarks. One unguarded move, and they ei-

ther fluttered to the floor or sank into the deep crack of the hymnal's binding. Suddenly, while Fry leafed frantically for his place in the book, he thought "Gee, if I had a little adhesive on these bookmarks, that would be just the ticket." Fry decided to check into that idea the next week at work. What he had in mind, of course, was Silver's adhesive.

What had happened in Fry's ever-searching curiosity was the creative association of two unrelated ideas. When Fry went to work on Monday, he ordered a sample of the adhesive, mixed different concentrations, and invented what he called "the better bookmark." Encouraged by Silver's enthusiasm and Nicholson's push for new products, Fry began to realize the magnitude of his creative activity. "I knew I had made a much bigger discovery," said Fry. "I soon came to realize that the primary application for Silver's adhesive was not to put it on a fixed surface, like the bulletin boards. That was a secondary application. The primary application concerned paper to paper." Fry had also coated only the edge of the paper so that the part protruding from the book wouldn't be sticky. In using these bookmarks for notes back and forth to his boss, Fry had come across the heart of the idea. It wasn't a bookmark at all, it was a note—a system of communication where the means of attachment and removal were built in and did not damage the original surface!

Over the years, Fry has been ordained as the Post-it notes champion, a title which, in ensuing years, has imposed some unusual burdens on him. Today, rather than working side-by-side in a lab with old friends like Silver and Oliveira, Art Fry is ensconced in his own laboratory. To a chemist, this is the equivalent of the corporate corner office—lofty among the echelons of the organization, but such loftiness often makes for a lonely job. On the other hand, Fry is often freed from the splendid isolation of his private lab to speak, as a company spokesman, to large groups of businessmen about the climate for creativity at 3M. He has been interviewed and quoted so often that business writers invariably peg him as the sole Post-it notes product champion. With Fry trapped by this role

and its demands, it's easy to see why Spence Silver seems relieved, perhaps even grateful at the comparatively short shrift given to his role in the Post-it story. Silver is still in 3M's basement, working out of a cramped, windowless office in a large, open, multihood laboratory, a place where experimental ferment still seems to take place. In Silver, the scientific playfulness that gave birth to the Post-it adhesive still seems intact. In fact, without much prompting, he will hold up a glass cylinder of the old Post-it polymer, showing its milky white color in its restful state. He then squeezes the polymer with a plunger and, under pressure, the contents magically become crystal clear. Silver releases the pressure and the adhesive becomes opaque again! Silver doesn't know why it does that. "Isn't that wonderful?" he says. "There must be some way you can use that!"

In 1974, after Silver had been making the same exclamation for many years, Fry had provided the first truly affirmative response. But with the "Eureka moment" at the North Presbyterian Church came many other problems. On the bulletin board, Silver's adhesive was attached to a favorable "substrate." It stuck to the bulletin board better than anything else. Move it to paper, however, and it peeled off onto everything it touched. If you couldn't change this property, you still couldn't make a future for Silver's Post-it adhesive. Says Fry, "You had to get the adhesive to stay in place on the note instead of transferring to other surfaces. I think some of the church hymnals have pages that are still sticking together." The two members who invented a paper coating that made the Post-it adhesive work were named Henry Courtney and Roger Merrill. Silver said, "Those guys actually made one of the most important contributions to the whole project, and they haven't received 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 structures."

Courtney and Merrill's contribution was the first in a series of actions that definitely were not accidents. Although there was still organizational resistance after Fry's choir book epiphany, every action thereafter, including Courtney and Merrill's research, was directed toward the development, production, and market success of the Post-it note. Fry was a tenacious advocate of the product through all phases from development to production scale-up. While Silver's task had been simply to convince his corporation that his glue was not just a footnote in the obscure history of adhesives, the job Fry assumed was to overcome the natural resistance of people to manufacturing a product differently from their normal experience base. The engineers in 3M's Commercial Tape Division were accustomed to tape, which is sticky all over on one side and then gets packaged into rolls. To apply glue selectively to one side of the paper, and to move the product from rolls to sheets, the engineers would have to invent at least two entirely unique machines. Furthermore, even though 3M is noted for its coating expertise, the company did not have the coating equipment capable of putting the necessary precision on an imprecise surface such as paper. Nor did they have a good way of measuring the coating's weight. Have you ever noticed, for example, that the pads are no thicker at the adhesive layer than at the rest of the pad?

