

Secretary of Defense Corporate Fellows Program

**FINAL REPORT
3M COMPANY**

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United States Marine Corps
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Disclaimer

This report represents the views, observations, and opinions solely of the author and does not reflect the official policy or position of the 3M Company, the United States Marine Corps, the Department of Defense, or any other governmental agency.

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Acknowledgements

My fellowship experience at 3M opened my eyes to the world of business; a world that I knew almost nothing about before my journey to St. Paul began. While at 3M, I had the wonderful opportunity to be immersed into a fantastic Fortune 500 company and observe its inner workings. My family and I were introduced to the Twin Cities for the first time; an area we learned to love and would like to return to. But, without a doubt, the most enriching portion of my fellowship was the great people at 3M that I got to work with each and every day. I can not possibly thank every one of them by name, but I would like to acknowledge a few that helped make my year both a personally and professionally rewarding experience.

John Houle, the Vice President for Manufacturing and Supply Chain Services and Lean Six Sigma, and my Secretary of Defense Corporate Fellows Program (SDCFP) sponsor. As the first (and maybe the last lawyer) to participate in this program, I must thank John for agreeing to take me on board in the first place. I am sure the last thing he expected when he agreed to host a Department of Defense fellow was another lawyer running around 3M. John included me on his Lean Six Sigma Leadership Team which gave me an opportunity to interact with directors from each of the Big Businesses and a great perspective across the entire company. With John's influence, 3M put together a first class Company Day event, which was highlighted by remarks by George Buckley, 3M Chairman, President, and Chief Executive Officer. I must also thank John's assistant, Janet Sneitzer, who did all of the "heavy lifting" necessary to pull off a successful Company Day including juggling the schedules of the ten or twelve 3M executives who spoke at the event.

Mary Griep, the Director, Lean Six Sigma Operations. Mary was my direct mentor for my time at 3M and she immediately integrated me into her managerial team and immersed me

into the world of Lean Six Sigma. Mary was not only a mentor, but also a friend. She and her husband helped us find a house in their neighborhood, helped my wife get a job at the 3M fitness center, and entertained our two boys with all of their cool toys. Mary is as energetic a person as I have ever seen and she taught me more about leadership than I have learned in a long time. She should have been a Marine! I would like to also thank Mary's assistant, Jayne Hurt, who alleviated all of the administrative headaches often associated with joining a new organization. Jayne saw to it that my identification badge, my computer, my e-mail account, my telephone, and even my workspace were all in order upon my arrival. Jayne was also critical to the success of 3M's Company Day event as she was responsible for all of the logistical support necessary to pull it off.

I need to thank the Lean Six Sigma Operations managerial team of Mark Bauer, Paul Chimzar, Marge Sagstetter, Bob Mitchell, and Marge Hartfel who graciously welcomed me onto their team and exposed me to every day life at 3M. I am especially grateful for the camaraderie of my regular lunchtime companions Mark Bauer, Paul Chimzar, and my favorite Ukrainian, Sergei Dovgodko – I will miss our lunchroom table with the fountain view.

“Mr. Smith served proudly in the United States Marine Corps” read the announcement of the newly named 3M Senior Vice President, Legal Affairs and General Counsel. With our Marine Corps connection, I was confident when I read the announcement last summer that I could at least get in to meet the new General Counsel, but little did I know how much of his time he would share with me and how many doors Marschall Smith would open for me during my year at 3M. “Marsch,” as he insists everyone call him, introduced me to what it is like to be the Staff Judge Advocate to a Fortune 500 company, and for this I will be eternally indebted to him. I would also like to thank all of the attorneys and staff of 3M Legal Affairs who shared their time

and experiences with me to include Tom Boardman, Kevin Rhodes, Joe Otterstetter, Ted Ringsred, John Stephan, Maureen Harms, and in particular Tim Wong. As a former Lean Six Sigma Master Black Belt, Tim was instrumental in translating all of the Lean Six Sigma terminology into a language that I could understand. Tim also did his best to ensure that my Minnesota experience transcended beyond the confines of 3M Center by arranging a meeting for me with the Chief Justice of the Minnesota Supreme Court and giving me his Minnesota Gopher men's basketball tickets on a Saturday night that he could not use them. I would also like to send a special thank you to Marsch's assistant, Jo Cernohous, who at times probably felt that she was also acting as my assistant – and not getting paid any extra.

Jim Anderson, the Director of 3M Government Contract Compliance, a retired Naval officer, and a Notre Dame graduate. Jim shared with me his government contract experience from both sides of the fence giving me a greater appreciation how challenging contracting with the government can be, particularly for a commercial company. But, what I must thank Jim most for is providing me an outlet to savor my Naval Academy football team's first victory over the Fighting Irish in my lifetime. Jim tolerated my gloating with both dignity and restraint.

Finally, I would be remiss if I did not thank Mr. George Buckley, 3M Chairman, President, and CEO. During his remarks at 3M's Company Day, one of the other fellows asked him a question and addressed him as "sir." He responded, "Call me George. I should be calling you sir." George not only allowed me to attend his Operating Committee meeting and a number of his quarterly business reviews, but he also took the time during each of these meetings to introduce me to the others and to sit down next to me for a few moments and share a few of his thoughts with me. I am unaware of any of my peer fellows who enjoyed this level of exposure to their host's CEO.

Chapter 1

Program Overview

“What program? I’ve never heard of it.” “I thought the Marine Corps cancelled that program a few years ago.” “What are you supposed to be doing while you are there?” These are just a few of the questions that I was asked by fellow Marines after my selection for the Secretary of Defense Corporate Fellows program and throughout its duration. “So what are you doing here?” “You are a lawyer, are you working in our general counsel’s office?” “Is being a lawyer in the military just like on the TV show JAG?” “Are you retired from the military?” “What is the difference between the Army and the Marine Corps?” “You must be in the Reserves ... right?” “I saw in the news that the Marine Corps is trying to get out of Iraq and move into Afghanistan ... is that true?” “What about that Marine in North Carolina suspected of killing the pregnant female Marine?” “Are you trying to get a job here at 3M?” “What do you think of water boarding?” These are just a small sampling of the types of questions that I was asked regularly by “3Mers” throughout the duration of my fellowship. Fortunately, I was warned ahead of time to expect these types of questions from both sides and I had my “elevator speech” ready to recite on queue to address most of them.¹

The Secretary of Defense Corporate Fellows Program (SDCFP) operates under the oversight and supervision of the Director, Net Assessment, who reports to the Secretary of Defense. The program was established on 6 October 1994 by then Secretary of Defense William J. Perry with fellows beginning tours with sponsoring companies in the fall of 1995. Under the SDCCFP, two or more officers with from each Service are selected annually to receive their senior service college credit by training with Corporate America rather than attending one of the

¹ The idea of having an “elevator speech” prepared and ready to recite was suggested during our initial orientation by Colonel James Slife, USAF, SCDFP with Microsoft Corporation 2006-07.

Service War Colleges or participating in one of the more traditional research fellowship programs. Various companies apply for a fellow and are selected each year based on their reputation for insightful long-range planning, organizational and management innovation, and implementation of new information and other technologies.² For the 2007-2008 academic year there were nine Corporate Fellows who participated in the program. The participating companies were: 3M, CNN-Money, Boeing, Amgen, Cisco, Lockheed-Martin, SRA International, Oracle, and CACI. I was the third DoD fellow that 3M has hosted over the years. The stated purpose of the SDCFP is to build a cadre of future military leaders who:

- Have an appreciation for how the revolutionary changes in information and other technologies that are influencing American society and business are manifesting themselves in ways that shall also affect the culture and operation of the Department of Defense over the next decades.
- Are able, during their assignment to the SDCFP and throughout their careers, to conceive compelling operational and organizational innovations, and options that derive from these revolutionary changes in information and other technologies.
- Shall motivate and lead their Services toward innovative responses to revolutionary changes in information and other technologies, and to challenge others to address these matters, thereby improving operational and organizational thinking throughout the Department of Defense.³

In my “elevator speech” I describe a bit about my background, a bit about the program, and described that my goals here at 3M were to learn as much as I could about the company and how they operate in order to broaden myself both personally and professionally. My hope was to

² U.S. Department of Defense, *Secretary of Defense Corporate Fellows Program (SDCFP)*, Directive 1322.23, February 22, 2005, 2.

³ Ibid.

observe, and take back with me (to the Department of Defense and the Marine Corps), any best business practices that could make us more efficient and better stewards of the taxpayer's money.

Our fellowship program began with a four-week orientation that can only be described as "top-notch." It was more an educational experience than an orientation to the fellowship program, and consisted of lectures by subject matter experts on a myriad of topics to include current political and military issues. We also met with senior Department of Defense officials, members of Congress, and former SDCFP officers. The speaker agenda was on par with the types of guest speakers our colleagues enjoyed during their year at the service war colleges. However, the small size of our group allowed for more individual interaction with the speakers which in turn enhanced our learning experience.⁴ Our final week of orientation was spent at the University of Virginia's Darden School of Business where we were treated to a week-long executive MBA curriculum. The week included classes on basic accounting methods and corporate financial statement analysis and was an opportunity for each fellow to research and become familiar with the financial statements of his sponsoring company. The informal theme of the week's agenda was "How to Keep from Looking Totally Ignorant When you Arrive at Your Sponsoring Company." While the Darden staff did not have much to work with in our group, they did a fantastic job at achieving the desired end state.

One of the obligations that each corporate sponsor agrees to under the SDCFP is to host a "Company Day" event for all of the Fellows as a group. The Company Day consists of a day or two of briefings and tours of the respective company. It is an opportunity for the executives of a company to present what makes them a leader in their industry segment and how they do it. In this way, some of the insights gained at an individual sponsoring company are imparted to the

⁴ The orientation agenda may be found at: <http://www.ndu.edu/sdcfp/overview.htm> (accessed April 6, 2008).

Fellows working at other companies. As long as there are no competitive conflicts, representatives from the other sponsoring companies may also attend these Company Days. These events proved to be a fantastic supplement to our overall fellowship experience. They provided us an opportunity to meet with the senior leadership of the other sponsoring companies and essentially compare notes and benchmark the interim findings and discoveries we were each making at our own companies. Our sponsoring companies also received a substantial benefit from attending the events hosted by the other companies as they received an unparalleled exposure to other industry leaders. 3M hosted its Company Day event in December 2007 at their Innovation Center located on the 3M campus. The event was highlighted by closing remarks by George Buckley, 3M's Chairman, President and Chief Executive Officer. A copy of the agenda is included at Appendix 1.

Chapter 2

Not Just Post-it® Notes and Scotch® Tape: A Brief 3M Corporate Overview

3M, with its corporate headquarters in St. Paul, Minnesota, describes itself as a global, diversified technology company. Financial analysts generally categorize 3M as a conglomerate comparing it to the likes of General Electric Company, United Technologies Corporation, and Danaher Corporation. However, direct market segment competitors, i.e. the companies that 3M competes directly with in the marketplace, are companies like Avery Dennison Corporation, El DuPont de Nemours & Company, and Johnson and Johnson. Unequivocally to me, the most surprising and impressive thing about 3M is its diversity: the diversity of its technologies, the diversity of its products, the diversity of its markets, and the diversity of its people. While almost everyone is familiar with Post-it® products and Scotch® tape, not many realize that 3M is also a leader in health care products and technologies, disposable diaper fastening systems, optical films, and occupational health & environmental safety products to name just a few. This chapter provides a brief overview of 3M's history, organization, technologies, business strategy, and financial performance.

A Brief History of 3M

The Minnesota Mining and Manufacturing Company was founded on the banks of Lake Superior in Two Harbors, Minnesota in 1902 by five businessmen who set out to mine a mineral deposit for grinding-wheel abrasives. Initially unsuccessful, 3M moved to Duluth, Minnesota to focus on manufacturing sandpaper products. The Company eventually moved to St. Paul, Minnesota in 1910. In 1921, 3M developed the first waterproof sandpaper and in 1925 invented masking tape. These breakthrough technologies marked the beginning of 3M's diversification of

products and helped established 3M as the leader in two of its core and everlasting technologies: adhesives and abrasives.⁵

3M Today

Today, 3M is a truly global company employing over 75,000 employees; more than half of whom are employed outside of the United States. 3M has operations in 26 states and more than 60 countries. 3M is a member of the 30 companies that comprise the Dow Jones Industrial Average and had sales in excess of \$24 billion in 2007. 3M has paid its shareholders 366 consecutive quarterly cash dividends and has increased its annual dividend for 50 consecutive years.⁶

⁵ http://solutions.3m.com/wps/portal/3M/en_US/our/company/information/history/ (accessed April 6, 2008).

⁶ "3M Increases Dividend for the 50th Straight Year." *Business Wire*, February 11, 2008 04:27 PM Eastern Time. <http://www.businesswire.com> (accessed April 6, 2008).

Corporate Summary

The following chart provides a brief summary of 3M's financial performance, organization, and technologies which will be described in more detail below.

3M Facts

Year-end 2007

3M is one of 30 companies in the Dow Jones Industrial Average and also is a component of the Standard & Poor's 500 Index.

Sales

Worldwide	\$24.462 billion
International	\$15.475 billion
63% of company's total	

Net Income

Net income – reported	\$4.096 billion
Percent to sales	16.7%
Earnings per share – diluted – reported	\$5.60

Taxes

Income tax expense	\$1.964 billion
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Dividends

(Paid every quarter since 1916)

Cash dividends per share	\$1.92
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One original share, if held, is now 3,072 shares

R&D and Related Expenditures

For 2007	\$1.368 billion
Total for last five years	\$6.600 billion

Capital Spending

For 2007	\$1.422 billion
Total for last five years	\$5.147 billion

Employees

Worldwide	76,239
United States	34,138
International	42,101

Leadership

- George W. Buckley
Chairman, President and Chief Executive Officer

Organization

- More than 35 business units, organized into six businesses:
 - Consumer and Office
 - Display and Graphics
 - Electro and Communications
 - Health Care
 - Industrial and Transportation
 - Safety, Security and Protection Services
- Operations in more than 60 countries – 32 international companies with manufacturing operations, 35 with laboratories.
- In the United States, operations in 27 states.

Technology

- 45 technology platforms, including:
 - Adhesives
 - Abrasives
 - Light Management
 - Microreplication
 - Nonwoven Materials
 - Nanotechnology
 - Surface Modification
- 7,000 researchers worldwide; 3,900 in the United States.

