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The Spirit of Innovation

*Lester C. Krogh**

Asked to comment recently on 3M's long record of success, a security analyst said, "3M gives people an environment in which they can create, and they just come up with brilliant idea after brilliant idea."[1] Flattering as that statement is, it raises an interesting question. How do you create a climate in which people can be innovative?

At 3M, the climate for innovation has evolved over the years from the accumulation and interaction of several factors. Generally, these can be lumped together into three broad categories:

* Organization
* Culture
* Specific strategies for innovation.

I. ORGANIZATION

For many years, our key strategy for organization at 3M has been to decentralize businesses into relatively small, agile operating units — and then to back up these units with the technical, manufacturing and marketing muscle of the entire company. We have close to forty product divisions, organized into four sectors:

1) Industrial and Electronics — which markets many lines of tapes, abrasives, adhesives, specialty chemicals, electrical and electronic connectors and telecommunications equipment;
2) Information and Imaging Technologies — which includes commercial graphics, audio visual, magnetic media and imaging systems;
3) Life Sciences — which is responsible for medical, surgical, orthopedic and dental products; personal and occupational safety products; and traffic control materials; and
4) Commercial and Consumer — which includes products ranging from *Scotch* brand *Magic* transparent tape and *Post-IT* brand repositionable notes to advertising services.

We do research on three levels. Divisions have their own laboratories where researchers develop products and technologies for specific markets — short-term research for the most part. At the same time, sector laboratories work on technologies the divisions will need five to

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[1] Davenport, *America's Most Admired Corporations*, FORTUNE, Jan. 30, 1989, at 68, 70 (quoting Theresa Gusman, security analyst at Salomon Brothers).

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ten years from now. Our corporate research laboratories conduct basic research that may not see the light of day as a commercial product for ten to twenty years.

With close to forty divisions, and about 110 core technologies, we want to make sure our researchers take full advantage of the rich technical resources available to them throughout the company. In fact, we have organized a massive and continuing effort to promote cross-communication among our technical people which we call the Technical Forum. It has twenty-two separate chapters that specialize in a wide variety of technical disciplines. Polymer chemists, for example, from all over 3M get together regularly to exchange ideas, compare opportunities and hash out problems that may have them stumped.

Our policy is that, while individual products belong to the division that develops or sells them, *technologies* belong to the company. Let's say, for example, that people from our Abrasives Division are looking for a new type of pressure-sensitive adhesive to use on the back of a sanding disc. They are perfectly free to help themselves to an adhesive developed by one of our tape divisions. This kind of cross-fertilization goes on all the time at 3M, and it is one of our major strengths.

In recognition of the fact that things get more complex every day, we have just organized a new chapter for our Technical Forum — a group to study the management of research, a subject that is becoming a discipline unto itself.

Another way we tie our diverse technologies together is through our corporate Technology Planning and Policy Committee. Our aim with this committee is to make sure that our technical development is moving in the same direction as our business policy. 3M's top technical executives meet regularly to review our existing technology portfolio, set priorities for use of our technical resources and identify technologies we think will have an impact on 3M in the future. In other words, we want to spend research dollars where they will count most.

What are we trying to accomplish with this kind of organization? We want the best of both worlds. We want business units that are small and agile enough to move quickly — to see an opportunity and go after it. We have found that, almost without exception, when we move new product lines into units of their own, sales of the new products begin to grow faster. At the same time, we can back these business units with tremendous worldwide resources.

II. CULTURE

In the last few years, corporate cultures have been defined, described, analyzed, dissected and evaluated on business pages and in the books of assorted management gurus. But culture is still a mystery — intangibles that seem to set the working atmosphere of one company apart from others.

What sets 3M's culture of innovation apart? I may be too close to the situation to be able to analyze it clearly, but I think there are three key ingredients: patience, a genuine respect for the ideas of others, and a constructive attitude toward failure. While these may sound like a routine list of organizational virtues, there is nothing routine about putting them into practice.

About forty years ago, 3M acquired the right to a process for producing fluorochemical compounds. At first, our people could make only low-boiling fluorocarbon, gases and inert fluorocarbon liquids. There was only one problem: no use could be found for these substances. Eventually, we produced some by-products, some of which turned out to be reactive, fluorine-containing materials. No use could be found for these either, yet they were among the most expensive organic chemicals known to man.

Seven years after acquiring the patents, we had about 100 people working on fluorochemicals. At that point management began asking politely whether we thought anything useful would ever come of our labors. In fact, the vice-president for research called in fifty of the people on the project and asked each one whether fluorochemicals were worth pursuing. Of the fifty interviewed, forty-eight said "yes." We were given the green light.

One day, a laboratory technician spilled a sample of the material on her tennis shoes. The substance resisted efforts to wash it off. Even more interesting, the affected area stayed much cleaner than the rest of the shoe. From that accident came *Scotchgard* brand fabric protector, and then a whole family of useful products.

