

MEMORIAL UNIVERSITY OF NEWFOUNDLAND - MARINE  
INSTITUTE

CASE STUDY #4

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## **Innovation at 3M Corporation (A)**

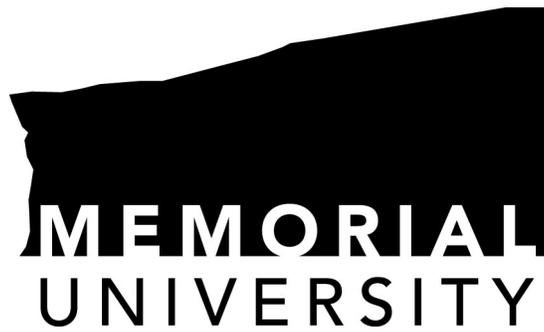
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April 11, 2013



## **Executive Summary**

The Minnesota Mining and Manufacturing Company (3M) has a long history of innovation. They are known for such products as the Post-it<sup>®</sup>, which revolutionized the way individuals communicate, masking tape, and waterproof sandpaper. Beyond these innovative products, 3M initially branched out into health care in 1961. This unit of 3M has grown substantially since that time, and in more recent years it has seen annual sales reach more than two billion dollars.

The Health Care Unit is a core component of 3M's business model. Although, the unit was recording significant and increasing sales, it had failed to introduce a successful product in almost a decade. This did not jibe well with one of the company's key objectives, which aimed to see at least thirty percent of sales originate from products that did not exist four years earlier (Thomke & Nimgade, 1998, p. 3). Rita Shor, a senior product specialist, and a hand-picked group of subject matter experts were tackling this challenge using a new and innovative market research method called "Lead User Research." This method addressed some of the shortcomings of the more traditional market research methods implemented by the company. After many months implementing the new market research technique, Rita and her team landed on four recommendations. Three of the recommendations would see the introduction of new product lines, whereas the fourth recommendation hinged on a complete rewrite of the Health Care Unit's business strategy.

Rita and her team were spending considerable time discussing the best path forward and trying to determine the ultimate recommendations they would make to the senior management team of the unit. Given the degree of change that would result from implementing the fourth recommendation and the waning desire for lead user research, it might be wise for Rita to initially suggest the new product lines to the senior management team. Rita should not disregard the fourth recommendation, but she and her team should invest more time into developing, planning, and further studying the potentially new approach to the unit's business model before introducing it to management.

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# 1 Problem Identification

The Minnesota Mining and Manufacturing Company (3M) has a long and famous history of innovation. They are known for such products as the Post-it<sup>®</sup>, which revolutionized the way individuals communicate, masking tape, and waterproof sandpaper.

The Health Care Unit was an important component of 3M's business model, contributing a large percentage to the company's revenue streams (see Figure A.2). Although, the unit was recording significant sales, it had failed to introduce a successful product in almost a decade. Given that the company had set one of its working objectives to produce thirty percent of sales from products that did not exist four years earlier, this team had its work cut out for them (Thomke & Nimgade, 1998, p. 3).

Traditional market research methods were marred with shortcomings, and have proved to be ineffective in helping the Health Care Unit understand customer and market needs (Thomke & Nimgade, 1998, p. 5). Rita Shor, a senior product specialist, with a creative mind and many years of experience at 3M was tasked with developing an innovative product or process that would see the unit break free of its long streak of unsuccessful products (Thomke & Nimgade, 1998, p. 5). Armed with her experience, and a hand-picked group of subject matter experts, Rita and her team embarked on a new approach to market research called "Lead User Research."

After a prolonged market research procedure, the product development team had developed three recommendations for new product lines, and a fourth recommendation that might potentially result in having the whole business unit's strategy statement rewritten. Given a recent change at the division manager level and a waning appreciation for the "lead user research" method, Shor and her team were now faced with having to balance between the current incremental approach that 3M was familiar with, and a more radical and potentially breakthrough change to its core business strategy. Shor's ultimate goal is to deliver successful product ideas and help position the company and unit for a healthy and competitive future.

## 2 Data Collection

3M's origins date back to 1902 when five investors came together in a failed attempt at mining exploration and development. From that date, the company has developed a number of innovative products, some of which came about haphazardly. For example, in the 1920s a young lab assistant made the link between a common paint problem encountered in auto-body shops and a new and crinkly backing material for sandpaper. The result was masking tape. As haphazardly as these innovations seem, they helped rocket 3M forward into a multi-billion dollar company.