U.S. Patents Awarded 569

⁷ http://solutions.3m.com/wps/portal/3M/en_US/our/company/information/financial-facts/ (accessed on 6 April 2008).

3M Organization

3M is matrixed organization structured around six major business segments, or “Big B’s”, which are comprised of more than 35 business units that oversee over 40 key technology platforms. Each “Big B” is headed by an Executive Vice President.

Industrial and Transportation Business

The Industrial and Transportation Business (I&TB), the biggest of the “Big B’s,” includes the Abrasives Systems Division, the Automotive Division, the Automotive Aftermarket Division, CUNO Incorporated (a liquid filtration company acquired by 3M in 2005), the Energy and Advanced Materials Division, the Industrial Adhesives and Tape Division, the Personal Care Division, and the Aerospace and Aircraft Maintenance Division. I&TB serves a broad base of industrial customers that range from some of the world’s largest automotive, aerospace, energy, and construction companies to small auto body repair shops in emerging economies. I&TB’s products and solutions include high-performance tapes, adhesives, abrasives, fasteners, films, specialty materials, and water/fluid filtration products. I&TB’s revenues over the last three years are shown below:

Industrial and Transportation Business (29.7% of consolidated sales):

	2007	2006	2005
Sales (millions)	\$7,274	\$6,640	\$6,047
Sales change analysis:			
Local currency (volume and price)	5.8%	9.0%	6.4%
Translation	3.8	0.8	1.2
Total sales change	9.6%	9.8%	7.6%
Operating income (millions)	\$1,501	\$1,342	\$1,210
Percent change	11.8%	11.0%	18.7%
Percent of sales	20.6%	20.2%	20.0%

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⁸ George W. Buckley, *2007 Annual Report*, (St. Paul, Minn.: 3M Company, 2007), 20.

Health Care Business

The Health Care Business (HCB) is comprised of the Drug Delivery Systems Division, 3M ESPE Division (dental), Health Information Systems Inc., Medical Division, and 3M Unitek Corporation (orthodontics) and has been one of the most successful and growing businesses for 3M in the last few years. Recent acquisitions by HCB have helped to expand their portfolio. The HCB is a leading provider of medical, dental and orthodontic products, drug delivery systems, health information systems, and infection prevention products. Some of their products include Tegaderm™ wound dressings, Steri-Strip™ Adhesive Skin Closures, and Littmann® stethoscopes. SoftMed Systems Inc., acquired by HCB in November 2006, complimented 3M's existing health information systems portfolio by adding solutions that enable hospitals to create an electronic medical record using templates, voice dictation, speech recognition, electronic signature and other important capabilities. The recent acquisition of Brontes Technologies Inc. adds leading-edge digital dentistry technology to their portfolio. This proprietary digital imaging capability allows dentists to capture 3-D models of teeth directly from a patient's mouth, enabling the digital impression information to be used to design and produce crowns, bridges and orthodontic appliances eliminating the need for making traditional molds of a patient's teeth. HCB's revenues over the last three years are shown below:

<i>Health Care Business (16.2% of consolidated sales):</i>			
	2007	2006	2005
Sales (millions)	\$3,968	\$4,011	\$3,780
Sales change analysis:			
Local currency (volume and price)	18.3%	6.0%	4.2%
Divestitures	(23.7)	-	-
Translation	4.3	0.7	0.4
Total sales change	(1.1)%	6.7%	4.6%
Operating income (millions)	\$1,882	\$1,845	\$1,114
Percent change	2.0%	65.6%	14.6%
Percent of sales	47.4%	46.0%	29.6%

⁹ Ibid., 22.

Display and Graphics Business

The Display and Graphics Business (D&G) includes the Commercial Graphics Division, Film Manufacturing Operations, Optical Systems Division, 3M Touch Systems Inc., Traffic Safety Systems Division, and the Projection Systems Department. 3M Vikuiti™ Display Enhancement Films, a core technology, enhances light making the screens on LCD TVs, notebook computers, cell phones, MP3 players, and other popular electronic devices brighter, while also conserving energy. The Vikuiti™ brand is being expanded into adjacent markets, such as rear-projection display systems, infrared filters for use in camera cell phones, and financial transaction cards. 3M's reflective materials such as Diamond Grade™ DG3 Reflective Sheeting make highway signs, license plates, and construction work zone markings more visible at night and in harsh weather. D&G is also a leader in touch screen systems as well as commercial graphics products that are used in places like advertising on the sides of buses and at sports arenas. D&G recently introduced a miniature projection engine which is expected to reach the market later this year. The projector, which is roughly the size of a wireless earpiece, can be integrated into cell phones, laptops, and PDAs giving users high quality projection capabilities at their fingertips.¹⁰ D&G's revenues over the last three years are shown below:

	2007	2006	2005
Sales (millions)	\$3,892	\$3,770	\$3,547
Sales change analysis:			
Local currency (volume and price)	1.8%	6.0%	4.6%
Divestitures	(0.4)	-	-
Translation	1.8	0.3	0.2
Total sales change	3.2%	6.3%	4.6%
Operating income (millions)	\$1,174	\$1,044	\$1,148
Percent change	12.4%	(9.0)%	2.9%
Percent of sales	30.2%	27.7%	32.4%

¹⁰ <http://www.3m.com/mpro/technology.html> (accessed 23 Apr 2008).

¹¹ Ibid., 23.

Consumer and Office Business

The Consumer and Office Business (COB) produces some of the most well known 3M brands and includes the Construction and Home Improvement Markets Division, Home Care Division, Office Supplies Division, Protective Materials and Consumer Health Care Division, and the Stationary Products Division. COB is home to the Scotch®, Post-it®, Scotch-Brite®, Scotchgard, Filtrete™, Command™ and Nexcare™ brands. New products around these brands continue to be introduced such as Scotch-Brite® Bathroom Floor Cleaner and the Scotch-Brite® Tub & Tile Scrubber. COB's revenues over the last three years are shown below:

Consumer and Office Business (13.9% of consolidated sales):

	2007	2006	2005
Sales (millions)	\$3,403	\$3,164	\$2,926
Sales change analysis:			
Local currency (volume and price)	5.0%	7.4%	6.1%
Translation	2.6	0.7	1.0
Total sales change	7.6%	8.1%	7.1%
Operating income (millions)	\$ 688	\$ 629	\$ 609
Percent change	9.3%	3.4%	9.4%
Percent of sales	20.2%	19.9%	20.8%

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Safety, Security and Protection Services Business

The Safety, Security and Protection Services Business (SS&PS) is a leading manufacturer of occupational health and environmental safety products, security systems, and building safety solutions. SS&PS consist of the Building and Commercial Services Division, Corrosion Protection Products Division, Industrial Mineral Products Division, Occupational Health and Environmental Safety Division, Security Systems Division, Track and Trace Solutions, and Mining and Mineral Extraction. SS&PS is a leading supplier of respirators and other personal safety products used across industries – from automotive and construction to metalworking and mining. A key product of this business is its Confirm™ Laminate with Floating Image

¹² Ibid., 24.

Technology which, in today's security conscious environment, makes it easier to verify the authenticity of driver's licenses and passports. Other major platforms include corrosion protection products and roofing granules. SS&PS' revenues are shown below:

Safety, Security and Protection Services Business (12.6% of consolidated sales):

	2007	2006	2005
Sales (millions)	\$3,070	\$2,663	\$2,320
Sales change analysis:			
Local currency (volume and price)	10.8%	13.7%	6.8%
Translation	4.5	1.1	1.0
Total sales change	15.3%	14.8%	7.8%
Operating income (millions)	\$ 611	\$ 549	\$ 513
Percent change	11.3%	7.1%	14.3%
Percent of sales	19.9%	20.6%	22.1%

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Electro and Communications Business

The Electro and Communications Business (ECB), the only of the Big B's not situated in St. Paul, is located in Austin, Texas. ECB is comprised of the Communications Markets Division, Electrical Markets Division, Electronic Solutions Division, and the Electronics Markets Materials Division. This Business markets insulating, testing and connecting products to utility, manufacturing, construction, and maintenance markets. The Business is also entering into adjacent market segments like electronic automotive safety systems and termination kits for high-voltage electrical lines. ECB generates almost 75% of its sales outside of the United States. ECB's revenues over the last three years are shown below:

Electro and Communications Business (11.3% of consolidated sales):

	2007	2006	2005
Sales (millions)	\$2,775	\$2,631	\$2,609
Sales change analysis:			
Local currency (volume and price)	2.3%	4.0%	1.5%
Translation	3.2	0.8	0.7
Total sales change	5.5%	4.8%	2.2%
Operating income (millions)	\$ 481	\$ 411	\$ 422
Percent change	17.0%	(2.6)%	40.7%
Percent of sales	17.3%	15.6%	16.8%

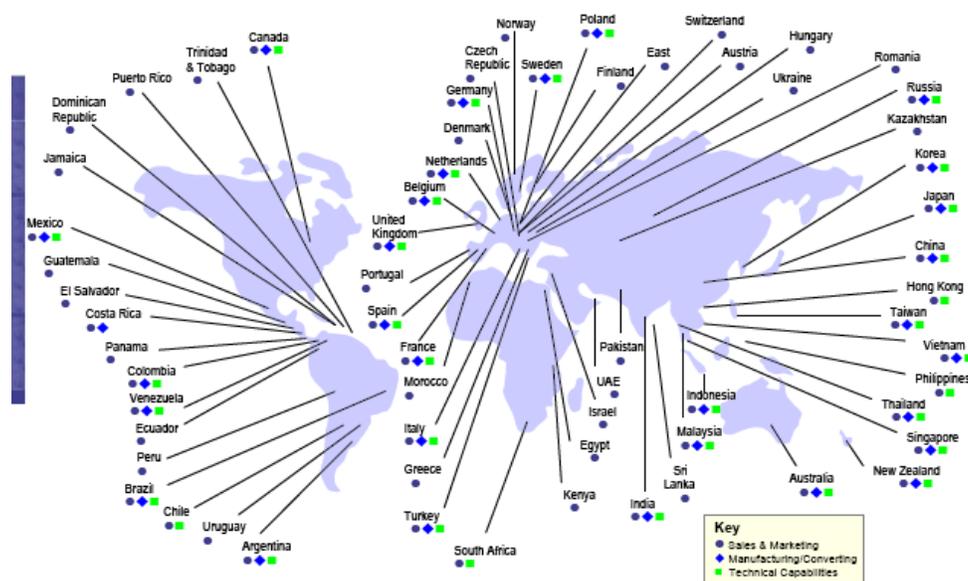
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¹³ Ibid. 25.

¹⁴ Ibid., 26.

International Operations

3M's International Operations is not considered a separate "Big B", but is also headed by an Executive Vice President and is by far 3M's largest growth platform. International Operations is divided into 3 regions: Latin America and Canada; Europe, Middle East and Africa; and Asia-Pacific and further breaks down into over 60 subsidiaries pictured below.



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There is an interesting dichotomy between 3M operations within the United States and its operations outside of the United States. Within the United States, 3M operates almost exclusively up and down, "stove piped," within the individual big businesses. However, outside the United States, 3M operates in regions and subsidiaries which work across many of the individual big businesses. For example within the United State each of the "Big B's" has operating goals and targets, whereas outside of the United States those goals are set by regions and subsidiaries as a whole, rather than individually within the businesses. In my opinion, this dichotomy is in part unifying for the company, particularly overseas, but also is in part divisive mainly here in the United States. Far be it for a lawyer with no business education whatsoever to

¹⁵ George W. Buckley, "Accelerated Growth, Premium Returns, Enhanced Shareholder Value" (slideshow presented at 25th Annual Lehman Brothers Industrial Select Conference, February 12, 2008, 37). <http://phx.corporate-ir.net/phoenix.zhtml?c=80574&p=irol-presentations> (accessed April 6, 2008).

offer opinions normally reserved for Wall Street analysts, but it has been my observation that 3M seems to be much more aligned, or in sync, in its overseas operations than it is within the United States. This may serve to account for 3M's less than staggering growth here stateside, but continued enviable growth overseas. A by-region comparison of sales and income is shown below:

Geographic Area	2007			2007 vs. 2006 % Change				
	Sales	% of Total	Oper. Income	Local Currency	Divestitures	Trans-lation	Total Sales Change	Oper. Income
United States	\$ 8,987	36.7%	\$1,692	5.7%	(4.2)%	—	1.5%	(11.3)%
Asia Pacific	6,601	27.0%	2,136	4.9%	(1.3)%	2.0%	5.6%	1.8%
Europe, Middle East and Africa	6,503	26.6%	1,705	11.7%	(6.6)%	8.5%	13.6%	56.1%
Latin America and Canada	2,365	9.7%	665	10.6%	(2.8)%	5.9%	13.7%	5.8%
Other Unallocated	6	—	(5)					
Total Company	\$24,462	100%	\$6,193	7.3%	(3.8)%	3.2%	6.7%	8.7%

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Corporate Leadership

On December 7, 2005 George W. Buckley became 3M Chairman, President, and Chief Executive Officer. Mr. Buckley is British born and came to 3M from the position of Chairman and Chief Executive Officer of Brunswick Corporation; a position he occupied since June 2000. Before joining Brunswick in 1997, Mr. Buckley was with Emerson Electric Company in St. Louis, serving as President of the U.S. Electric Motors Division, and the Automotive and Precision Motors Division.¹⁷ Mr. Buckley came to 3M with a strong desire to reinvigorate innovation at 3M and to grow the company. In a recent earnings call, Mr. Buckley described 3M's strengths and his vision of 3M's future:

One of 3M's great strengths is that there is no one, single source of growth. We are very diverse, market wise and geography wise and therefore growth patterns are likely to be repeatable and extendable ... I would be remiss if I did not

¹⁶ 3M 2007 Annual Report, 27.