In war and politics, the best strategy is to divide and conquer. In production engineering, the reverse seems to be true. Fry brought together the production people, designers, mechanical engineers, product foremen, 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. Although the problems bothered the production people, they delighted Fry. "Problems are wonderful things to have if, in overcoming them, you've created a product that is easy for customers to use but difficult for competitors to make."

Inevitably, from these discussions people started thinking of places around 3M where they'd seen machines and parts they could use to piece together the impossible machines they needed to build. And they thought of people who could help. "In a small company, if you had an idea that would incorporate a variety of technologies and you had to go out and buy the equipment to put those together, you probably couldn't afford it, or you'd have to go as inexpensively or as small as possible," said Fry. "At a large company like 3M, we've got so many different types of technology operating and so many experts—guys that really know all about any subject you want—and so much equipment scattered here and there, that we can piece things together when we're starting off. It's the old 80:20 rule; that is, 80 percent of the equipment and materials needed can probably be found within the company and can be scrounged by an 'entrepreneuring' champion."

Then there was Art Fry's basement. He had had arguments with several mechanical engineers about a difficult phase of production, applying adhesive to paper in a continuous roll. He said it could be done; they said it couldn't. Fry assembled a small-scale basic machine in his basement, then adapted it until he'd solved the problem. The machine worked, and it would work even better once the mechanical engineers had a chance to refine it. But the next problem Fry had was worse: the new machine was too big to fit through his basement door. If he couldn't get it out of his cellar, he couldn't show it off to the engineers. Fry accepted the consequences of his genius and did what he had to do. He broke down an external wall in his ground-level basement and delivered his machine by caesarean section!

Within two years, Fry and 3M's mechanical engineers had tinkered their way to a series of machines that, among other things, coated the yellow paper with its "substrate," applied adhesive, and cut the sticky paper into little square and rectangular note pads. All of the machines are unique and proprietary to the company. They are the key to the Post-it Notes' marvelous high-quality consistency and dependability. The immense difficulty of duplicating 3M's machinery is part of the reason few

competitors have made it to the market with Post-it note imitations. Fry and the engineers worked on their unique machines and mass-production methods in a pilot plant in the Commercial Tape lab. The project team mapped out every raw material, processing step, test procedure, and intermediate product needed to produce the final output (according to Fry, the quality is so good that there have been fewer than 75 complaints since Post-its were introduced nationwide in 1980). The pilot plant produced more than enough Post-it note prototypes to supply all the company's offices. All the sticky pads went to Nicholson's office. From there his secretary carried out a program of providing every office at 3M with Post-it Notes. Early in the program, secretaries on the fourteenth floor, where the senior managers work, all received Post-it Notes and became hooked. Jack Wilkins, the Commercial Tape Division's marketing director at the time, described the process of discovery that hit people the first time they encountered the Post-it Notes. "Once people started using them it was like handing them marijuana," said Wilkins. "Once you start using it you can't stop."

Strangely enough, the personal enthusiasm of secretaries and marketing people like Wilkins did not impress the people responsible for putting Post-it Notes onto the market. For the division's marketing organization, fear of the unfamiliar repeatedly raised its head and threatened to scuttle the program. The marketing department had got out of the habit of dealing directly with consumers. This is ironic, because that much-heralded 3M hero, William L. McKnight, had established a tradition of direct contact with consumers in 1914. That year, as the company's brand-new national sales manager, the first act performed by the young McKnight was to visit furniture factories in Rockford, Illinois, and find out from workers what was wrong with 3M's mediocre sandpaper, which was then the company's only product. That trip to Rockford was the first instance of an executive from 3M walking in the door, approaching a user, and saying, "Here! Try this! Tell me what you think!"