Known for its creative atmosphere and for being a 'hothouse' of innovation, the company continued making large investments into research and development (R&D) activities. In recent years leading up to 1997, the company made considerable R&D investments ranging between approximately \$880 million and \$950 million (Thomke & Nimgade, 1998, p. 15). In 1997, the laboratory-based R&D investments topped out over one billion dollars. As part of these investments, 3M employed over 6,500 scientists, engineers, and technicians between the United States and overseas. These large investments allowed 3M to achieve its high rates of innovation (Thomke & Nimgade, 1998, p. 3).

Product development teams at 3M generally relied on more traditional methods of seeking marketing input. These methods involved the collection of data from: (1) data from sales representatives; (2) focus groups; (3) customer evaluations; (4) site visits; and (5) data on risk factors for diseases (Thomke & Nimgade, 1998, p. 3 - 4).

The success, to date, of the Medical-Surgical Markets Division was built on the sale of surgical drapes. In 1995, the company was enjoying over \$100 million in sales from surgical drapes alone. Although the company was enjoying reasonable success from the sale of surgical drapes, it found that growth in the United States was limited, and penetration into markets overseas was hampered by the high cost of 3M products when converted into foreign currencies. Faced with these challenges, and the reality that technological excellence often was not enough, the business unit had

gone almost a decade without introducing more than one successful product (Thomke & Nimgade, 1998, p. 5). Senior management tasked Rita Shor with breaking this cycle.

In identifying the lackluster efforts and success of the Medical-Surgical Markets Division, it became evident that a change was needed. Recent involvement of Mary Sonnack, a division scientist with 3M, in a new approach to product development known as "lead user research" presented a new opportunity for the division. The general concept for the new method required that the product development team tap into "lead users," or those individuals that face market needs well before others (Luck, Pocock, & Tricker, 2004, p. 167).

Shor, in cohorts with Sonnack, convinced senior management of giving them a chance to pursue the new approach. After receiving an initial green light, Shor assembled the lead user research team. The team consisted of individuals with a wide breadth of expertise and backgrounds, including antimicrobial pharmacology, chemistry, dermatology, biology, veterinary science, and even Broadway make-up artistry (Thomke & Nimgade, 1998, p. 19 - 20).

The general approach to "lead user research" involved four stages:

1. Project planning
2. Trends/needs identification
3. Preliminary concept generation
4. Final concept generation

In the project planning stage, the team identifies the various types of markets and potential new products of interest that they would like to explore. In addition, the team needs to decide whether an incremental or breakthrough innovation will be pursued, identify the boundaries for the procedure, and get an initial feel for current needs and trends of the market (Thomke & Nimgade, 1998, p. 17). For Rita and her team, this stage took roughly six weeks. During that time, the team developed an invaluable database of information. The database included tidbits of previously unknown information such as that thirty percent of infections originated from a patient's own skin (Thomke & Nimgade, 1998, p. 7).

The next stage includes the identification of trends and needs. In contrast to stage 1 where an initial look at trends and needs of the market is undertaken, this stage requires the team to narrow in on a specific need-related trend or trends, which will remain the focus of the rest of the procedure. This stage often involves a workshop (Thomke & Nimgade, 1998, p. 17). Over the course of a 5-day workshop, the lead user research team at 3M had to decipher all the information that was gathered in Stage I. As the stage progressed, a variety of subject matter experts were enlisted. These experts included individuals from a wide breadth of specialties including veterinary sciences and make-up artistry. This stage lasted approximately six weeks for the team (Thomke & Nimgade, 1998, p. 8).

In the third stage, preliminary concept generation, the team begins matching preliminary concepts with actual customer needs. Business potential of the new product or service concept is assessed, while conformity with current business interests is confirmed (Thomke & Nimgade, 1998, p. 17). In general, this stage takes between five to six weeks. However, Rita and her team engaged in international fact-finding trips in countries such as Korea, Indonesia and India, which increased the length of this stage by almost four times (Thomke & Nimgade, 1998, p. 8).