¹⁷ http://solutions.3m.com/wps/portal/3M/en_US/our/company/information/leadership/ceo-officers/chairman-ceo/ (accessed on 6 April 2008).

continue to stress the long term health of 3M. Within 10 years your life will have changed significantly and 3M will be driving a lot of that change. Your personal life will be impacted most by technology and innovation. Hospitals will be safer because of 3M's infection detection platforms, you will use less energy, in part driven by 3M's products, solar will become a bigger piece of your life, in part due to 3M, your security fears will ease, again because of 3M. Your life will be impacted everywhere by digital information, display and electronics. We will have a piece of that change also. In many places, precious water will become more drinkable and useable and fluids more pure because of 3M. The future looks very bright for our company.¹⁸

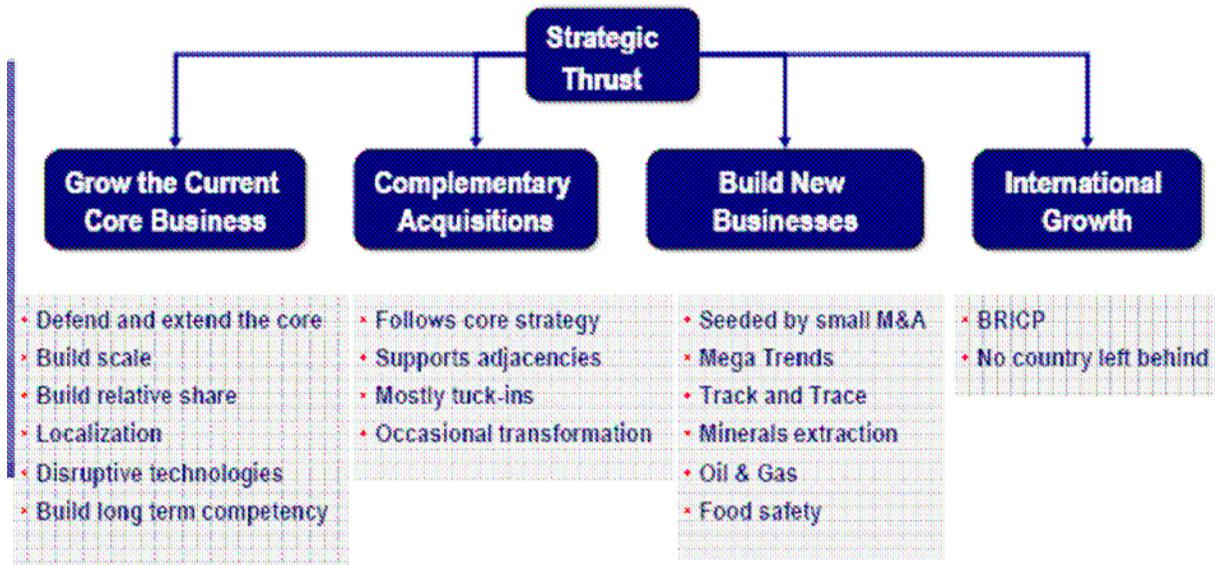
I had the great fortune to meet George Buckley and attend a number of his meetings to include a few of his Quarterly Operating Reviews (QOR) as well as his Operating Committee meeting. Additionally, Mr. Buckley spent an hour with all of the fellows during the Company Day event that 3M hosted on 13-14 December 2007. At the QORs, each of the business executive vice presidents and their staff brief Mr. Buckley and his Chief Financial Officer (CFO) on that business' quarterly performance and their plan for the way ahead. At the Operating Committee meeting, attended by all of the executive vice presidents, high-level decisions such as major personnel moves and capital expenditures are made. What struck me most about Mr. Buckley was his sheer passion and enthusiasm towards 3M's technologies, products, and its continual innovation. Mr. Buckley is an electrical engineer at heart. It was clear to me that there were times when he would just as soon be working in the laboratory with his shirt sleeves rolled up exploring and inventing 3M's next breakthrough technology rather than be the CEO.

¹⁸ George W. Buckley, "Q4 2007 Earnings Conference Call" (presented from St. Paul, Minn., January 29, 2008). <http://library.corporate-ir.net/library/80/805/80574/items/277255/TranscriptQ4Earnings.pdf> (accessed March 15, 2008).

Corporate Strategy

Mr. Buckley has an aggressive growth strategy for 3M that he routinely shares both inside and outside the company. When addressing 3M's growth strategy Mr. Buckley uses the diagram below which he refers to as his "rake diagram".¹⁹

A Visual Of Our Basic Strategy



The four tines of the rake represent the four prongs of 3M's strategic thrust.

Continuing to grow the current core business is a relatively self explanatory tactic, but sometimes difficult to do, particularly in a struggling economy. Over the years, 3M has had success in growing its core businesses by sharing and exploiting its technologies across its many business units, and continuing to build on some of its enduring brands and franchises.

Complimentary acquisitions are a relatively new growth focus for 3M. I had the opportunity to meet with Mark Copman, 3M's Vice President for Corporate Development and

¹⁹ George W. Buckley, "Continuing to the Path of Higher Growth" (slideshow presented at the 2007 3M Investor Conference, St. Paul, Minn., October 9, 2007, 8). <http://phx.corporate-ir.net/phoenix.zhtml?c=80574&p=irol-presentations> (accessed 6 April 2008).

Mergers and Acquisitions and he shared that growth through acquisitions was not routinely practiced by Mr. Buckley's predecessor.²⁰ However, today 3M is as active as any other big company with its acquisition strategy; conducting 16 to 18 acquisitions over each of the last two years. Acquisitions can be very lucrative but also very risky. Approximately 50% of all acquisitions fail, meaning that they are not profitable for the acquiring company. Statistics show however, that smaller "tuck in"²¹ acquisitions are much more successful - in the 70% range.²² "Tuck in" acquisitions are an area in which 3M has been particularly active, acquiring businesses with technologies that fit in nicely with its current businesses and technologies.²³

Building new businesses is the third prong of 3M's growth strategy and consists of moving into entirely new areas that make sense and are a good fit with 3M's current businesses. Track and Trace Solutions are one such successful example. This new business was added within the Safety, Security and Protections Services Business, in part as an acquisition. Track and Trace Solutions consists of using technologies such as Radio-Frequency Identification (RFID) to track, trace, and improve asset utilization, safety, and security.²⁴

International growth is the largest platform in 3M's growth strategy. In 2007, over 63% of 3M's revenues were generated outside the United States. 3M has set a goal for 65% international sales in 2008 and more than 70% international sales by 2010. "BRICP" is the term

²⁰ Mark Copman, 3M Vice President for Corporate Development and Mergers and Acquisitions, interview with author, December 4, 2007.

²¹ A "tuck in" acquisition is the acquisition of another company made for the sole purpose of merging it into a division of the acquirer; it is sometimes also referred to as "bolt-on acquisitions." This type of corporate strategy is generally used to acquire companies with technological breakthroughs or comparative advantages at a cost less than implementing the changes themselves. <http://www.investopedia.com/terms/t/tuckinacquisition.asp> (accessed April 6, 2008).

²² Mark Copman, interview with author. December 4, 2007.

²³ A recent example of a "tuck in" is 3M's acquisition of Standard Abrasives; a 375 person private company out of Sini Valley. See "3M Acquires Standard Abrasives" http://solutions.3m.com/wps/portal/3M/en_US/CMPAGlobalNewsCtr/pressroom/news/browsepr/ (accessed April 6, 2008).

²⁴ http://solutions.3m.com/wps/portal/3M/en_US/Track_And_Trace_Solutions/Home/ (accessed April 6, 2008).

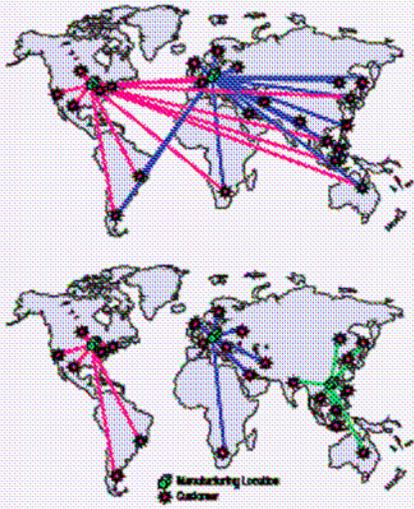
used at 3M for continued expansion into Brazil, Russia, India, China and Poland.²⁵ To support its international growth strategy, 3M currently has 18 international plants under construction which will allow 3M to move much of its international manufacturing operations closer to their international customers and shorten their supply chain operations.

Creating faster, more responsive supply chains

Which supply chains deliver true service excellence?
Usually, the short and simple ones.

That is why our goal is to reduce our supply chains to their shortest, simplest forms; minimize waste within the entire value stream; and increase their capacity to accommodate future growth.

As 3M streamlines our global supply chains by moving them closer to you, we also are making them faster, more efficient and more responsive to your needs.



Moving from Single Sources to Regional Sources.

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3M believes that moving towards regional sources of supply benefits its customers in 5 significant ways: 1) Shorter lead times; 2) Higher service levels; 3) Products that meet the local needs of the customer; 4) Enriched global communities; and 5) Improved costs.²⁷

Not only does international growth offer 3M an expanded customer base, but it also provides 3M significant tax advantages, which in turn serves to improve its bottom line. 3M's effective tax rate today is in the 32% range overall,²⁸ whereas many of its competitors enjoy a significantly

²⁵ We also heard the term "BRIC" used by executives at Lockheed Martin during their Company Day event on 19-20 February 2008 in Orlando, Florida when discussing both international growth and globalization, as well as at Cisco during their Company Day on 26-27 March 2008 in San Jose, California.

²⁶ 3M Manufacturing and Supply Chain Services, "Moving Closer to our Customers" (St. Paul, Minn.: 3M Company, 2008).

²⁷ Ibid.

²⁸ 3M 2007 Annual Report, 18.

lesser effective tax burden.²⁹ 3M's believes that continued international growth will facilitate balancing this playing field and is driving towards a 30.5% effective tax rate by 2012.³⁰

²⁹ For example, General Electric's effective tax burden over the last few years has been in the 11-18% range. Calculated based on GE income statements posted at: <http://finance.yahoo.com/q/is?s=GE> (accessed April 6, 2008).

³⁰ Patrick D. Campbell, "Accelerated Growth, Premium Returns, Enhanced Shareholder Value" (slideshow presented at 2008 Citigroup Industrial Manufacturing Conference, March 5, 2008, 34) <http://phx.corporate-ir.net/phoenix.zhtml?c=80574&p=irol-presentations> (accessed March 19, 2008).

Chapter 3

3M Culture, Values, and People

3M Culture

McKnight Principles

When an institution has been in existence for over 100 years, inevitably there will be many individuals who will make their mark on that institution; however, at 3M no individual has imprinted a more lasting impression than William L. McKnight.³¹ William McKnight, a Duluth Business University graduate, joined the Minnesota, Mining and Manufacturing Company as an assistant bookkeeper in 1907. Over the years he quickly rose through the company becoming president in 1929 and chairman of the board in 1949; a position he occupied until 1966.³² McKnight is probably best known for his management principles which are still echoed throughout the hallways of 3M.

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.³³

³¹ I drove north on McKnight Road to 3M every morning during my short 4.5 mile commute to work.

³² http://solutions.3m.com/wps/portal/3M/en_US/our/company/information/history/McKnight-principles/ (accessed April 6, 2008).

³³ Ibid.

These management principles should not sound novel to military readers. Decentralization of authority, particularly in the Marine Corps, is a key facet of leadership that we emphasize daily.

Decentralization is simply authorizing subordinates to act, guided by commander's intent and focus of effort, in situations where judgment and experience dictate action. The one concept that is repeated again and again within classic military literature is the advantage of allowing junior leaders to apply judgment and act upon their decisions.³⁴

The idea of empowering one's employees, or in the case of the military, one's subordinates helps explain why both 3M and the United States Marine Corps routinely are considered among two of the most admired institutions in the United States.³⁵ The parallels between the McKnight principles and Marine Corps leadership are demonstrative of one of the common conclusions that we fellows came to over the course of our year: that despite entirely different missions and focus, there is tremendous overlap and similarities between the corporate world and the military.

3M Leadership Attributes

The Old

In his book, Winning, former General Electric CEO Jack Welch discusses the importance of a corporation having both a strong mission statement and clearly defined corporate values. When discussing corporate values, Welch actually prefers to use the term corporate "behaviors" instead of "values." His rationale is that the predominant force behind establishing corporate values is to drive particularly desired behaviors in the corporation's employees.³⁶ It should come as no surprise then that one of the first things that Jim McNerney, a Welch protégé at GE, did

³⁴ Headquarters U.S. Marine Corps, *Leading Marines*, MCWP 6-11 (Washington, DC: Headquarters U.S. Marine Corps, January 3, 1995), 75.

³⁵ See e.g. Fortune Magazine's "America's Most Admired Companies" online at: <http://money.cnn.com/magazines/fortune/mostadmired/2008/top20/index.html> or America's Greatest Brands online at: <http://www.americasgreatestbrands.com/volume2/frameset.html> (accessed April 6, 2008).

³⁶ Jack Welch with Suzy Welch, *Winning* (New York: HarperCollins Publishers, 2005), 13-24.

when he became CEO at 3M in 2001 was establish the 3M Leadership Attributes - his version of Welch's values or behaviors. McNerney's 3M Leadership Attributes were:³⁷

- *Charts the Course:* Demonstrates the ability to create and communicate clear vision based on internal and external variables. Translates that vision into an action plan. Maintains flexibility to change course if circumstances change.
- *Raises the Bar:* Redefines and stretches entitlement continuously. Clarifies the risks and opportunities inherent in the competitive landscape. Utilizes Lean Six Sigma to dramatically elevate employee and customer satisfaction.
- *Energizes Others:* Inspires, influences, motivates and teaches individuals/ organizations about corporate and unit strategies, goals and plans: assures alignment. Creates a winning atmosphere where people genuinely understand and are excited about the business. Creates an atmosphere where employees experience opportunities to stretch, take risks, create, contribute and learn. Applies personal "touch" and all of the tools available to encourage everyone's best efforts. Celebrates successes and acknowledges disappointments in such a way that they motivate an even higher level of commitment and performance.
- *Resourcefully Innovates:* Proactively navigates internal and external ambiguity and complexity; recognizes and realizes opportunities globally. Drives a business development mindset through the organization. Creates and sustains an investment in processes and tools that enable the organization to achieve results. Cultivates an atmosphere in which revenue growth is accelerated via novel approaches to

³⁷ 3M Source, "3M Leadership Attribute Clarification Tool," online, 3M intranet, May 31, 2002. Available at: http://merlion.ap.mmm.com/hr/HR_WP/Introducing%20Leadership%20Attributes.pdf (accessed February 18, 2008).