By 1978 the Commercial Tape Division's marketing department was involved in the introduction of half a dozen new products that met eas-

ily identified needs for clearly defined markets, products like book binding tape for libraries and PMA adhesives for the art market. The Post-it Note was just another new product, and not a high-priority product at that. While the company's marketing people had become mesmerized by Post-it Notes in their own offices, they couldn't imagine that other people would feel the same way. They said you could only sell these things if you gave them away free, because who's going to pay a dollar for scratch paper? Although most of the marketing group had used Post-it Notes, when they created marketing materials to present the new product they included no samples. Instead they wrote brochures describing the note pads, they sent boxes of samples separately—which people would open only if they got excited by the brochures. The 3M marketing group was trapped by its own paradigm. It was their job, as marketing experts, to explain products, not to demonstrate them. And as explainers, they had no words to overcome the "scratch paper" metaphor. If they couldn't explain them, they couldn't sell them.

Nicholson, who had spread Post-it Notes like an infection within 3M, only had limited power to push them outside the company. When the four-city market test failed, he alone might not have had the influence to keep the produce alive. But by this time Nicholson had a heavyweight ally in his own boss Joe Ramey, a Division vice president and General Sales Manager of the Commercial Tape Division. Nicholson and Ramey were curious as to why a product that to them had obvious appeal had bombed so terribly. Had 3M's conventional marketing approach victimized an unconventional product? They were sufficiently curious about the trial to fly to one of the market-test cities—Richmond, Virginia. Ramey had been a marketing troubleshooter and he knew realistically that some market problems are just too far advanced to be saved. Nevertheless, he agreed to go to Richmond because he liked Nicholson, not because he liked Post-it Notes' chances of survival.

If Nicholson and Ramey hadn't gone to Richmond, 3M almost certainly would have ceased pilot production of Post-it Notes, retired the new machinery they'd designed for the job, and let the

several hundred thousand note pads dwindle into dusty inventory. 3M had always been a company very skilled at developing new variations from old products and then expanding their range of activities as a result of such developments. But Post-it Note Pad was unique, a product entirely unrelated to anything that had ever been sold by 3M. The reason Nicholson made the extra effort to go to Richmond with Ramey to engineer a market reversal was that they had both used Post-it Notes. They knew how clever and irresistible they were. They also knew that their own marketing people had approached the market tests in the four cities of Tulsa, Denver, Richmond, and Tampa in a traditional style. These were tests that relied heavily on advertising to generate enthusiasm in distributors who did not themselves use Post-it Notes and who saw little sense in exerting sales efforts for a scratch pad that represented both an exorbitant price and a dubious profit margin. Nicholson and Ramey took to Richmond a bit of understanding that had eluded all the marketers and distributors: Post-it Notes were just something you had to *use* to appreciate.

Nicholson and Ramey took the next logical step: they stopped depending on the organization. They went out and did it themselves. To do this, they returned to the two things that had already "sold" Post-it Notes more than once. First, like Spencer Silver shuffling from one 3M division to another with his queer adhesive, Nicholson and Ramey went door-to-door. Second, they gave away the product, which is what they had been doing within 3M for more than a year. Throughout the banks and offices of Richmond's business district, Nicholson and Ramey introduced themselves and handed out little sticky pads of Post-it Notes, saying, "Here, try this." And they watched as all kinds of people, from secretaries to programmers to vice-presidents, did just that. They tested Post-it Notes in the flesh and saw firsthand the excitement and addiction of first-time users. In one day of personal contacts in Richmond, Nicholson and Ramey had obtained vivid assurance, not only that people liked these things, but that they were pleading for 3M to make more and that they were going to tell their friends about them. As was later demonstrated in a

massive marketing giveaway program in Idaho, now immortalized in 3M as the "Boise Blitz," people loved the Post-it Notes they got free at first, and if getting more meant they had to pay a dollar a pad, it was well worth the price. Post-it Notes seem to spoil office people forever, for they do something no product ever did before. They convey messages in the exact spot you want with no after marks, dents, or holes. They can be moved from place to place and they come in various sizes (and now in colors) for different kinds of messages. Once you've used them, it's hard to go back to staples and paper clips.