In the final stage, final concept generation, builds on the initial concept developed in stage three. This stage focuses on improvement and add-ons to the preliminary concept. A core component of this stage is a one to two day workshop. The workshop involves an evaluation of the concepts from the perspective of technical feasibility, market appeal and potential, and conformity to current management priorities (Thomke & Nimgade, 1998, p. 17). Rita brought 11 3M personnel and 11 outside experts together for the final concept generation stage. During this stage, the team faced a multitude of challenges. Four specific challenges they faced included the lack of structure for corporate meetings; balancing the participation of introverts and extroverts in a meeting; integrating creative ideas with technical and economical feasibility; and being able to discern the most important aspects from a sea of facts (Thomke & Nimgade, 1998, p. 10 - 11).

Despite the challenges faced in Stage IV, the lead user research team were able to put forward four recommendations:

1. The "Economy" Line
2. The "Skin Doctor" Line
3. Antimicrobial "Armor" Line
4. Evolution or Revolution

The first three recommendations included a mix of incremental and breakthrough innovations. They included new product lines for low cost surgical drapes; hand-held devices for layering antimicrobial substances; and "armor" that protected against blood borne, urinary tract, and respiratory infections (Thomke & Nimgade, 1998, p. 22).

The product development team had also developed a fourth recommendation, which was quite unlike the first three. As the lead user research team progressed through the stages, it started to become evident that there existed a large gap in the current health care system. The team noticed that companies had not started to provide early intervention in the disease process, in what is known as the upstream containment of infections. Therefore, the fourth recommendation hinged on the decision to be evolutionary or revolutionary. In the case where the team would put this recommendation forward, it would have the additional and likely unwelcoming effect of requiring a complete re-write of the Health Care Unit's scripted business strategy. (Thomke & Nimgade, 1998, p. 12).

3M, as a company, was enjoying substantial increases in net income (after taxes) as demonstrated in Figure A.1. In 1997, the company's net income (after taxes) was approximately \$2.12 billion. The largest contributors to 3M's profitability and revenue streams included tape products, consumer and office products, and health care products (Thomke & Nimgade, 1998, p. 16). Figure A.2 provides a look at the average revenue by class of product/service between 1995 and 1998E. Health care products accounted for approximately 17% of total revenue between 1995 and 1998E.

### **3 Analysis of Facts**

The importance of the Health Care Unit to 3M's bottom line becomes clearly evident when we look at Figure A.2, and the percentage of health care sales that contributes to 3M's total revenue.

Even though the unit is evidently important to the overall company, it has failed in recent years to deliver any substantial innovations. Rita Shor, a senior product specialist, attributed some of this failure to 3M's current approach to market research and new product development. The traditional methods implemented by 3M were inefficient and carried with them a number of inherent disadvantages. For instance, information obtained from the traditional methods wasn't necessarily proprietary. In order for 3M to successfully capitalize on potential market research, a new means was required. In addition, the need to hire market researchers to facilitate these methods often resulted in disjointed and non-seamless interaction between market researchers, the development team and costumers (Thomke & Nimgade, 1998, p. 4).

The sheer fact that the Health Care Unit accounts for approximately 17% of 3M's revenue goes to show how important of a task Rita was facing. The commitment by senior management in allocating both time and resources to Rita and her product development team also left little room for failure. The team was to approach market research and product development in a new and unfounded way, and seek out radical changes for the unit. Rita's ultimate goals were to find new ways to identify those leading-edge customer needs; develop concepts for breakthrough products and services; and implement a product development process that was customer-focused.

The success of the lead user research method hinged on the team's ability to tap into those individuals that face market needs sometime well before others. One of the key benefits of lead user research is the fostering of strong working relationships between cross-functional teams, lead users and customers, and a variety of experts. Bringing together all of these into a directed and targeted approach allows for the development of new insights and innovations. Lead user research also allowed 3M to manage any intellectual property arising from the process by having the experts sign over intellectual property rights to 3M (Thomke & Nimgade, 1998, p. 10). This is one of the core advantages over the traditional approach to market research at 3M.