- customers, products and markets. Embraces change for the opportunity it may present. Plays offense rather than defense.
- *Lives 3M Values*: Conducts himself/herself in a manner which consistently earns the trust and respect of all 3M stakeholders. A leader who encourages and rewards diverse styles. Constructively challenges. Demonstrates boundary less behavior. Committed to 3M's Corporate Values, Human Resource Principles and Business Conduct policies.
 - *Delivers Results*: Uses outcome based thinking, selects among available alternatives, and responds to changing circumstances. Effectively marshals and balances the other leadership attributes and values to consistently reach a desired endpoint. Strong operating skills and an ability to execute consistently. Provides accurate forecasts. Openly confronts issues, does not rationalize shortfalls, and is accountable. Adept at capitalizing on unanticipated opportunities. Manages aggressively through unforeseen difficulties.³⁸

Again, these attributes were designed to drive desired employee behavior. McNerney explained that “[t]his renewed focus on leadership development motivates and encourages everyone to reach their full potential.” “When we raise the game of every individual and every team, we raise the game of the entire company.”³⁹ Accordingly, 3M almost immediately incorporated these attributes into its Employee Contribution and Development Process (EC&DP); the process

³⁸ Jim McNerney left 3M in 2005 to become CEO at the Boeing Company; another SCDFP sponsor this year. We learned during their Company Day event, that once aboard at Boeing, McNerney quickly worked with his leadership team to establish the Boeing Leadership Attributes which are: 1) Charts the Course; 2) Sets High Expectations; 3) Inspires Others; 4) Finds a Way ; 5) Lives the Boeing Values; and 6) Delivers Results. The influence a leader like McNerney can have on the direction of a company is apparent when one compares how similar the attributes he used at 3M are to those currently being used at Boeing.

³⁹ 3M Company, *A Century of Innovation: The 3M Story* (3M Company, 2002), 235.

by which 3M annually evaluates, promotes, and in part compensates their employees. For us in the military, the EC&DP process is equivalent to our fitness reports or performance evaluations.

The New

In February 2008, 3M's Leadership Attributes underwent their first revision since McNerney's departure and were revised to the following:

- *Think From the Outside in:* Create and execute flexible, results-oriented strategy based on comprehensive understanding of customer, competitor and other outside interests and events relevant to the business.
- *Drive Innovation and Growth:* Expand revenue by setting stretch goals, encouraging sound analysis and the development of new opportunities and innovative approaches to serve customers and the markets where we do business.
- *Develop, Teach and Engage Others:* Inspire other employees to take responsibility for company and unit performance in a way that engages employees to stretch, create and take risks to contribute to corporate and business unit strategies and plans, and helps employees to fully develop and utilize their skills.
- *Make Courageous Decisions:* Manage ambiguous, complex or challenging situations with intelligence, speed and courage while holding oneself and others accountable for decisions, actions and performance.
- *Lead with Energy, Passion and Urgency:* Contribute to an environment where teams can quickly respond to changing circumstances and are highly motivated to succeed and win.

- *Live 3M Values*: Act with uncompromising honesty, integrity and professional ethics in a way that constructively challenges processes and behaviors and encourages the inclusive behavior of others.⁴⁰

The changes in these attributes are reflective of a change in leadership philosophy at the top of the company. As previously discussed, George Buckley's strategy is focused on growth, particularly international growth. These new attributes are his way of driving the behaviors that he deems imperative for 3M to grow in the breadth and depth that he expects and demands. In describing these new attributes, Joe Harlan, the Executive Vice President, Electro and Communications Business, explained that "[b]y encouraging individuals to make bold, courageous decisions, we nurture the true spirit of 3M – namely, the entrepreneurial spirit that leads our people to explore the limits of what our technology can bring to our customers and communities around the world."⁴¹ Again, the idea is to drive desired behaviors throughout the entire organization.

3M Innovation

Since its beginning, 3M has been a company full of inventors always seeking out new ideas, products, and technologies. The company's history is replete with stories of incredible discoveries like that of Patsy Sherman, a chemist who in 1953 was dabbling with fluorocarbons and accidentally spilled a compound on her sneakers. Much to her dismay, she discovered that the substance she spilled on her shoe was impervious to water, soap, and scrubbing; a discovery that later led to the introduction of the Scotchgard™ product in 1956.⁴² In the mid 1970's, Art Fry was tired of the paper bookmark falling out of his hymnal in church. Art decided to coat the edge of a scrap of paper with an adhesive and use it as a bookmark instead; an idea that led to

⁴⁰ "A New Look at 3M's Leadership Attributes", *3M Stemwinder*, February 19 - March 3, 2008, 3.

⁴¹ *Ibid.*

⁴² *The 3M Story*, 54-6.

Post-it® Notes.⁴³ These are just a few examples of the innovation at 3M that has made the company so successful.

The Fifteen Percent Rule

The “15 percent rule” at 3M is a policy that allows researchers to dedicate up to 15 percent of their working hours towards independent projects of their own initiative - outside of their regular responsibilities. The rule is designed to stimulate independent experimentation and innovation.⁴⁴ Patsy Sherman and Art Fry each made their remarkable discoveries experimenting on their own. When one does the math he discovers that 15 percent of an employee’s time is a substantial investment; it equates to six hours in a typical 40-hour work week.⁴⁵ Most companies probably would not think of allowing their employees time to dabble during their work day, but 3M has discovered that providing an environment that fosters creativity and innovation is what we in the military call a “force multiplier,” and has led to many brilliant and profitable discoveries.

Leadership Development and Talent Management

An organization is only as good as the people within that organization and 3M is no exception. 3M is continuously striving to attract, train, and retain the best people that they can. Throughout its history, 3M has been able to generate tremendous loyalty amongst its employees. A majority of the current senior leadership of the company started with the company, or has been with the company for many years. Throughout my time at 3M, I met very few employees of my approximate age who had not been with 3M for at least 20 years, which really says something about longevity and loyalty at 3M. While 3M offers salaries and benefits competitive with many

⁴³ Ibid., 38-40.

⁴⁴ Ibid., 22.

⁴⁵ Consider the significance of this time commitment. In the military, the importance of continued professional-military education is always emphasized, but members are expected to fit it in on their own time. 15% would equate to allowing military members six dedicated hours each week solely for professional-military education.

of its competitors,⁴⁶ the factor most often cited to me as the reason for staying with the company is 3M's diversity and the flexibility. 3M provides its employees the ability to work in many unrelated business sectors throughout one's career or to simply stay in one area for an entire career. Like many of the other companies that we visited during our fellowship experience, 3M continues to strive to develop its global talent pool. It accomplishes this by providing employees enormously diverse opportunities across the enterprise to include both business and staff positions. 3M provides its high potential employees stretch assignments that challenge them to succeed. Finally, 3M is committed to leadership development and offers employees a number of leadership training opportunities throughout their careers. I discuss a few of these opportunities below.⁴⁷ I also discuss some of the talent management challenges that 3M faces in the near future.

Optimized Operations (O2)

The Optimized Operations Program, or 'O2' program as it is called, has been in existence since the mid-1980s and offers a recent college graduate an experience beyond the mainstream within engineering and supply chain analysis. O2 is a one-year program that helps 3M develop young talent for 3M manufacturing plants. High potential candidates are selected from a diverse student population with undergraduate and graduate degrees in chemical, mechanical, industrial and quality engineering, supply chain operations, manufacturing sciences and safety-related curriculums. O2s are recruited for specific plant needs based on degree and start date. O2s ordinarily begin work at their assigned plant for an initial orientation and, after a few weeks, travel to 3M Center in St. Paul to begin classroom training. Here they receive training in supply

⁴⁶ Angela Lalor, Senior Vice President, Human Resources described during her presentation at the 3M Company day on 14 December 2007 that 3M's compensation policy is to generally aim for the 50th percentile of pay compared to the market/industry.

⁴⁷ The Lean Six Sigma program at 3M is one of its most significant leadership opportunities. I discuss Lean Six Sigma at 3M in Chapter 4.

chain principles, project management, leadership, interpersonal and facilitation skills, Lean Six Sigma methodologies, and statistical analysis. Throughout their year, they are provided additional training trips to St. Paul to further their development. At their plants, O2s lead at least two major projects during their training year and their membership on multiple project teams at any given time gives them broad exposure to the plant's operations. O2s complete their assignments at their plant location with the goal of full-time employment at that plant at the end of the developmental year.⁴⁸ During my fellowship, I had the opportunity to meet with two groups of O2s and present each group a block of training on leadership. In this class, I shared with the students a bit about Marine Corps leadership and compared 3M's leadership attributes with those of the Corps. An excerpt of this training is included at Appendix 2. Like our young lieutenants out of the Basic School, I found this group of young engineers to be a highly motivated and driven group of individuals.

ALDP

The flagship of 3M's leadership development programs is its Advanced Leadership Development Program, or ALDP, which was initiated under then-CEO Jim McNerney who had experience with similar leadership development programs during his time at General Electric.⁴⁹ ALDP continues today in two formats: ALDP I and ALDP II. ALDP I is a 12-day program designed for new corporate directors, whereas ALDP II is a more abbreviated week-long program targeted for 3M managers within a particular big business. Both programs are designed around similar core elements which include: 1) leaders teaching leaders; 2) action learning; and 3) 360° feedback. In ALDP I, 3M's executive vice presidents, i.e. the leaders of the company, are responsible for teaching a majority of the classroom portion of the program. Additionally,

⁴⁸ http://solutions.3m.com/wps/portal/3M/en_US/Careers/Home/Students/Development/O2/ (accessed April 6, 2008).

⁴⁹ McNerney initiated a similar ALDP program upon his arrival at the Boeing Company.

there is a question and answer session with George Buckley, the CEO included. In ALDP II, aimed at managers, the leaders within the individual big business conducting the training are responsible for teaching a majority of the classroom portion of the program and there is a question and answer session with one of the “big business” executive vice presidents. In the “action learning” portion of each program participants are asked to provide creative solutions to real business problems facing 3M. In ALDP I, the class is divided into three groups who each attack a business problem selected by the CEO. In ALDP II, the business problems are selected by the executive vice president of the business hosting the training. During this action learning phase, students enjoy unfettered access to 3M business leaders for the purposes of interviewing them in order to understand the business problem and develop potential solutions. Both programs culminate with the groups briefing their solutions to senior 3M leadership. In the case of ALDP I, the groups brief George Buckley and his operating committee and in ALDP II, the executive vice president of the hosting business and his operating committee receive the brief. Throughout the course the students receive feedback from their peer attendees as well as the attending business leaders which helps them identify personal shortcomings and areas for improvement.⁵⁰ 3M is intentional in its efforts to build a strong reputation for leadership throughout industry. Not only is strong leadership imperative for solid business results, but a strong leadership brand helps attract and retain better people.⁵¹ 3M’s leadership efforts have not gone unnoticed. 3M was recently ranked #18 in a list of the top 20 North American Companies for Leaders in 2007.⁵²

⁵⁰ Cindy L. Johnson, Manager 3M Leadership Development Institute, interview with author, March 20, 2008.

⁵¹ Ibid.

⁵² Hewitt Associates, “Top Companies for Leaders 2007,” *Research Highlights – North America*, 2007, 9. <http://www.hewittassociates.com/Intl/NA/en-US/KnowledgeCenter/ArticlesReports/ArticleDetail.aspx?cid=4336> (accessed March 23, 2008).

Talent Management Challenges

Success in business requires having the right people in the right positions. With an aging workforce, finding the right people and finding enough qualified people is becoming significantly more challenging for corporate America. One of the common themes that we heard from each of the sponsoring companies during our visits was the human capital challenge they each face in the years ahead. The baby-boomer workforce is nearing retirement and will be exiting the workforce in droves in the upcoming years. 3M estimates that it will have to replace nearly 26,000 employees by 2012.⁵³ The average aerospace and defense industry worker is currently 54 years old and this industry estimates that there will be a shortfall of 41-87,000 defense engineers by the year 2010.⁵⁴ Corporate America is not alone. The Department of Defense is likewise expected to face a worldwide civilian manning challenge in the near future. Approximately 22% of the Department of Defense's civilian workforce will reach retirement eligibility in the next two years.⁵⁵ It is not just the sheer numbers of departing employees that is so concerning, but the vast reservoirs of corporate knowledge that will also depart with these employees. To help fill the expected void, each company discussed its aggressive recruiting efforts and most highlighted its student internship programs. For example, 3M brings in over one hundred student interns annually and on average converts 50% of these interns into full-time 3M employees.⁵⁶ The Army is significantly expanding its intern programs, growing from 1,586 interns in 2007 to 2,500 by 2102.⁵⁷ Companies are also focusing on trying to retain their top

⁵³ Angela Lalor, Senior Vice President Human Resources, presentation to the Secretary of Defense Corporate Fellows during 3M Company Day visit, December 14, 2007.

⁵⁴ Robert H. Trice, Senior Vice President Business Development, presentation to the Secretary of Defense Corporate Fellows during Lockheed Martin Company Day, February 20, 2008.

⁵⁵ Jimmy Norris, "DoD Official Predicts Civilian Staffing Woes," *Pacific Stars and Stripes*, March 13, 2008. <http://www.stripes.com/article.asp?section=104&article=60630&archive=true> (accessed March 15, 2008).

⁵⁶ Lalor, 3M Company Day presentation.

⁵⁷ Norris, "DoD Official Predicts Civilian Staffing Woes."

talent and slowing down the “revolving door” of younger, newer employees.⁵⁸ Finally, aggressive knowledge management strategies are being implemented to digitally capture and warehouse corporate knowledge prior to the exodus of the baby-boomers.

Community Outreach

As a product of the East Coast, my year at 3M was my first introduction to the concept of “Minnesota nice.” “Minnesota nice is the stereotypical behavior of Minnesota residents to provide hospitality and courtesy to others. The term is also sometimes used in a derogatory way, to connote a sort of smiling stubbornness, forced politeness, false humility or passive hostility.”⁵⁹ I personally experienced only the former connotation and none of the latter; everyone went out of their way to welcome both me and my family to 3M and the Twin Cities area. This “niceness” also transcends across 3M through a spirit of volunteerism. 3M is an enormous supporter of the United Way, sponsoring events throughout the year. Employees stimulate interest in science and scientific discovery in elementary schools through volunteering in 3M’s Visiting Wizard program. Additionally, 3M hosts workshops for elementary and middle school science teachers. 3M maintains a partnership with St. Paul Public Schools to bolster math, science and economics learning, and career awareness at urban schools. 3M is also large sponsor of the Science Museum of Minnesota and the Minnesota Children’s Museum in St. Paul. The directorate in which I was assigned used volunteering at a local food bank as a team building event. All of these charitable endeavors enjoy tremendous support by 3M leadership. I was very struck by how involved in the community almost everyone at 3M was.

I also discovered that the folks at 3M are a very patriotic group, and politics aside, were tremendously supportive of the our men and women in uniform. 3M is very supportive of its

⁵⁸ Lalor, 3M Company Day presentation.

