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DO QUALITY CONCEPTS AND PRINCIPLES APPLY TO COMBAT  
OPERATIONS? DOES "QUALITY" END WHEN THE SHOOTING BEGINS?

by

Myron P. Kryschtal

Lieutenant Colonel, United States Army

A RESEARCH REPORT SUBMITTED TO THE FACULTY  
IN  
FULFILLMENT OF THE CURRICULUM  
REQUIREMENT

Advisor: Colonel R.A. Khalar

MAXWELL AIR FORCE BASE, ALABAMA

April 1994

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## ABSTRACT

TITLE: Do Quality Concepts and Principles Apply to Combat Operations? Does "Quality" End When the Shooting Begins?

AUTHOR: Myron P. Kryschtal, Lieutenant Colonel, USA

The United States and the Department of Defense have adopted the principles of Total Quality Management. Quality Air Force is a controversial and innovative program to institute the principles of Total Quality Management into the Air Force. Any system adopted by a military service must be able to stand the test of war. A comparison of the management principles of W. Edwards Deming, the core values of Quality Air Force, and the combat experience of a brigade commander during the Persian Gulf War show that quality concepts and principles do apply to combat operations.

Lt Col Myron P. Kryschal (BA, John Carroll University; MA, Boston University) is a member of the Air War College Class of 1994. Lt Col Kryschal served as the Chief of the 1<sup>st</sup> Infantry Division (Mechanized) Materiel Management Center during Operation Desert Storm and commanded the 101<sup>st</sup> Forward Support Battalion, 1<sup>st</sup> Infantry Division (Mechanized). Lt Col Kryschal is a graduate of Army Command and General Staff College.

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## CHAPTER I

### PREFACE

The Battle of Norfolk was in many ways a leap of faith. We did what we had to because we all had faith in one another. We were able to execute incredibly difficult operations with little or no information, planning time and intelligence because all of the leaders in the brigade had faith in the ability of each other to do what was right when things were tough. When the brigade approached the Tawakalna Division in the dead of night, there was no panic, no superfluous questions about the mission, no reluctance among the leaders. Cohesion made dealing with fear, uncertainty and ambiguity not only possible, but with the same aggressive spirit demonstrated during the breach.

-Colonel Lon E. Maggart, Commander, 1st Brigade, 1st Infantry Division (Mechanized), during the Persian Gulf War describing the climactic battle between his brigade and the Tawakalna Division of the Iraqi Republican Guard.

## CHAPTER II

### THE ISSUE STATED

Do quality principles apply to combat operations? Does "quality" end when the shooting begins? I chose to address these questions for several reasons. As a soldier I am interested in furthering my professional development. As a veteran of the Persian Gulf War I wanted to examine how we conducted combat operations in order to see if it would have been better to use a different approach to leadership. Additionally, Quality Air Force is a controversial subject here at the Air War College and is strongly opposed by some of my peers. Since the Air Force and Department of Defense say that quality is here to stay, I believe that it is important to discuss whether or not it will work in combat. I was convinced of the need to examine this issue when I heard future leaders say that if war comes quality will be discarded, that quality with its emphasis on empowerment and decentralization has no place in combat. If this is true then quality should be discarded immediately, because to change the way you do business when you go to war is folly. The Air Force is committed to the program of Quality Air Force and its leaders at all levels must be equally committed to making it work. I believe that most principles of quality work and that it will work in combat.