As a result of the lead user research method, Rita and her team landed on several recommendations. The recommendations ranged between incremental innovations to breakthrough products, and even one recommendation to potentially rewrite the business unit's strategy statement. A bal-

anced approach with careful thought and consideration would be required by the team in order to maximize the overall benefit of these recommendations. The recommendations that involved radical or breakthrough products would likely carry with them characteristics of high risk, cost, and usually take many years before tangible results can be seen. On the other hand, incremental innovation, a type of innovation 3M is very familiar with, is less risky, usually requires less investments in R&D activities, and results become visible within a reasonable period of time (HBSP, 2003, p. 6). Although the pursuance of incremental innovations could be seen as a risk adverse approach, it is important for 3M to continue investing in R&D activities aimed at the radical or breakthrough innovation, much of what Rita and her team were doing in this case (HBSP, 2003, p. 7). These radical innovations could potentially allow 3M to break into new markets, and develop new revenue streams. In order to maximize the returns of these products while minimizing risk, the company will need to balance between incremental and breakthrough innovation.

The product development team's fourth recommendation, evolution or revolution, was looking at changing the Health Care Unit's business strategy statement. This recommendation has at its core a strong emphasis on organizational or change management. Organizational change looks at significant changes that would impact the day-to-day operations of the Health Care Unit. It could involve embracing new processes, changes to organizational structure, downsizing, cultural change, and other complex moves. Given the nature and complexity of these types of changes, studies have shown that a staggering seventy to eighty percent of these changes fail. These statistics should not curtail organizations from facing change, as it is often necessary to reinvent oneself to remain competitive. However, careful planning is required by senior management teams (Secord, 2003, p. 67).

## **4 Solution Development**

In order to ensure that Rita and her team are able to effectively demonstrate the value of the lead user research model and highlight the successes from the past months, the team should initially put forward their three recommendations for new product lines. The "economic", "skin doctor",

and the antimicrobial “armor” lines would allow 3M to promote a balanced risk-based portfolio containing both incremental and breakthrough innovations. These proposed product lines would provide 3M with the potential to increase sales for the Health Care Unit, and open up its door to emerging markets, such as hospitals in Korea, Indonesia, and India. The antimicrobial “armor” line alone has the potential to introduce the company into a new \$2 billion market (Thomke & Nimgade, 1998, p. 22).

Due to the staggering failure rates associated with introducing significant change into an organization, as outlined above, Rita and the rest of the product team should not rush to put forward the fourth recommendation on infection prevention. The team could make an initial presentation to senior management on infection prevention and then take time to carefully study, plan, and build a better business case for the new model. Instead, by placing the emphasis on the recommendations for new product lines the team would be promoting lead user research and ensuring that as a method it would be available for future teams to pursue. These views are in line with John Pournoor, a research specialist that was part of the lead user research team.

Following this approach would allow Rita to easily demonstrate the value of lead user research to the new division manager, Dunlop. By doing so, she could potentially change his views and gather additional support from senior management. In future cases, Rita might be able to argue that the implementation of this research method in other divisions of 3M could result in significant savings. This has been the case for other markets, such as the construction technology market, where the lead user concept resulted in the halving of R&D costs and the overall time-to-market for innovations (Shavinia, 2003, p. 703).

## **5 Findings and Managerial Recommendations**

Rita and her team have pursued an innovative approach in moving past the more traditional market research methods that 3M had grown accustomed to. In doing so, they were able to land on three potential new product lines that could help improve the company’s bottom line, and continue to build its competitiveness in the health care market. Beyond continuing with this new approach

to market research, the Health Care Unit of 3M could stand to benefit from a number of other recommendations.

First of all, the company should continue to rely on product developers to visit potential customers. Product developers are aptly familiar with the technical limitations of products and/or services, and may be more knowledgeable with the limits of particular technologies, trends, and business priorities. Also, 3M could potentially save costs associated with hiring external market researchers.

Another suggestion would be to continue to encourage management to invest in R&D activities. A Danish study of a variety of industries showed that there existed a fairly strong relationship between R&D investment intensity and product innovation intensity (Christensen & Kristensen, 1994). In other words, higher investments in R&D resulted in increased innovation. This bodes well for attaining the company's objective to generate at least thirty percent of sales from products that did not exist four years earlier. Convincing senior management of making additional R&D investments might not be difficult, as the company already invests significantly. In addition, the team could propose to senior management that additional investments be made in hiring overseas scientists, engineers, and technicians. This could potentially allow 3M and the Health Care Unit to break into overseas markets, and potentially develop region-specific innovations (such as the low cost surgery drapes). This would allow 3M to increase its profits and gain a stronghold on new markets.