⁵⁹ http://en.wikipedia.org/wiki/Minnesota_nice (accessed March 15, 2008).

employees that serve in the Reserves. Individual groups within 3M are regularly organizing drives to send letters and packages to deployed troops. I had an opportunity to witness this support first hand during my stay, as I have an older son who is a Marine Corps officer currently deployed to Iraq. When my son arrived in Iraq in January 2008 he discovered that his work spaces were rather shoddily constructed. He and his Marines needed to hang and mount a status boards etc. but could not use nails without damaging the structures. Looking for an alternative, he soon discovered that 3M's Command™ hooks for sale in the post-exchange onboard Al Asad airbase were a great alternative to nails. My son inquired whether I might be able to get some for him at 3M. I immediately contacted a person that I had met in the Consumer and Office Business about whether they might have any excess inventory that they could part with (my son was also looking for Post-it® Notes). The response I received was immediate and overwhelming, almost too overwhelming. Less than a week later I had 50 pounds of Post-it® Notes delivered to me to send to my son in Iraq. A week later, I was informed that 5 pallets of Command™ hooks had been identified and could be loaded on a commercial ship for transit to Iraq! I had to intervene at this point and explain that my son and his unit could not handle such a large quantity, not to mention the fact that by the time they arrived in Iraq my son and his unit would probably have already redeployed to the United States. In the end, I was able to work with them to get a much smaller quantity shipped for my son in Iraq. 3M's responsiveness, generosity, and patriotism was inspiring and touched me personally.

Chapter 4

What is Lean Six Sigma?

During my year at 3M I had the incredible opportunity to explore all facets of the corporation however; my “home base” was within Lean Six Sigma Operations because my corporate sponsor, John Houle, served as the Vice President for Manufacturing and Supply Chain Services and Lean Six Sigma. Lean Six Sigma Operations is the organization within 3M that specializes in training and coaching employees to improve their businesses results by using Lean Six Sigma and other process and quality improvement methodologies. Merely saying the words “Lean Six Sigma” can evoke all kinds of emotional responses from the listener. Some ask “Lean Six what?” Others simply run away with their hands over their ears never looking back. Some shake their head in agreement and say “yeah, I’ve heard of that.” Others respond, “I’ve heard of that, but it has no applicability whatsoever to what we do here.” And finally ... some just get it.

So much has already been written on Lean Six Sigma, including by past Secretary of Defense Corporate Fellows, that I can not possibly (nor competently) do the subject justice in this report, and so I will not attempt to do so. Rather, I will attempt to share what I learned about Lean Six Sigma from this perspective: a political science major with a law degree. The truth is, when you boil it all down and can get over the scary statistical gobbledygook, Lean Six Sigma offers a structured methodology that helps one drill down to the root causes of process inefficiency and poor quality, and drives significant and measurable improvement in both. In this chapter I will attempt to provide a layman’s overview of Lean Six Sigma in general, a brief description of how Lean Six Sigma has been employed at 3M, and finally some personally relevant examples of how and where Lean Six Sigma could be applied in the Marine Corps.

Lean

Lean is all about speed, efficiency, and the elimination of waste in the eyes of the customer. “The goal of Lean is to accelerate the velocity of any process by reducing waste in all its forms.”⁶⁰ When one understands the basic Lean concepts, much of the methodology really becomes common sense in application. In very basic terms, Lean methodology simply involves asking the question “Why?” Why do we do this? Why does it take so long? Why would a customer pay us to do this? Why can’t we do it this way instead? Think about all the times in your life that you have been frustrated by how slowly a process moved. Maybe it was getting your drivers license renewed at the DMV. Maybe it was getting seen at the doctor’s office. Maybe it was waiting to find out what your next duty assignment would be. Each of these is an everyday example of a process where Lean tools could be applied to speed up and improve that process.

Muda

Some of the basic tenants of the Lean philosophy have been around for hundreds of years. However, today the gold standard for Lean is considered to be the Toyota Production System which was started by Kiichiro Toyoda, Taiichi Ohno, and other Toyota owners after World War II. Its Japanese roots serve to explain why much of the Lean terminology is of Japanese origin.⁶¹ Lean is all about eliminating waste. The term “muda” is the Japanese word for “waste” and in the Lean manufacturing world there are seven forms of muda:

1. *Overproduction*: Producing more of an item than is required for immediate use.

Overproduction prohibits the smooth flow of operations, results in excess inventory, increased

⁶⁰ Michael L. George, *Lean Six Sigma for Service*, (New York: McGraw-Hill, 2003), 24.

⁶¹ <http://www.lean.org/WhatsLean/History.cfm> (accessed March 15, 2008).

lead times, higher costs and poorer quality. A lean system strives for “Just-in-Time” production; producing items as they are needed by the customer.

2. *Waiting*: Delay between steps in a process, usually due to poor flow. This creates bottlenecks and long lead times. A lean system strives for continuous flow of a product through the process.

3. *Transportation*: Unnecessary movement of material or products from place to place. A lean system strives to minimize transportation by arranging moving equipment and processes closer together.

4. *Over processing*: Using expensive high precision equipment when simpler, less expensive methods would do.

5. *Unnecessary Inventory*: Any work in process in excess of that required, often the result of overproduction and waiting. This creates longer lead times, takes up space, and costs money. A lean system strives for continuous flow and just-in-time production.

6. *Motion*: Needless movement of people such as bending, reaching, having to move from place to place. A lean system is ergonomically efficient and minimizes the movements that workers have to make.

7. *Defects*: Any aspect that does not conform to the customer’s needs which will ordinarily result in rework of the product or scrap. A lean system, which encourages continual process improvement, strives to reduce and eliminate defects.⁶²

The concept of waste, or muda, all makes sense when you are manufacturing widgets in a plant, but how does this apply in a non-manufacturing or service environment? Here are some examples:

⁶² <http://www.emsstrategies.com/dm090203article2.html> (accessed March 16, 2008).

1. *Overproduction*: Processing large batches of lower priority work because it is more convenient to do so rather than working on higher priority projects because it is difficult or time consuming. Reprinting a multiple page document to correct an error on one page.

2. *Waiting*: Waiting for information or approvals.

3. *Transportation*: Work moving from person to person physically or electronically.

4. *Over processing*: Multiple layers of approval and hand-offs.

5. *Unnecessary Inventory*: Backlogs of work sitting in queue in someone's in-box (either on their desk or email).

6. *Motion*: Having to go to multiple sources to find necessary information, for example multiple databases, telephone calls, or excessive or repetitive keystrokes.

7. *Defects*: Having to rework mistakes.⁶³

Again the goal of Lean is to identify, reduce, and eliminate this muda. As I said at the beginning, much of Lean is common sense, but in our everyday lives we often overlook muda and simply consider it part of our jobs and the way things are done. It does not have to be that way.

Identifying Value and Value Stream Mapping

Lean concentrates on looking at a process and focusing on creating value from the perspective of the customer. "Value can only be defined by the ultimate customer. And it's only meaningful when expressed in terms of a specific product (a good or a service, and often both at once), which meets the customer's needs at a specific price at a specific time."⁶⁴ In simple terms, a step in a process is value-added where a customer would be willing to pay for it if they knew it was part of their purchase price. Steps are non-value added where a customer would be

⁶³ George, *Lean Six Sigma for Service*, 259-62.

⁶⁴ James P. Womack and Daniel T. Jones, *Lean Thinking*, (New York: Free Press, 2003), 16.

unwilling to pay for them if they knew about them.⁶⁵ The wastes, or muda, discussed above are non-value-added. The goal of Lean is to eliminate the non-value-added steps in a process and improve upon the value added steps.

To assess value, one must identify the value stream of a particular process. This is accomplished by developing a value stream map (VSM). A VSM is a diagram of a particular process that maps out each step of that process and shows both the physical and information flows on one diagram. The purpose of the VSM is for all involved to get a clear picture of what is actually happening in a process and then to sort these activities into three categories: 1) those that create value; 2) those which do not create value but are currently required (system requirements, rules and regulations etc.); and 3) those that do not add value.⁶⁶ The VSM process involves creating and analyzing the current state map and then creation of a future state map that maximizes value-added work and minimizes tasks and work that do not add value. An example of a value stream map is included in Appendix 3.

Stabilizing the Process - the Five S's

Generally after mapping out and analyzing the value stream, steps should be taken to stabilize the process in an attempt to reduce variability. One of the most effective tools for stabilizing a process is using a tool called “the Five S's”. The term Five S's is derived from the Japanese⁶⁷ but has been adapted in English to the following:

1. *Sort*: Keep only what is needed. Pitch everything else.
2. *Straighten*. A place for everything and everything in its place.
3. *Shine*. Clean machines and work area to expose problems.

⁶⁵ George, *Lean Six Sigma for Service*, 27-8.

⁶⁶ Womack and Jones, *Lean Thinking*, 37-8.

⁶⁷ “The term “5 S's” derives from the Japanese words for five practices leading to a clean and manageable work area; *serei* (organization), *seiton* (tidiness), *seiso* (purity), *seiketsu* (cleanliness), and *shitsuke* (discipline).” Womack and Jones, *Lean Thinking*, 61, footnote 8.

4. *Standardize*. Develop systems and procedures to monitor conformance to the first three rules.

5. *Sustain*. Maintain the standard processes for sorting, straightening and shining.⁶⁸

Developing standard of work and using visual management/controls also assist in stabilizing the process and flow out of the Five S's. Creating standard work means ensuring that a worker does the same thing every time. This helps reduce variability and defects. For example, Navy and Marine Corps pilots are familiar with NATOPS⁶⁹ checklists; these are a great example of standard work. A pilot's checklist ensures that he does the same thing every time he flies or experiences an in-flight emergency. This in turn reduces variability (makes sure the aircraft starts up properly, is properly configured for landing and takeoff etc.) and serves to eliminate defects (mishaps). Visual management or control comes in many forms, but in its simplest form consists of status boards or other similar tools that assist to keep those involved in a process informed as to what is going on in that process.⁷⁰ With effective visual management, a supervisor on a line can readily identify problems, backlogs, and bottlenecks before they become overbearing.

Flow

A Lean process is one that replaces a traditional batch and queue system with continuous one-piece flow. Flow is continuous movement without waiting; lining up the value-added steps

⁶⁸ Jay Arthur, *Lean Six Sigma Demystified*, (New York: McGraw Hill, 2007), 34.

⁶⁹ Naval Aviation Training and Operating Procedures Standardization.

⁷⁰ For example, when we visited Boeing's JDAM Production facility in St. Charles, MS we saw that they used web cameras as a form of visual management. A web camera was focused on their pan stock bins (nuts, bolts, etc) so that their supplier could see when stocks got low. Another web camera was placed on their production status board so that the plant manager could view the status board over the internet in his office or even while traveling away from the plant.

in a process so that they flow without interruption.⁷¹ Are you one of those families that send out a Christmas letter each year? If so, you probably first print a whole bunch of form letters on your computer. Then you fold each letter and stuff it into a blank envelope. Then you go through your address book and decide who is worthy of receiving a Christmas card this year and you place the address on each envelope. Finally, you dehydrate yourself as you lick 115 stamps and place them on each envelope in the stack (hopefully by now you have at least purchased adhesive backed postage stamps). This is an example of traditional batch and queue. Intuitively it makes sense to print them all out first, then to fold them all, and then to stuff them all into envelopes ... right? This saves time ... right? Wrong! Think about how many times you touch (and move) each letter when you use this process. It would be much quicker (or leaner) to pull the individual letter as it comes off your printer, fold it, stuff it in its envelope, address the envelope, and then affix the stamp.⁷² Try it. This is continuous one-piece flow.

Pull

The whole idea of Lean is to focus on the needs of your customer and to be responsive to those needs. After a process is stabilized and begins to flow, the ultimate goal of Lean is to create a pull system. A pull system means that you operate at the speed of your customer; you do not produce something until there is a demand for it by your customer. For example, Toyota prides itself that it can deliver a custom ordered car with five days after the customer places an order.⁷³ Pull systems are triggered by actual demand and not by forecasts or expectations.

Pursing Perfection

When studying concepts such as cover and concealment at the Basic School, Marine Corps second lieutenants are taught that camouflage is continuous. One should continuously

⁷¹ Arthur, *Lean Six Sigma Demystified*, 37.

⁷² Womack and Jones, *Lean Thinking*, 22.

⁷³ Arthur, *Lean Six Sigma Demystified*, 36.

improve his camouflage as time and the situation allow. Like camouflage, the whole idea behind Lean is continual process improvement and the pursuit of perfection.

As organizations begin to accurately specify *value*, identify the entire *value stream*, make the value-creating steps for specific product *flow* continuously, and let customers *pull* value from the enterprise, something very odd begins to happen. It dawns on those involved that there is no end to the process of reducing effort, time, space, cost, and mistakes while offering a product which is ever more nearly what the customer actually wants. Suddenly perfection, the fifth and final principle of lean thinking, doesn't seem like a crazy idea.⁷⁴

One of the tools used in this continual process improvement methodology also comes from the Japanese: the “Kaizen burst” or “Kaizen event”. A Kaizen event is a short term rapid improvement project, usually spanning less than a week's time.⁷⁵ Multiple Kaizen events may be used to eliminate muda (waste) identified during value stream mapping, assist to create single-piece flow, drive towards a pull system, and ultimately achieve Lean perfection.

What is Six Sigma?

Six Sigma is a problem solving methodology that focuses on reducing variability, improving quality, and most importantly keeping the customer satisfied. It originated with Motorola in the mid-1980's as they struggled with competition from Japan and became more popular when it was adopted by General Electric in the 1990's. Today hundreds of companies are using Six Sigma. 3M describes Six Sigma as “a methodology for pursuing continuous quality improvement and reducing inherent variability. It requires a thorough process and product understanding and is clearly focused on customer driven expectations.”⁷⁶ The term, “Six Sigma,” relates to the number of defects in a process. The sigma level is a measure of how much of the process is within the specification; i.e. acceptable to the customer. Achieving a six sigma

⁷⁴ Womack and Jones, *Lean Thinking*, 25.

⁷⁵ Arthur, *Lean Six Sigma Demystified*, 323.