The Boise Blitz was unusual but not unique at 3M. The company had saturated test markets before with products and ads. In addition to spending a small fortune on advertising, promotions, and free Post-it Notes, 3M diverted most of its Office Supply Division sales force and a battalion of temporary employees to the city of Boise in Idaho. The blitz confirmed the appeal of Post-it Notes, revealing that sales inevitably follow the distribution of free samples. Reorders came in at a rate of 90 percent, which is double the rate of any other wildly successful office product. But Boise notwithstanding, the real key to the market breakthrough for Post-it Notes was the first effort in Richmond, when Nicholson and Ramey did what 3M sales representatives had been trained to do since the early days when sandpaper was their only product; they talked directly to the end-user and then they showed distributors and retailers the results.

Recalling the trip to Richmond, Nicholson called it an "accident" and "an act of desperation." Neither he nor Ramey were hopeful that they could rejuvenate a doomed product by an impulsive flight to Richmond to knock on strange doors. "What made me go out into the market was the enthusiasm of Nicholson and Fry," said Ramey. "I just figured for their morale I should get out and find out whether we ought to kill it once and for all. My reaction when I first went out into those markets was that we probably had a dead duck on our hands. Frankly, I thought it was a product that people just wouldn't buy." Nicholson described the Richmond revelation as the last in a series of accidents from

the initial invention of the adhesive technology by Silver to the invention of the Post-it Note itself. Fry was around the adhesive and he had a problem that he needed to solve. Had Fry not been in an environment where people were playing around with that adhesive, he never would not have come up with his contribution.

Retrospective writings about Post-it Notes refer effusively to the encouragement provided to creative people by champions and patrons in 3M management. Silver often wonders where all that management encouragement was during the first five years of his struggle to be heard. The 3M organization does not provide interesting soil for new ideas to grow, but until Nicholson listened to a presentation by Silver and his colleague Oliveira, 3M management had given no hint of support for what eventually became the Post-it Notes project. Until then, the flame was borne by researchers from below, acting largely in solitude and occasionally in defiance of the organization's implicit desires. Silver's adhesive (and the sticky bulletin board it spawned) lasted out a half decade of cold shoulders only because 3M has a tradition of "internal selling"; that is, anyone with a product idea can shop it around the company's many divisions for developmental support. This means that inventors never really get stopped at 3M—there isn't any central overseer saying, "Cut that out and get back to work!" Instead, inventors labor in their spare time, experiencing mounting rejections from managers, most of whom do not have the imagination, the patience, or the budget to take a serious look at their ideas. As in other companies, product ideas die at 3M, but their deaths are often more slow and lingering.

Silver and Oliveira were chemists, working at 3M's central R&D lab to develop variations in chemical products. Like other chemists, they worked within specific programs set out by 3M to attain certain results, but they also had encouragement to follow up on interesting, unexpected results—within reason, of course! According to 3M policy, scientists can use up to 15 percent of their time pursuing interests outside their primary assignments. But when asked who keeps track of 3M