I will examine the question by comparing Quality Air Force Principles to the fourteen points of W. Edward Deming

to determine whether they are consistent with the principles of Total Quality Management. Additionally, I will compare Quality Air Force Principles with the leadership philosophy and experience of Colonel Lon E. Maggart. Colonel Maggart commanded the 1<sup>st</sup> Brigade of the 1<sup>st</sup> Infantry Division (Mech) during the Persian Gulf War. In his after action report of the brigade's operations during the Gulf War he prepared an article which articulated many of the principles and core values found in Deming and Quality Air Force. I will also examine the issues against the framework of some of my personal experiences during the Gulf War. I did not follow the principles of a quality leader during the Gulf War. In fact, going into the war my leadership style was authoritarian and centralized. I drove my people hard but did not always make the best use of their talents and abilities. I used this approach because I felt the challenge we faced was enormous and anything less than perfection would cause us to fail. Experience is a hard teacher. Fortunately I learned that my leadership style was not the best way to gain success and that the pace and complexity of combat operations demanded that I trust my subordinates and give them the power to accomplish the mission. I learned this lesson after a period of struggle and pain for some of my subordinates. I dedicate this paper to those officers and NCOs for their loyalty and patience.

## CHAPTER III

### QUALITY AND COMBAT

Before examining Quality Air Force (QAF) Principles and combat it would be useful to define a few terms. Total Quality Management (TQM), which is the basis for Quality Air Force is a management system that was developed during the 20<sup>th</sup> Century through the work of Shrewhart, Deming, Juran, Feigenbaum, and others to improve and ultimately replace the traditional management system. While the quality movement began in the United States, it was only within the last ten years that American industry and government have truly embraced TQM.

The traditional management system traces its origins back to the time and motion studies conducted by Frederick Taylor in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. This philosophy, sometimes called Theory X, states that few workers want to or can handle work that requires creativity, self direction or self control.<sup>1</sup>

Total Quality Management however, assumes that people have a natural drive for accomplishment. Part of management's job is to provide opportunities for that drive to prosper which will then benefit the organization. TQM traces its origins to Wolter A. Shrewhart who, while working at Bell Laboratories in the 1920s developed a system for measuring variance in production systems, known as statistical process control (SPC) which is used by TQM to monitor consistency and diagnose problems. He also created

the Plan-Do-Check-Act cycle, the basic framework for introducing improvements to processes. During World War II W. Edwards Deming taught SPC to America's defense industry. After the war the U.S. dropped the system. Deming was invited to teach it to the Japanese to help them revitalize their industry.<sup>2</sup>

Quality Air Force, a subset under TQM, is a leadership commitment and operating style that inspires trust, teamwork, and continuous improvement everywhere in the Air Force.<sup>3</sup>

The Joint Staff Officers Guide defines war as a state of undeclared or declared hostile action characterized by the sustained use of armed force between nations or organized groups within a nation involving regular and irregular forces in a series of connected military operations or campaigns to achieve vital national objectives. Army Field Manual 100-5, Operations, defines battle as a series of related tactical engagements. Combat operations are tasks undertaken during a war in preparation for, or part of a tactical engagement. Fighting comprises a very small portion of combat operations. Combat operations and war are not a slaughterhouse type operation. More accurately war is like a hospital where the majority of time and resources are spent preparing the patient for surgery and in post operative healing with a relatively short time spent in the surgical theater.

Quality principles are the core values of Quality Air Force. These six principles incorporate some of Deming's fourteen points and some values that are unique to the Air Force. In his after action report on the war, Colonel Maggart, the 1<sup>st</sup> Brigade Commander addressed the principles that contributed to the success of his brigade in combat.

## CHAPTER IV

### CONCEPTS COMPARED

#### Leadership Involvement

QAF: Leaders set the vision, policies, priorities, and strategies. Leaders must clearly communicate these actions by creating an environment that supports trust, teamwork, risk taking, initiative reward, and continuous improvement.<sup>4</sup>

Deming: Leadership is the job of management. Most supervision does not help workers do their job correctly. Often supervisors, hired straight out of college, don't know the work they supervise. "There is no such thing as supervision, and should not be, unless people know how to supervise. The job of the manager is to lead, to help people do their jobs better. In hiring people, management takes responsibility for their success or failure."<sup>5</sup>

Maggart: Leaders must know their business. High speed, mounted operations at night are no place for the timid or ill-prepared leader. As a point of fact much of what leaders do is mental. Rehearsals are key to training leaders for combat. Rehearsals that rigorously tax company commanders and platoon leaders are among the very best of techniques to train for war.<sup>6</sup>

Deming and Maggart take a more hands on view of leadership. The QAF principle of Leadership Involvement

seems to be aimed at the senior leader. In QAF the leader creates conditions in which the organization can succeed without micro managing the workers. The leader is responsible for the command climate and articulating the vision of the unit.