⁷⁶ “2007 Approved Outside Presentation,” 3M Lean Six Sigma Information & Tools Database, (St. Paul: 3M Company) 18 (accessed March 17, 2008).

level equates to a process that produces only 3.4 defects per million.⁷⁷ The strength of Six Sigma methodology is the rigor of the process and its reliance on data to drive decisions in the improvement process. Admittedly it is this rigor, the data, and the statistics that can make the methodology a bit scary to some (like me) but with some training and coaching, these apprehensions can be alleviated.

Lean Six Sigma - Putting it All Together

I will discuss the Six Sigma methodology in a bit more detail below, but it is appropriate at this point to briefly explain the how Six Sigma has evolved into Lean Six Sigma at many companies, like 3M. In very simple terms, the best of the Lean tools have been blended with those of Six Sigma. Lean generally focuses on the speed of a process and eliminating waste, whereas Six Sigma typically focuses on eliminating variability and defects. The Lean tools are bit more free flowing and lack the rigor to get a process under statistical control, whereas the Six Sigma tools do not put a premium on identifying value and waste or speeding up a process. Many companies, like 3M, have found that blending the two methodologies provides an even more powerful tool set that is complementary in nature. It is kind of like the Reese's® Peanut Butter Cup of the process improvement world - combining the best of both worlds.

Who are those Guys with the Black Belts?

While different organizations may have their own nuances and put a slightly different spin on how they deploy Lean Six Sigma, the key players involved are generally consistent across the board.

Champions: Usually a business leader who owns the process, oversees the deployment of Lean Six Sigma in his business, and selects the projects and value streams to attack. A strong

⁷⁷ George, *Lean Six Sigma for Service*, 25.

champion is critical to Lean Six Sigma success as the champion is responsible for providing support and resources to the improvement effort.

Master Black Belts: Generally have prior Black Belt or other significant Lean Six Sigma experience. A full time position that ordinarily reports to a business leader and is responsible for aligning Lean Six Sigma projects and goals with those of the business he supports. Master Black Belts are responsible for mentoring and leading Black Belts. Formal training is approximately three weeks in length.

Black Belts: Are full time Lean Six Sigma experts who are responsible for leading improvement projects. Black Belts are expected to be well versed in the Lean Six Sigma tools and must be able to teach Green Belts and other members of improvement teams the requisite skills. Generally Black Belts undergo three to five weeks of formal training and must successfully complete a specified number of projects before becoming certified as a Black Belt.⁷⁸

Green Belts: Are trained employees who support Black Belts in getting projects done in their respective job areas. They undergo basic training to gain a familiarity with the processes and some of the tools. The Green Belt role is generally a collateral responsibility to one's normal job.

The Process - DMAIC

DMAIC is the acronym that is most typically associated with the Six Sigma process and represents each of the steps or phases in this structured and disciplined methodology. These phases are: Define, Measure, Analyze, Improve and Control. Each phase in the process is linked to the subsequent and previous phase. The following is a brief summary of each of the phases in the DMAIC process:⁷⁹

⁷⁸ At 3M, Black Belts must close two projects before receiving their certification.

⁷⁹ Rath & Strong, *Six Sigma Pocket Guide*, (Lexington: Aon Management Consulting, 2003), 5-6.

Define: In this step the project's purpose and scope are clearly defined. This is considered the most important step in the DMAIC process. The project should be clearly connected to business priorities and a process owner should be identified. It is during the define phase that the key player are identified and resources for the project committed. The typical outcomes of the define phase include a team charter, a high level process map, and list of what is important to the customer.

Measure: The purpose of this phase is to collect or gather data on the current situation. The output of the measure phase provides baseline data on the current process and its performance, helps focus on the problem locations, and helps develop a more focused problem statement.

Analyze: The purpose of this phase is to identify the root causes of the problems and confirm them with data. These verified causes provide the basis for improvement opportunities in the next phase.

Improve: During this phase improvements are developed, implemented, and evaluated. The goal is verify, with data, that solutions have been made that eliminate or minimize the root causes previously identified.

Control: The goal of this phase is to develop and implement a control plan that captures the improvement and ensures that they continue. Once measurable improvements are identified a control plan is implemented to ensure that the process is not allowed to revert back to its old ways.

When confronted with problems, everyone has their own opinion or intuition as to what the problem is, but rather than chasing rabbits down a hole, the DMAIC methodology provides a systematic solution backed up with data to solve those problems.

Lean Six Sigma at 3M

“Perhaps the biggest but most unheralded benefit of Six Sigma is its capacity to develop a cadre of great leaders.”

Jack Welch
Winning

Six Sigma came to 3M in 2001 with the arrival of Jim McNerney who, as the new CEO, made Six Sigma one of his primary initiatives.⁸⁰ With McNerney’s prior association with General Electric, it should come as no surprise that he echoed Jack Welch’s opinion that Six Sigma was a leadership development opportunity, and during his time at 3M, Six Sigma served as one of the primary leadership development pipelines. McNerney truly pushed Six Sigma from the top down. He quickly created a new executive position: Executive Director, Six Sigma. He formed a Six Sigma Leadership team made up of Six Sigma directors that reported directly to each of the executive vice presidents of the business sectors and the vice presidents of the international regions.⁸¹ He required that Master Black Belt and Black Belt positions be filled by employees who had been identified as “high potential” candidates by their management. He instituted an aggressive training program, initially with the assistance of outside consultants, and then once the requisite knowledge was acquired inside the company, stood up Six Sigma Operations giving them the responsibility to teach and coach the methodology across the company. He directed that all salaried employees be trained in Six Sigma (green belt) and participate on a process improvement project. To date, over 55,000 employees have been trained

⁸⁰ When Jim McNerney brought it to 3M, the initiative was called “Six Sigma”. Today it has evolved into “Lean Six Sigma.”

⁸¹ Today, several of these initial Six Sigma leaders have ascended to senior leadership positions within the company. Brad Sauer, who McNerney named as his first Vice President (at the time Executive Director) Six Sigma, is now the Executive Vice President for the Health Care Business. Jean Lobey, the current Executive Vice President for the Safety, Security, and Protection Services Business, was the Six Sigma Executive Director for the European/Middle East region under McNerney. Angela Lalor, the current Senior Vice President for Human Resources, was a “first wave” Master Black Belt in Human Resources under McNerney.

in Lean and Six Sigma and over \$5.5 billion in Lean Six Sigma contributions have been made to 3M's bottom line since 2001.⁸² McNerney and 3M embraced Six Sigma because it:

- Achieves excellence in our business processes and customer perceived quality.
- Provides leadership development throughout all disciplines within the corporation
- Provides a common leadership development experience.
- Develops transferable skills to all levels.
- Right Process for business decisions within 3M.
- Provides common approach to process improvement globally.
- Institutes a common language throughout the corporation on a global basis.⁸³

We can all appreciate the concept that what is important to your boss suddenly becomes very important to you. This is essentially how McNerney successfully drove Six Sigma throughout 3M and into its DNA; he made it his number one priority, he provided the necessary personnel and resources for it, and he very visibly supported the initiative.

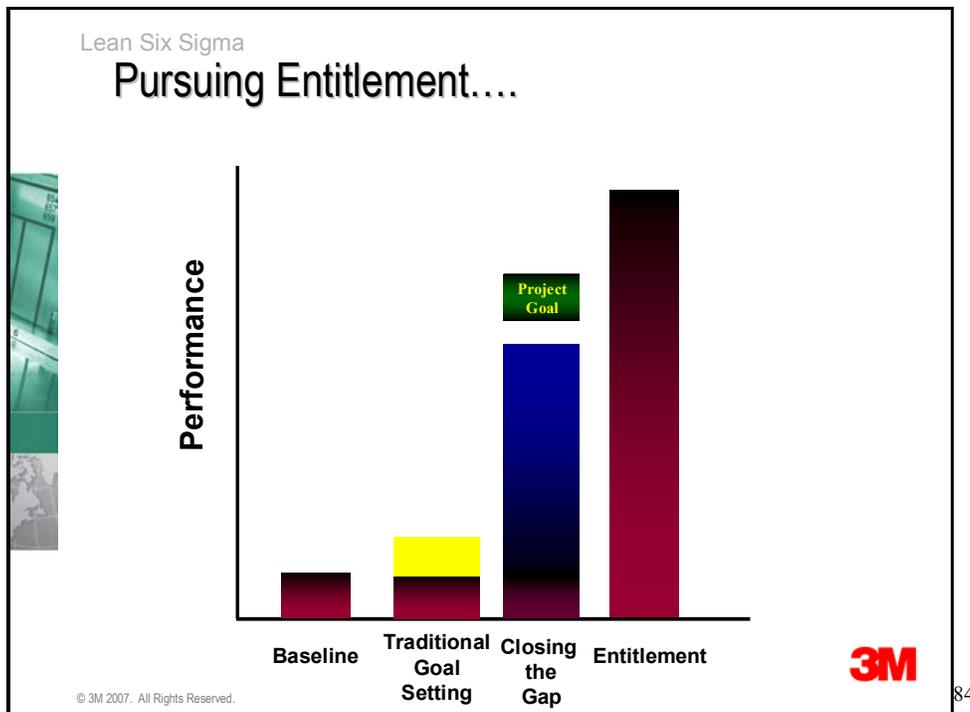
Pursuing Entitlement

One of the unique aspects to Lean Six Sigma at 3M that I have not encountered in any of the Lean Six Sigma literature elsewhere is the concept of "entitlement." At 3M "entitlement" is not what is owed or due to an individual, but rather entitlement is term used to measure how good a process can possibly be. When a Black Belt is asked at a project review "what is entitlement here?" that Black Belt is being asked "what is the best this process can possibly perform?" A 10% improvement in a process sounds great, but if there is actually room for 30% worth of improvement in that process, then you have missed the mark. The idea behind entitlement is that rather than making small incremental improvements, the goal is to stretch

⁸² "2008 Approved Outside Presentation," 3M Lean Six Sigma Information & Tools Database, (St. Paul: 3M Company), 17 (accessed April 1, 2008).

⁸³ "2008 Approved Outside Presentation," 12.

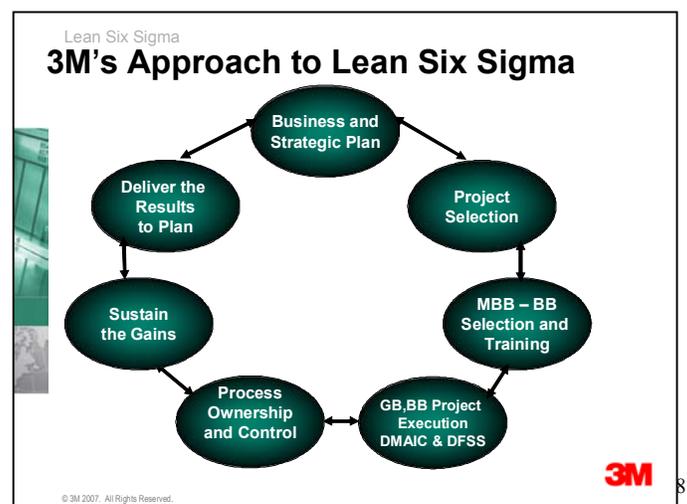
towards closing the gap to perfection much more quickly. Depending upon the circumstances, entitlement can be determined in a number of different ways. If available, entitlement may be calculated from looking at historical data to see the best a process has ever run in the past. It might be determined based upon what the competition is doing in a particular area. Finally, where data is lacking, entitlement may be simply an educated guess keeping in mind that the purpose of entitlement is to stretch. The diagram below is a pictorial representation of the concept of entitlement thinking.



⁸⁴ "2007 Approved Outside Presentation," 37.

Lean Six Sigma Today at 3M

Today, Lean Six Sigma is alive and well at 3M, though it has undergone a bit of an identity transformation since the departure of Jim McNerney. With a change in leadership, and a leader with a different background and different priorities, Lean Six Sigma has become less of a visible focal point at 3M, but nevertheless an important aspect of George Buckley's strategy for growth and operational efficiency. The provocative cover of the June 11, 2007 issue of *BusinessWeek* invited readers to examine "3M's Innovation Crisis: How Six Sigma Almost Smothered Its Idea Culture" but the text of the story, much less provocative than the cover, really describes the evolution of Lean Six Sigma at 3M.⁸⁵ McNerney "pushed" Lean Six Sigma from the top down, whereas today at 3M, Lean Six Sigma is less of a regimented mandate and instead the businesses "pull" Lean Six Sigma where they need it and where it makes sense. Over time there has been a recognition that Lean Six Sigma is not a one-size fits all solution that can be forcibly applied to every situation, but rather consists of a suite of improvement methodologies and a complementary toolset that may be pulled from in a manner tailored to the situation or problem. 3M's approach to Lean Six Sigma is pictured below:



⁸⁵ Brian Hindo, "At 3M, A Struggle Between Efficiency and Creativity," *BusinessWeek*, June 11, 2007, 8.

⁸⁶ "2007 Approved Outside Presentation," 27.

Today at 3M, Lean Six Sigma starts with the creation of strong business and strategic plans. Through a project idea creation and prioritization process (referred to as hopping), projects that drive and support the business plans are selected and then chartered. Master Black Belts and Black Belts continue to undergo rigorous and intense training. Black Belts and Green Belts execute and lead improvement project teams. The project teams are trained to own, improve, and control the processes they are working to improve. After improvements are made, the focus is on sustaining the gains over the long term with documented control plans. The results of the gains are then delivered to the business plans, and the cycle continues.⁸⁷

While some aspects of Lean Six Sigma have changed over time at 3M, one certainly has not: Lean Six Sigma is still a leadership development opportunity at 3M. There still is a Vice President for Lean Six Sigma and there are still Lean Six Sigma Directors that report to each of the businesses and the international regions. Additionally, Master Black Belts and Black Belts still come from the “high potential” pool of employees. In my opinion, the evolution of Lean Six Sigma at 3M was to be expected and really follows a sort of natural progression. Without Jim McNerney’s disciplined push from the top, it is my opinion that Lean Six Sigma would have likely failed and been viewed as the fad of the day. Instead, with his aggressive Six Sigma stance, McNerney drove the process improvement methodology and an accompanying mind state into 3M’s DNA. Now that this discipline has been engrained in the company, I believe that there is less of a need to push the methodology from the top. 3M has, in a sense, grown self sufficient and now pulls what it needs in order to prosper.

How Does this Apply to Me?