researchers' use of the 15 percent rule, and how this is done, the answer is that no one really keeps track. In fact, Fry points out that "No one really has extra time. The 15 percent is time that's put in after 5:00 or in weekends. (The 'bootleg' rule was instituted by McKnight after he had ordered Dick Drew back in 1923 to stop working on what turned out to be masking tape.) It gives us a chance to shape our own careers, for McKnight recognized that people give their best efforts to projects they're most interested in. The reward for the extra effort is that we are soon officially asked to do what we wanted to do all along." Fry goes on to emphasize that the beauty of bootleg projects is that they don't rely on top-down decision making. "If you are going after an established market with existing technology, then top-down decision making is fine, but new-to-the-world things generally require perspectives and information from people scattered within the organization. While innovation starts with the initial idea for a creative product, a lot more creativity and new ideas are needed to build the idea into a business." The creative climate allows one to keep a low profile during the time when the early, tough problems arise that require creative solutions. One of the things that Fry had going for him right away was the support from his immediate lab supervisor, Bob Molenda, to charge expenses to "miscellaneous accounts." This is another of the ways the corporation puts teeth into McKnight's policy of giving freedom to chase new ideas. The company had provided Fry with just enough time and money to get started. "Throwing a lot of money or people at the task not only won't speed it up," says Fry, "it will only cut down on management's ability to afford to be patient. Things can be easily killed before they get a real chance."

Silver also kept the Post-it adhesive alive for a remarkably, and perhaps unreasonably, long time because he also kept busy with other research tasks assigned by the company and didn't devote his entire energy to his funny discovery. He is also a cheerful man with an amazing tolerance for rejection. For more than five years, Silver's adhesive was a really oddball idea that make little sense either technically or commercially. It had no per-

ceptible application; it was a solution looking for a problem. And of all the ways to devise new products, probably the most difficult and inefficient is to invent some substance with novel properties and then search for ways to use it, especially when the goal is to develop a product for which people will pay. Nevertheless, seeing face-to-face the reactions of people in Richmond "playing" with Post-it Notes was so dramatic to Ramey and Nicholson that they finally had all the evidence they need to orchestrate the Boise Blitz.

It's remarkable that Post-it Notes and sandpaper, two of the company's greatest breakthroughs, sixty-six years apart, grew out of a similar style and faith in the wisdom of sitting down with customers and asking questions, without any of the trappings of corporate protocol. It could be just a coincidence, but according to many analysts, Post-it Notes finally succeeded because 3M's corporate culture creates a positive environment for innovation. Although corporate culture is one of those ill-defined and overused business concepts, suffice it to say that there is something in 3M's style that tends to encourage a measure of individual ingenuity among its workers. Fry comments in his talks that "if managers aren't innovative, if they don't provide the climate for creativity, if they can't set aside their carefully laid plans to take advantage of a new opportunity, then intrapreneurs (entrepreneurs within a large established business) have little encouragement."

"3M operates on a simple principle," Forbes magazine once said, "that no market, no end product is so small as to be scorned; that with the proper organization, a myriad of small products can be as profitable, if not more so, than a few big ones." This tolerance of the small-scale certainly helped Spence Silver, and then Art Fry, to keep the company from stomping on the Post-it Notes project before the project had developed a life of its own. But there was also the benefit of bigness. Over the years, 3M has grown into a loosely integrated cluster of divisions, with senior management in the St. Paul corporate headquarters. One of the results of this corporate sprawl is that it permits the clever researcher to hide in the crevices and carry out his

own version of the "15 percent principle." Silver benefited more from this "neglect" than from anyone overtly encouraging him to innovate. Fry also enjoyed this dispensation from scrutiny as he fostered the Post-it project through the touchy and costly labor of product development. Although Fry started out as the team leader, the project's formal coordination passed back and forth between marketing and engineering. "Others were better suited to that function than I," says Fry, "and I needed to be free to focus on technical problems."

A more provocative issue, though, is why people at 3M enjoy such unchecked opportunity to "get away with things." A hasty judgment might be that the company's senior management is consciously fostering and rewarding innovative growth. But there is ample evidence to challenge this assertion. The company tends to recognize its most successful creative people by investing them into the company's Carlton Society or, as in the case of Fry, installing them in private laboratories. After each unexpected invention emerges at 3M, the company tends to follow up by creating new programs for innovation (the latest is called Genesis) and new honors to motivate inventors. 3M also gives "Golden Step Awards" for products that sell \$2 million, at a profit, within the first two or three years of national introduction. When Post-it Notes won a Golden Step Award in 1981, 13 other products also won the award. In 1987, 3M had over 50 Golden Step Winners. Yet there seems to have been no desire for trophies, promotions, or rewards in any of the Post-it project principals nor in any of 3M's prior inventors. They were people obsessed with problems, not rewards, and they usually invented their own program in order to get a problem solved.