Deming and Maggart place more emphasis on leader competence and the need for the leader to take direct action in the process. Deming would have little patience for leaders who come to work armed with management theories and no knowledge of the work produced on the assembly line. Neither did Colonel Maggart. He required all of his leaders to be competent in the basic skills of armored warfare. In practical terms this meant that the officers and sergeants of his brigade spent a great deal of time mastering these tasks in a leadership certification program conducted by their battalion commanders and inspected by the brigade commander. Colonel Maggart would personally test his officers at random to ensure their competence. If they did not meet his standard he removed them from positions of leadership and placed them in staff positions to give them more training and experience. The tactical rehearsals and sand table exercises he conducted were mentally challenging and stressful for all participants. At sand table drills a scale representation of the battlefield was marked on the ground with engineer tape, using sand and stone representations of terrain features. Leaders equipped with

models of their equipment would talk through their piece of the operations plan. Each leader was expected to have the plan committed to memory and be prepared to answer the colonel's questions concerning the details and any potential problem areas. Most officers came prepared because they had to perform in front of all of the brigade leadership and their own peers. Those few who weren't prepared were not publicly chastised by Colonel Maggart. Their embarrassment at being found lacking in front of their fellow soldiers was punishment enough. This demanding and hard approach to the issue of competence paid dividends in combat. The bottom line is that without competence organizations cannot improve or accomplish their mission.

### Dedication to Mission

QAF: Reflected in all that is done to accomplish organizational success.<sup>7</sup>

Deming: Create Constancy of Purpose for the Improvement of Product and Service.<sup>8</sup>

Maggart: Cohesion is singularly the most important aspect of being prepared for combat. A cohesive unit can overcome many training deficiencies because everyone in the organization will strive at the pain of death and injury to do what is right given only a minimum of leadership.<sup>9</sup>

Dedication to mission is an important element of quality. It means that everyone in an organization knows why the organization exists, its goals and its values. In the army this principle is included in the concept of the commander's intent. Every operations order contains a paragraph dedicated to the commander's intent. In that paragraph the commander spells out, in plain English, what he wants to accomplish during the operation. The intent enables subordinate leaders to modify the plan when necessary while remaining faithful to the mission. In combat dedication to mission is possible if an organization is cohesive. In a cohesive unit the team members understand what the mission is, what needs to be done to accomplish the mission, and are willing to sacrifice their lives in order to accomplish it. The willingness to sacrifice one's

lifegoes beyond Deming or any management system. It is what makes the military unique. Not many individuals are willing to die for Toyota Motors. Developing an organization that has that kind of dedication to mission requires a high degree of leadership.

### Respect for the Individual

QAF: Recognition of individual skills and contributions. Understanding how each person can make an important contribution to the team.<sup>10</sup>

Deming: Remove barriers to Pride of Workmanship. Workers do not know from one day to the next what is expected of them. Standards change frequently. Seldom get feedback on their work until there are performance rating or raises.<sup>11</sup>

Maggart: Initiative is rewarded and the result is a soldier or leader who quickly develops self-confidence.<sup>12</sup>

Deming, QAF and Maggart are in agreement that respect for the individual is very important. There is a difference between the Quality Air Force interpretation of this principle and that of Deming and Maggart. TQM emphasizes the importance of the team with the individual taking a secondary role. The QAF principle of recognizing the individual's skills and contributions is an effort to maintain morale by providing positive feedback. Deming

emphasizes the need for feedback as a means of improvement rather than morale. Maggart sees individual recognition as a tool for encouraging initiative and building the self-confidence of the unit.