Lean Six Sigma is already being used in many places throughout the Department of Defense and within each of the military services. Most supply, logistics, and aircraft repair

⁸⁷ Ibid.

depots are currently using Lean Six Sigma methodologies to improve operations. Many procurement activities are also using Lean Six Sigma. In May, 2006 the Department of the Defense published its Continuous Process Improvement (CPI) Guidebook stressing that every DoD organization must continually improve the effectiveness of support to the [W]arfighter.⁸⁸ In May, 2006 the Secretary of the Navy launched a Lean Six Sigma initiative across the Department of the Navy.⁸⁹ In 2007, the Army launched Lean Six Sigma across the entire Army, making it the largest deployment of Lean Six Sigma ever.⁹⁰ Also in 2007, the Air Force launched its organizational-wide continuous improvement effort called Air Force Smart Operations 21.⁹¹ The Marine Corps too has been using CPI methodologies, including Lean Six Sigma, across the Corps over the last few years. In December, 2007 the Marine Corps published its own CPI Guidebook and in January, 2008 followed with the issuance of the first in a series of Marine Corps-wide messages providing policy and guidance for the application of CPI in the Marine Corps.⁹² Clearly the Department of Defense is affirmatively taking steps in the right direction with Lean Six Sigma but I think there is a long way to go before a CPI mentality, like that of 3M, becomes a part of our DNA. Lean Six Sigma opportunities are abound particularly in the transactional environments such as finance, personnel, and yes, even legal; areas which, in my opinion, are probably the most resistant and least receptive to the methodologies, mostly due to lack of an understanding of how the methodologies can really apply in these worlds.

So, let's talk about a few examples to put this all into perspective. First, a success story: the Marine Corps Automated Performance Evaluation System or A-PES. A-PES is the

⁸⁸ Deputy Secretary of Defense, *Establishment of DoD-wide Continuous Process Improvement (CPI) Programs*, Memorandum For, May 11, 2006.

⁸⁹ Secretary of the Navy, *Transformation Through Lean Six Sigma*, Memorandum for Distribution, May 3, 2006.

⁹⁰ Elaine Schmidt, "Lean Six Sigma is in the Army Now, Improving Efficiency," *iSix Sigma Magazine*, September/October 2007. <http://military.isixsigma.com/library/content/m071101a.asp> (accessed March 17, 2008).

⁹¹ Ibid.

⁹² Commandant of the Marine Corps, *USMC Continuous Process Improvement (CPI) Implementation Policy*, MARADMIN 014/08, January 7, 2008.

electronic means of creating and submitting fitness reports through the appropriate chain of command and then on to Headquarters Marine Corps (HQMC) where, through an electronic interface, the reports are placed into a Marine's Official Military Personnel File (OMPF) and immediately available to any promotion or school board that may require the information. A-PES is a prime example of a truly Lean process. Prior to A-PES, completing a fitness report could take months and require multiple rounds of frustrating re-work. A paper report had to be physically routed from the individual Marine, to his Reporting Senior (supervisor), to the Reviewing Office (the supervisor's supervisor), and then on to HQMC where it eventually wound its way into the Marines OMPF often too late for a promotion or school board to consider it. Often times the individuals involved were not co-located, and because the original signed document had to be submitted, the report had to be mailed to the next in line. If there were mistakes made along the way, which inevitably there were, the report had to be sent back and re-worked. A-PES solved all of this. Now a Marine, no matter where he is located, can complete the initial portion of the fitness report on-line and digitally forward it to his Reporting Senior. The Reporting Senior can then pull the report up in the system, complete his portion of the report, digitally affix his signature, and send it on the Reviewing Officer. The Reviewing officer does the same and then forwards it along to HQMC for almost immediate inclusion in the Marine's OMPF. A-PES has built in error catching software that will not allow the report to be forwarded to the next person if there is required information missing and allows the report to be electronically returned to the sender if there is an error or more information required. So let's look at what happened here. All of the muda in the original paper process was eliminated. Transportation time, i.e. mailing, was eliminated. Wait time, i.e. sitting on someone's desk, was virtually eliminated. Re-work was minimized. The system was streamlined to focus almost

exclusively on value-added steps – getting a timely and accurate evaluation into a Marine’s record quickly. While this improvement benefited from the use of technology, not all improvements require additional technology; in fact most do not need high-tech solutions at all. For example, a trained Green Belt-led team on the Navy Judge Advocate General’s staff was able to shorten the officer dismissal process from an average of 100 days down to 15 days, saving nearly \$3.5 million dollars a year for the Department of the Navy, using simple Lean Six Sigma tools like value stream mapping and a cause and effects matrix.⁹³

From my experience on the Commandant’s legal staff, there are a number of processes that immediately come to mind that are ripe for improvements through use of the Lean Six Sigma methodology. The officer promotion and removal process is riddled with redundancies and waste. These decision packages are routed through at least four separate legal staffs alone, before they arrive to the Secretary for decision and can take months for resolution. Lawyer jokes aside, how much value can review by four separate legal staffs possibly provide? The pace of the post-trial processing and mandatory appellate review of military courts-martial has historically been a thorn in the Navy-Marine Corps legal community’s side.⁹⁴ These delays that require us to keep convicted servicemembers on our rolls for longer than necessary can cost us millions of dollars each year. The Lean Six Sigma opportunities are out there for the choosing, but require a serious commitment to make a meaningful change.

⁹³ William Whitacre, Deputy Director, Management and Plans, Office of the Judge Advocate General of the Navy, telephone interview with the author, March 17, 2008.

⁹⁴ See e.g., *United States v. Moreno*, 63 M.J. 129 (2006).

Chapter 5

Takeaways for the Department of Defense

Throughout my year I was often asked by 3Mers, “so are you learning anything this year?” My answer was always unequivocally “yes I am.” But, I often struggled to articulate in some specificity exactly what it was that I was learning. I finally came to the realization that one of the reasons for my uncharacteristic loss of words was that I was continually learning that there is an awful lot that I know absolutely nothing about! I had never taken a business class or a sales and marketing class. As a political science major in college, I had avoided taking classes on statistics like the plague. Yet, upon my arrival at 3M, I found myself immersed in these unfamiliar areas. Without a doubt, my fellowship experience was both a personally and professionally rewarding experience. It opened my eyes to so many areas that I knew absolutely nothing about, and quite candidly, would have no reason to otherwise explore on my own. Much of what I learned is hard to put into words and falls into the category of “intangible,” yet I know that in the years to come I will draw from my experiences here at 3M and be a better, more rounded, Marine Corps officer as a result.

In my “elevator speech,” which I described at the beginning of this report, I said that my hope for this year was to observe and take back with me (to the Department of Defense and the Marine Corps) any best business practices that could make us more efficient and better stewards of the taxpayer’s money. It is in this section of my report that I attempt to synthesize some of the tangible lessons learned during my year at 3M. These lessons take into account not only my experiences here at 3M, but also some of the common themes that resonated from our Company Day visits with the other sponsoring companies.

1) Lean Six Sigma is a proven methodology that should continue to be driven across the Department at all levels.

The Lean Six Sigma methodology is not a passing fad; it continues to be adopted and deployed by leading companies across the business world and has proven to deliver extraordinary results. Success requires commitment from the top down and requires that a continual process improvement mentality be driven across an entire organization. Success also requires a commitment of full-time resources to fill Black Belt and Master Black Belt roles, and a commitment to ensure that everyone involved receives the proper training. The extent and depth of the training will depend upon what role that individual will fill in relation to selecting, managing, or implementing improvements, but everyone should receive at least some basic awareness training to familiarize them with the vocabulary and the basic principles of the methodology. Companies that have truly succeeded with Lean Six Sigma have typically committed about 1% of their people for full-time Lean Six Sigma positions.⁹⁵ Companies ordinarily start with outside consultants for their initial waves of training, but over time, build the requisite knowledge to instruct and coach internally. The current support of Lean Six Sigma by senior DoD and Service leadership is a good start, but there is still much more that can be done to drive it across the entire Department. For example, just through casual conversation, I have learned that very few of my peers have any idea what Lean Six Sigma is all about; and those that do are not convinced that it translates well to a military environment. Until folks like these become “believers”, I fear that Lean Six Sigma could be destined to die on the vine like other initiatives that preceded it.

I am not advocating that we need to have a Black Belt at every infantry battalion, particularly with the Global War on Terrorism ongoing. Rather, I am advocating that we should

⁹⁵ George, *Lean Six Sigma for Service*, 22.

continue to drive Lean Six Sigma in places where it makes sense to do so and continue to foster the mindset that the status quo is not good enough - we can always improve. That being said, having a Marine in each battalion with some basic understanding of the Lean and Six Sigma tools such as value stream mapping, identifying and reducing waste, and simply asking “why” could reap many benefits for our war fighters. By streamlining and improving the processes that touch our Marines, whether it is for example predeployment preparation, maintenance part ordering and fulfillment, or acquisitions of necessary gear, we could improve the quality and safety of our Marines lives as well as their combat effectiveness. As I have already touched on in the main text of this report, I believe there are significant untapped Lean Six Sigma opportunities in our transactional or back office processes particularly at Headquarters, Marine Corps and the other Major Supporting Command staffs.⁹⁶ We often caulk lengthy lead or cycle times of our everyday processes up to the bureaucracy or the complexity of our organizational structure or in other words, “that is just the way we do it around here.” Lean Six Sigma challenges these basic assumptions, takes a structured and data-based look at a process, and can offer significant and dramatic improvement.

One of the challenges with driving Lean Six Sigma across an enterprise is that there is the potential that the personnel affected might perceive the initiative as merely a cost-cutting mechanism. If the process that I am involved in is improved, I could be out of a job. DoD must avoid the pitfall of using Lean Six Sigma as means to accomplish a workforce reduction. That is not what Lean Six Sigma is all about. While cost savings are an incidental benefit of Lean Six Sigma, the initiative has faltered or failed in companies that have used the methodology solely

⁹⁶ Some of these opportunities have already been identified and improvement efforts are ongoing. In its CPI implementation the Marine Corps has identified nine High Impact Core Value Streams (HICVS) to focus improvements within: Acquisition; Aviation Material Life Cycle Management; Capability Development, Human Resources Development; Information Technology; Installation Management; Resource Allocation; Service Advocacy; and Total Life Cycle Management. MARADMIN 014/08.

for slashing costs and reducing personnel levels. Improving process efficiencies should free up personnel, but those personnel need to be reallocated to other areas that are short personnel, used for increased or surge capacity, or committed to work on further process improvements. Lean Six Sigma is a methodology and a tool set, but more importantly it is a mindset; one of continual process improvement. To encourage this mindset, or in 3M terms, to drive entitlement thinking, there has to be an incentive or a “what’s in it for me?”⁹⁷ In the past, fiscal frugality in DoD ordinarily resulted in a penalty. If an organization saved money, or did not spend its entire budget in any given year, it was rewarded with less money to spend the following fiscal year. To combat this phenomenon, and to incentivize a continual process improvement mindset, the services have implemented cost recapturing policies that allow an organization to recapture, i.e. keep any money saved as a result of a process improvement project.⁹⁸ This is exactly the type of powerful incentive that I am suggesting. Now the key is to continue to get the word out.

2) Availability of reliable metrics is essential to measure and drive continual improvements

One of the tenants of Lean Six Sigma is that it is a data-driven decision making methodology. Success necessitates that one has the necessary data available to draw from. One of my observations at 3M was that it seemed like they captured data on, and measured, almost everything. In a manufacturing plant environment, I expected that volumes of data would be captured regarding machine efficiency (speed, temperature, output etc.) but I also saw significant data collection and collection methods that I had not anticipated. 3M would routinely use surveys to capture data on customer satisfaction, employee satisfaction, work place atmosphere,

⁹⁷ Also known as a “WIIFM” - What’s In It For Me?

⁹⁸ See e.g., Secretary of the Navy, *Validating and Leveraging Financial Benefits Associated with Lean Six Sigma for Continuous Process Improvement*, SECNAVINST 5220.13, November 30, 2007 and United States Marine Corps, *Continuous Process Improvement Guidebook*, December 21, 2007, 10. <http://hqinet001.hqmc.usmc.mil/i%26L/v2/LR/LRHome.htm> (accessed 5 April 2008).

course curriculum evaluations, and instructor performance evaluations to name a few. Most of us have completed a post-course evaluation or survey, so this methodology may not sound very novel, but the key is what you do with it afterwards. 3M ensured that their surveys were designed upfront to yield statistically significant results; results from which problems and processes could be meaningfully analyzed and improved upon. We in DoD need to ensure that we have the means in place to capture the kinds of data that will help us drive improvements. In some cases this may mean beginning to collect data that we had never been capturing, or in other instances it may mean refining our data collection mechanics and repositories. In some instances it is not that we do not have the data available to us, it is instead that we are overwhelmed with an abundance of data that we can not make heads nor tails of it. The good news in this instance is that the statistical rigor of the Lean Six Sigma methodology can facilitate boiling that data down into a useable and meaningful format.

3) DoD needs to use and leverage existing technology more effectively to make our jobs easier

3M uses Lotus Notes as its platform for e-mail, calendars, meetings, etc. With my 3M Lotus Notes account I could look up any one of the over 75,000 3M employees operating in over 60 countries and view their point of contact information, send them an email, check their availability for a meeting, and share a document with them. If I wanted to schedule a teleconference with a person in Singapore, the system would do the time conversions for me and assist to select the best timeslot to make the telephone call. With my Navy-Marine Corps Intranet account in the Pentagon, I could not even look up the email address for a Navy officer located a stone's throw down the passage way, and forget trying to find an Army or Air Force member. I am not advocating that DoD should switch to Lotus Notes. My point here is that the technology is out there, and in most cases we already own it, yet we have not implemented and

integrated it effectively to make our lives easier and gain the full benefit of what we have purchased. At 3M, I would regularly attend meetings in St. Paul where there were attendees from three other continents participating in the meeting through teleconference and net meeting software or a combination of the two. With simple internet-based net meeting services a presenter in France can share her PowerPoint slideshow to a worldwide audience. In DoD we have incredibly sophisticated communications systems and impressive video-teleconference facilities at our major headquarters locations, but how much time and money do we spend to send staff officers on temporary duty to attend a planning meeting, where access to the meeting via net meeting would suffice? A key buzz word that we heard at many of the corporate sponsors this year, particularly at Cisco, Oracle, and CNN.Money, was “collaboration.” Technology now allows us to collaborate on a project and share information in ways that we never thought of. Admittedly in some instances this proliferation of information availability can be an overwhelming burden, but when used effectively, collaboration tools can be force multipliers. Relatively simple and inexpensive tools such as QuickPlace and SharePoint allow multiple users to create, view, store, and work with documents in a shared environment. These collaborative tools promote efficiency, help eliminate document version control issues, and can serve as knowledge management vehicles or platforms.⁹⁹ We can do a better job leveraging simple everyday technology.