Extrinsic incentives simply don't explain why 3M gets creativity from its Silvers and Frys. There might be a more credible explanation in the company's origins. Since 1910, 3M has been inextricably linked with the city of St. Paul, and some 80 percent of its employees have historically come from the upper Midwest. One of the striking characteristics of community-linked Midwestern companies like 3M is that company and community

have grown up together, and they like to think they know what to expect from each other. This bond among town, corporate management, and workers creates trust, and with trust comes an air of amiability. The ease and unpretentiousness of the highest officials at 3M is different from the formality and status sensitivity of managements in other regions, especially in the East. Nicholson and Ramey, for example, did not need to overcome a lot of deep-seated conditioning in order to go out on the streets and behave like peddlers. Fry himself sold pots and pans and luggage door-to-door while he was in college. At 3M, it is simply not good form for management to watch too closely over the shoulders of its veteran employees. It is equally bad form for employees to violate the trust placed in them by a less than vigilant management. There is an honor system, and it works.

The source of this heartland ethos may lie in the farms that surround St. Paul and the pioneering spirit from which they originated. A midwestern American farm is a place where—for generations—each worker has been expected to complete his daily chores before sitting down to supper. Nobody ever watches him do his chores; if he doesn't do them, the disastrous evidence will become apparent by the next day's dawn. Nobody ever asks him if he did his chores, because he wouldn't be eating if he hadn't. People carry on without permission at 3M because they're trustworthy. And they're trustworthy because trust is a part of the larger culture that has surrounded and affected 3M for eighty-five years. In fact, one thing 3M has shown is that when it gets too structured and self-conscious about managing its innovation, it doesn't innovate any better than any other company. As Nicholson said, Post-it Notes came from accidents, not calculations.

The Post-it note accidents were Spence Silver's polymer discovery, Arthur Fry's bookmark epiphany, and Geoff Nicholson's dragging Joe Ramey off to Richmond. Each accident occurred after one person took an entirely independent

course of action from the one assigned by the corporation. Each time, the individual got frustrated by either the indifference or the resistance of the organization. Similar accidents had occurred in the past. In 1956 a researcher spilled a tube full of totally useless fluorocarbon compound on her shoes—and from that accident, chemists Patsy Sherman and Sam Smith created Scotchguard fabric protector. In 1950, after three polite 3M requests to stop wasting money, researcher Alvin W. Boese squeezed synthetic fibers mixed with wood pulp through a makeshift comb and created one of the most successful types of nonwoven decorative ribbon ever devised. Masking tape, cellophane tape, and many other big product successes can trace their origins to a similar sequence of "happy accidents."

These accidents happened because when the organization, or management, discouraged people from doing something, the cancellation order didn't carry much conviction. Ego is not popular at 3M, and it is clear that the people thinking up things often have more room to express their egos than the people who are supposed to be running things. If there is an organizational key to breakthrough at 3M, a significant element of corporate culture, it is the fact that people there don't believe in placing the values of the corporation above the values of the individual. People keep the organization vital by not taking the organization too seriously. As a result, when the creative people, Silver and Fry and Nicholson, inevitably ran into the resistance of the organization, they felt the freedom to say, "Well, okay. Never mind. I'll do it myself." The organization simply did not have an equal measure of persistence in response. 3M gives in to people who are sure of themselves. Just as important, everybody at 3M knows that, if someone's pet project blows up in his face, it isn't the end of the world. If Silver, Fry, or Nicholson had failed, they wouldn't have been dismissed or disgraced. As long as they had their chores done, they always had a place at the table.