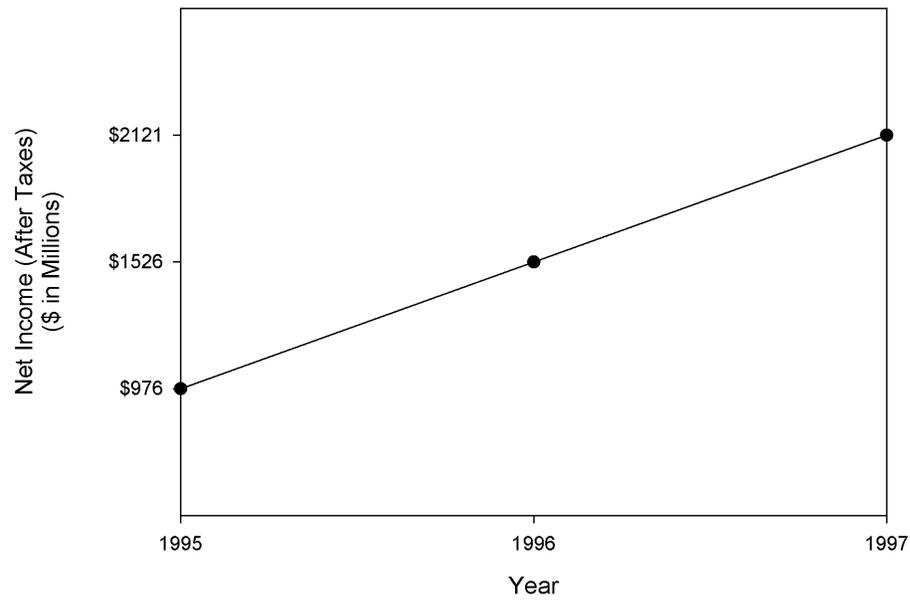
For the time being, 3M should not discard its experience with traditional market research methods. The lead user research concept still needs consideration and additional refinement before it could be implemented at a wide scale across the company. For instance, the various challenges the group faced during Stage IV of the process would need to be addressed in order to increase the efficiency of the overall process. In addition, a successful launch of the three recommended product lines might further dictate the value of lead user research and make for a stronger case for company-wide implementation. All to say, the division should not put all of its eggs into the same basket - just yet.

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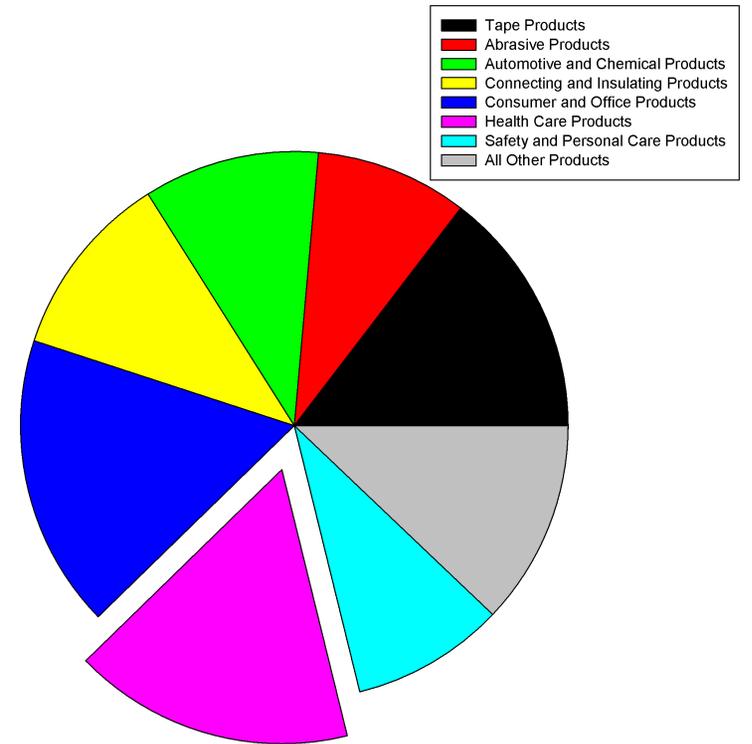
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# Appendices

# A Figures & Tables



**Figure A.1:** Net Income (After Taxes): 1995 to 1997



**Figure A.2:** Percent Revenue by Class of Product/Service