4) Contracting with the government is hard and inefficient

My report is not about the need for acquisition reform and so I will spend very little time on it here, but I believe it should be mentioned. A reoccurring theme that we heard from most of

⁹⁹ More expensive tools, such as Cisco’s telepresence technology that was demonstrated to us during Cisco’s Day in March 2008, allow individuals at multiple sites to meet and interact over high definition video without the delay often associated with video teleconference technologies. With this technology, the participants really felt like they are in the same room together. Learn more at: <http://www.cisco.com/en/US/products/ps8333/index.html> (accessed April 6, 2008).

the corporate sponsors this year was that contracting with the government can be at times difficult, time consuming, inefficient, and frustrating. They further commented that the complexities and the structure of the acquisition process often prevent the government from getting the best solutions for their money. I practiced government contracts law for three years so I understand that the laws and regulations are designed around the premise that competition is good and I agree with this basic premise. My problem, and I believe that of industry, is in the execution of this basic premise. I believe that if major corporations had to operate under the constraints of the Federal Acquisition Regulations, they would soon go out of business. For example, while 3M does do some business with the Federal government, they do it mostly through either the General Service Administration schedules or as supplier to a prime contractor. They have found that bidding directly on Federal contracts is cumbersome and requires specific expertise that they do not believe is worth the investment. 3M is but one example, but other commercial companies are similarly situated and as a result, I believe that the government loses out on valuable technologies, products, and solutions. While ultimately it may take Congressional action and changes in the law, I believe that we need to continue to push for further reform, particularly in the area of commercial acquisitions. We ought to be able to conduct sourcing operations as efficiently as our industry counterparts, yet I believe the rules and regulations are frustrating us from being able to do so.

5) In today's information age, DoD should strive to be as transparent possible

We heard from all of our corporate sponsors that in order to be successful, a business must be customer-centric. In other words, the business must be in tune with the voice of their customer, understand what the customer wants and needs, and understand what that customer's challenges or "pain points" are. Additionally, with the explosion of information technology and

connectivity, today's customer is much more "connected" and informed than ever before. This connectivity leads to customers that are more knowledgeable, more demanding, and thirstier for information. Translating this customer-centric concept into DoD terms is a bit of a challenge as it begs the question who is DoD's customer? My response to this question is that DoD has a number of different customer segments that it must be attentive to, but ultimately the individual warfighter sits at the top of our customer list. We need to do a better job staying in tune with the warfighter.

Today's Soldiers, Sailors, Airmen, and Marines are coming into the service more connected than ever before with their cell phones, PDAs, and the internet. They communicate and share information through YouTube, MySpace, and the like. Rather than fight this reality, we need to better embrace it. That is what successful companies have done. For example, John Chambers, the CEO at Cisco, does his own video blog whenever he wants to share information with the entire company. He encourages employees to post comments and feedback on his blogs. Additionally, Cisco employees share information, videos, etc. with each other through their internal network. If a product bug or defect is discovered, the Cisco engineer who crafts the solution can video that solution and then immediately push it out to all of the sales representatives who can immediately inform their customers. These are just a few examples of the flavor of transparency that I am advocating. Clearly we can not be as open or transparent as many businesses are. We still need to preserve and respect our chain of command, we need to protect classified material, and we need to preserve operational security. Yet even with these serious considerations, I believe there are significant opportunities for us to be more in tune with the needs and pulse of the war fighter. For example one suggestion is creating an internal network that allows service members to pass along information, share lessons learned, and

collaborate. We know our service members are already doing this on their own via the internet and in some instances have posted information either of a sensitive nature, or that adversely reflected on the services. Providing service members an avenue to share information and collaborate, in a controlled environment, could make us a more productive and healthier organization.

Our other customer segments include the folks that pay our bills: the Congress and the American public. Just like our own service members, these segments are also more “connected” than ever before and both expect instant gratification in the form of information flow. We must be more conscious and attentive to this trend, particularly in an era where we are seeing a noticeable decrease in the percentage of military service in each of these two segments.¹⁰⁰ Keeping the needs to protect national security, classified information, and operational security in mind, we must strive to be as open and transparent as possible with these customer segments. Admittedly it is often the lawyers, like me, that discourage greater transparency, but we need to buck this trend and can use the practices of our industry partners as a model to follow. In my own neck of the woods, we are always quite guarded about information regarding ongoing military courts-martial cases. Often times, many of these cases are high profile and draw the attention of national media, the public, and the Congress. These cases also often draw sharp criticism from these same groups which, in my opinion, can normally be attributed to a lack of information or unfamiliarity with the process. While there are rules that guide what we can and can not disclose, these rules also provide some leeway or flexibility in what may be disclosed. I believe that we ought to examine what information we are providing, whether it would be beneficial to disclose more information, and explore new and more collaborative means of

¹⁰⁰ Kathy Roth-Douquet and Frank Schaeffer, *AWOL: The Unexcused Absence of America's Upper Classes from Military Service – and How it Hurts our Country* (New York: HarperCollins, 2006), 5-7.

disclosure across the board in everything we do. This is particularly important where we know that we will be facing decreasing budgets, yet continued threats, in the years ahead. In industry terms, the Department of Defense and the Military Services need to ensure that we are continuing to articulate our value proposition to our customers (the Congress and the public) and differentiating ourselves from others that are competing for a finite number of resources. We can accomplish these ends with greater transparency towards these customer segments.

6) DoD should continue to support and expand non-traditional educational opportunities

My fellowship experience opened my eyes to the many parallels between the Department of Defense and corporate America. While we have entirely different missions, we both struggle with many of the same issues and challenges in the execution of those missions: limited resources; personnel challenges; and a continually changing marketplace (or battlefield) to name a few. Additionally, through our contacts with corporate CEOs and senior executives, we confirmed that the Department of Defense does not have a monopoly on leadership. Our fellowship experience gave us a unique exposure to leadership in a different flavor and environment. We saw how executives were able to successfully drive significant change throughout their organizations in order to get ahead of their competition and flourish in a complex and rapidly changing marketplace. We saw how corporate leaders were able to motivate their employees to perform and to reach towards attaining “stretch” goals. We also saw how a number of corporations were able to successfully negotiate through significant downturns and periods of adversity. With the companies that do a substantial amount of business with DoD, we had the opportunity to “walk in their shoes” and gain their perspectives of the challenges of doing business with the government. These are just but a few examples of the valuable experiences we gained through this fellowship experience that distinguishes the

program from more traditional military educational opportunities. I believe that DoD would be wise to continue this program and to expand other non-traditional learning opportunities in order to further develop and retain a well rounded and diverse population of military officer who can lead us into the future.

Closing

I would like to say one final thank you to everyone at the 3M Company who graciously shared their time with me to ensure that my fellowship experience was as enriching as possible. I know that I am taking much more away from my experience at 3M than I contributed to 3M - they got the raw end of the deal. Without a doubt, the greatest thing about 3M is the quality and character of its people. They love what they are doing and this is reflected in their attitude, work ethic, and the quality of their products. The folks at 3M are a tremendously patriotic lot who immediately welcomed me and integrated me into the everyday on goings at 3M. I depart with a new network of friends for life. Semper Fidelis.

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Appendix I: 3M Company Day Agenda



SECRETARY OF DEFENSE CORPORATE FELLOWS PROGRAM 3M Company Day

Wednesday, 12 December 2007

2:00 – 6:30	Arrive MSP Intl Airport and transportation to hotel	Wildwood Lodge
7:15	Meet in hotel lobby	Wildwood Lodge
7:20	Dinner (No host)	Machine Shed

Thursday 13 December 2007

7:30	Depart hotel	Wildwood Lodge
7:45	Arrive 3M Innovation Center	Innovation Center
8:00 – 9:00	Tour Innovation Center John Leuck , 3M Innovation Center	Innovation Center
9:00 – 10:00	Welcome and Corporate Overview John Houle Vice President, Manufacturing and Supply Chain Services and Lean Six Sigma (SDCFSP sponsor)	Innovation Center
10:00 – 10:30	Break	Innovation Center
10:30 – 11:00	Lean Six Sigma at 3M Mary Griep Director, Lean Six Sigma Operations	Innovation Center
11:00-12:00	Research and Development Larry Wendling Vice President, Corporate Research	
12:00 – 1:00	Lunch	Innovation Center
1:00 – 1:45	Industrial and Transportation Business: A Business Unit Perspective H.C. Shin Executive Vice President, Industrial and Transportation Business	Innovation Center

1:45 – 2:30	Occupational Health & Environmental Safety Division A Business Unit Perspective J. L. Bushman Vice President, Occupational Health & Environmental Safety Division	Innovation Center
2:30 – 2:45	Break	
2:45 – 4:15	Fellows Time with Eric Briggs	Innovation Center
4:15 – 5:00	Sourcing Initiatives Keith Weber Vice President, Sourcing	Innovation Center
5:00	Depart 3M Company	Wildwood Lodge
7:00	Dinner	Forepaugh's St. Paul
9:00	Return to Hotel	Wildwood Lodge

Friday, 14 December 2007

7:30	Depart/checkout hotel	Wildwood Lodge
7:45	Arrive 3M Company	Innovation Center
8:00 – 8:45	International Operations Sue Harrington Director, Construction Markets and Lean Six Sigma	
8:45 – 9:30	Corporate Supply Chain Operations John Woodworth Senior Vice President, Corporate Supply Chain Operations	Innovation Center
9:30 – 10:15	Human Resources: Talent Management, Recruitment, 02 Program Angela Lalor Senior Vice President, Human Resources	Innovation Center
10:15 – 10:45	Break	
10:45 – 11:30	Aerospace Markets: A Business Unit Perspective Brian Young General Manager, Aerospace and Aircraft Maintenance Department	Innovation Center
11:30 – 12:00	Enterprise Services Jim Stake Executive Vice President, Enterprise Services	Innovation Center
12:00 – 1:00	Lunch	

1:00 – 2:00	CEO Remarks George Buckley Chairman of the Board and CEO	Innovation Center
2:00	3M Company Store (Optional for those interested)	Bldg 275
3:00	Fellows Depart	

Guests:

2007 Secretary of Defense Corporate Fellows:

Commander Bill Brougham, U.S. Navy, Government Education & Healthcare, Oracle
Colonel Murf Clark, U.S. Air Force, IT Acquisitions Integration, Cisco Systems, Inc.
Lieutenant Colonel Jeff Colwell, U.S. Marine Corps, Lean Six Sigma Operations, 3M Company
Commander Brent George, U.S. Navy, Special Projects, CACI - Athena
Colonel Alan Lake, U.S. Air Force, Ongoing Change Program Office, Amgen, Inc.
Lieutenant Colonel Rey Masinsin, U.S. Marine Corps, Production, CNNMoney.com
Colonel Willie Melendez, U.S. Army, Missiles and Fire Control, Lockheed Martin Corporation
Colonel Joe Moore, U.S. Army, Special Projects, SRA International, Inc.
Lieutenant Colonel Roger Witek, U.S. Air Force, Weapons Division, The Boeing Company

Department of Defense representatives:

Mr. Eric Briggs, Director, Secretary of Defense Corporate Fellows Program (SDCFP)

Corporate Representatives:

Cynthia Wenban, Director, Supplier Quality, Missiles and Fire Control, Lockheed Martin
Jan Browne, Director of Stand-Off Strike/Surface Program, The Boeing Company

3M Company:

John Houle, Vice President, Manufacturing and Supply Chain Services and Lean Six Sigma (SDCFSP sponsor)
Mary Griep, Director, Lean Six Sigma Operations

Administrative Information:

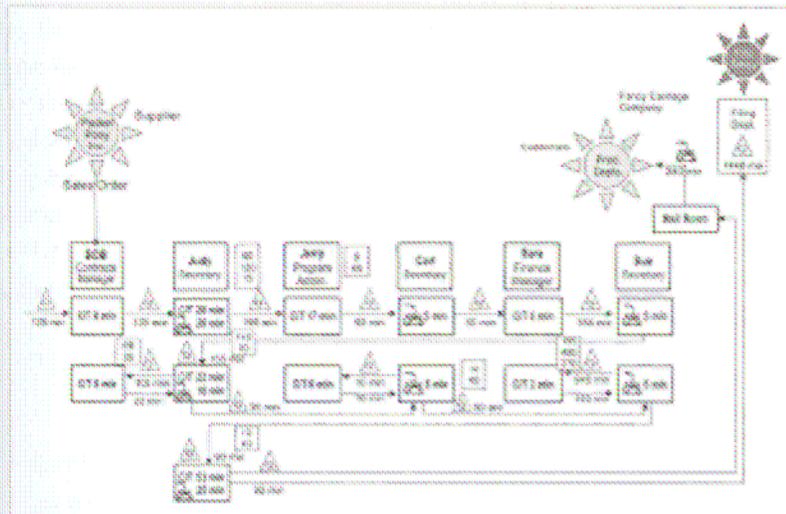
Dress: Business casual (slacks and long-sleeve shirt or equivalent) for all meetings and socials. However, the colder weather may drive a jacket as appropriate, no ties required.

Appendix II: 02 Leadership Class

3M	USMC
Leadership Attributes	Leadership Traits
<ul style="list-style-type: none">■ Thinks from the Outside In■ Drives Innovation and Growth■ Develops, Teaches, and Engages Others■ Makes Courageous Decisions■ Leads with Energy, Passion, and Urgency■ Lives 3M Values	<ul style="list-style-type: none">■ Bearing■ Courage■ Decisiveness■ Dependability■ Endurance■ Enthusiasm■ Initiative■ Integrity■ Justice■ Judgment■ Knowledge■ Loyalty■ Tact■ Unselfishness
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Appendix III: Value Stream Map

Figure 2.7: Value Stream Map (A process flow map)



This value stream map, based on an actual process, captures the main sequence of activities in the boxes across the top line. The triangles and other notations show wait times (delays) and rework loops (another form of waste). Notice that the order begins by waiting 125 minutes "in queue" at Bob's activity before he spends 8 minutes adding value, then waits 120 minutes at Judy's station before she adds 20 minutes of value, etc. The order makes several loops back and forth between Judy, Bob, and Sue. Creating a map like this highlights wasted time and effort that usually isn't apparent to people mired in the process. Why the long queue times? Because there is a lot of work-in-process that has to be handled before any new item of work can be handled.

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¹⁰¹ George, *Lean Six Sigma for Service*, 39.