In research, patience is indeed a virtue, as is the willingness to listen to the people closest to the job and to respect what they have to say.

Another lesson we have learned is the value of a constructive attitude toward failure. We don't even like to use the word "failure" around 3M, but we've all experienced it at one time or another. The important thing is what you do about it.

One group of our researchers working on non-woven fibers discovered that when you make very large fibers from polyvinyl chloride in a particular way, you end up with very curly fibers. Again, no one had any idea of what to do with these very curly fibers. The project seemed like another failure, but the researchers continued to kick around ideas. Then someone thought of putting a backing on the fibers, and produced the extremely popular *Nomad* brand floor mats. However, not all failures can be turned into successes.

In a company working on hundreds of new products at a given time, failures are inevitable. When that happens, we do not crucify the people on the project. We invite them to think about what happened, then to pick themselves up and get going on something else. Because their jobs

are not constantly in jeopardy from a slip-up, they are generally more ready to take the risks that can lead to breakthroughs.

Do we always live up to our ideals? No, sometimes we run a little short of patience, respect for ideas and constructive attitudes toward failure. But we know these are the values of our organization — the benchmarks against which we measure our managerial styles. Over the years, these values have been woven thoroughly, and we hope inextricably, into our culture.

III. Strategies for Innovation

In order to encourage our people to be innovative, 3M uses the following specific strategies. First, we challenge our people with this target: in any year, at least 25% of our sales should come from products introduced in the last five years. In fact, in the last four years, we have been exceeding that target. Our managers are judged, not only on their ability to make existing product lines grow, but also on their knack for sponsoring the development of new products and bringing them successfully to market.

Second, we encourage our people to spend up to 15% of their time in the laboratory on projects of their own choosing. Despite the fact that a relatively small percentage of our people make use of this option at any given time, they know the option is available if they would like to use it.

In the 1920s, a 3M laboratory worker named Dick Drew happened to be visiting an auto body shop, and watching painters trying to deal with one of the new-fangled two-tone cars. The painters had masked one of the colors with paper and glue. When they pulled off the paper, they ruined the whole paint job. Dick Drew thought he could do something about this. He produced a masking tape with some glycerine in the glue, so that you could pull off the tape without pulling off everything underneath it. The only trouble was that in the summer the tape would unwind by itself, and in the winter you couldn't pull the tape off the roll to save your life.

Now, Drew had other responsibilities that had nothing to do with his tape ideas. But after some initial skepticism, his managers gave him some time to follow through. Eventually, the result was the first masking tape, the first in a long line of Scotch brand tapes. That was more than sixty years ago.

Just a few years ago, another 3M researcher, Art Fry, was working on a pet project of his own, using his 15% option. What he eventually developed was *Post-IT* brand repositionable notes — a habit forming communication device that has turned into one of the best-selling office products in the world.

A third strategy for innovation is recognition, and plenty of it. We don't use a bonus system to reward innovation, although inventors of

blockbuster products can approach their next salary review with a certain amount of confidence.

We have found that innovative people really respond to the admiration of their peers. So we developed a variety of ways to recognize innovation and excellence. The rewards range from dinner with the boss to fairly lavish award banquets and election to the Carlton Society, a select group of the very best 3M scientists. Awards like that mean a great deal to our people. Our recognition programs dramatize over and over again that our company owes success to the ideas and drive of individual men and women. That is perhaps our most deeply held belief.

Finally, for our technical and sales organizations, we have two parallel career paths. One is a route which can lead a technical person, for example, to positions as supervisor, manager, laboratory manager and technical director. The other route is for talented people who would rather fight a pit bull than prepare budgets or performance appraisals. This career path allows them to advance in pay and perks, without abandoning their first love — the laboratory. Some people move back and forth between the management and technical career paths during their career. Moreover, the people who make contributions know that they don't have to wait until I retire or die before they can move up — an encouraging thought for them and a comforting thought for me.

That, very briefly, is our strategy for creating an atmosphere of innovation. It involves the way we organize, the culture we nourish, and that nourishes us, and includes a series of practical steps meant to ensure that people have a chance to take an idea and run with it.

What does all this have to do with the protection of intellectual property?

Let's ask a fundamental question: What *is* the product of a laboratory? Is it the product that eventually goes to market? No, the laboratory simply tells the manufacturing plant what to make and then tells the marketing people about benefits to customers that will sell the product. The true product of a laboratory is *information*.

Patents encourage this flow of information in two ways. First, they protect the information and allow our organization to be rewarded for creating it. In this way, patents provide an important stimuli to innovation; they help guarantee sufficient return both to reward the organization and its inventors and to provide seed money for more invention. Second, patents protect the identity of the inventors. Without patents, we would have to do our work in the deepest secrecy. The accomplishments and the identity of our innovators would remain in the dark.

Thanks to strong patent protection, we can tell the world who our innovators are and what they have done. We can point to individual men and women and say with pride and gratitude what they have contributed to our company and to our society. For 3M, that is the heart of a creative environment.