The military pays a great deal of attention to recognition and to the process of rewarding excellence. In combat and in peace time operations this recognition takes the form of medals. A soldier usually receives a medal for completing a tour of duty or for an outstanding accomplishment. While this is more than most civilian firms do for their employees it does not accomplish the improvement sought by Deming. The shortcoming of the system is that in most units soldiers do not get frequent feedback and the feedback they get is not based on a thorough knowledge of the soldiers accomplishments or on improving performance. Too often feedback is either completely laudatory or a tool to identify and eliminate poor performers. The solution is for leaders to be competent in what their soldiers do and to do more management by walking around. Another part of the solution is to schedule feedback as a routine part of the leader's obligation to his soldiers and then ensure that all feedback includes recommended improvements. As a battalion commander I tried to spend at least two hours of each day visiting my soldiers at their work areas. During these visits I spoke with them about their jobs and had them teach me what it was they did.

When I was impressed with a soldier I would give that individual a battalion coin. The coins were easier to acquire than a medal and were valued by the troops. If I saw something amiss I would take up the issue later with the individuals' supervisor unless it was a matter of safety or discipline. The impact of the feedback was beneficial to everyone involved. My troops enjoyed showing me their stuff and I drew strength from their enthusiasm. Most importantly it proved to them that I respected them for who they were and what they did. In addition to coins I counseled each individual I rated once a month and once every three months for everyone whose rating I endorsed. I used the officer or noncommissioned officer evaluation report as my worksheet and tried to be as candid as possible with my subordinates. It was time consuming and difficult work but the results were worth the effort.

### Decentralized Operations

QAF: Tearing down functional walls and eliminating unnecessary layers of bureaucracy. Organizations aligned to support critical processes to the benefit of the customer, stakeholder, and the environment.

This is a core principle that is best applied before a unit enters combat. The military spends a great deal of resources designing lean and functional organizations. It sometimes seems as though we spend so much time developing the "perfect" organization that we never gain mastery over how to operate the latest modification of the model. During combat operations I found that effective organizations applied the principle in a formal and informal manner. By formal I mean a modification directed or approved by the chain of command. For example, before we deployed to Saudi Arabia transportation was managed by the operations section. When operations began we found that transportation would be more efficiently coordinated by the materiel management center. Doing this removed one level of bureaucracy and saved time. Informal modifications occurred frequently, usually as a result of individuals trying to accomplish a task in the face of bureaucratic barriers. A good example of this was the work accomplished by my sergeant major. While my sergeant major was not responsible for customer service, he soon became the man to see if you wanted a

problem solved. He made our organization work in a lean and functional manner.

#### Empowerment at the Point of Contact

QAF: Giving people the opportunity, authority, and resources necessary needed to get the job done. When managed wisely, empowerment enhances the role of leaders and followers. Creates an environment in which subordinates, with proper training can continually improve the organization. Encourages innovation and risk taking.<sup>13</sup>

Maggart: Decentralization is a necessary but often overlooked component of team building that contributes directly to cohesion. While centralized and decentralized styles of leadership both produce results, a centralized unit can operate at the speed of one brain - - the boss's. In a decentralized outfit, actions occur at the speed of every brain in the outfit. I saw the dividends of this style of leadership every day on the battlefield in Iraq. We defeated the Iraqis under the worst of conditions precisely because leaders could act independently according to the situation.<sup>14</sup>

Colonel Maggart's definition of decentralization meets the criteria of empowerment. The concept of empowerment makes some leaders uncomfortable since it seems to subvert the chain of command. It is absolutely critical in combat and must be practiced during peacetime training. Junior leaders must be trained in the use of power and leaders must

learn how to recognize which of their junior leaders has the competence necessary to be empowered. Before, during, and after Desert Storm my organization was divided into as many as five parts, separated by several hundred miles linked together by a tenuous and sometimes broken communications system. I had to depend on the junior leaders in my team and had to give them the authority and resources to get their job done. Because we seldom practiced empowerment in peacetime we went through some growing pains during combat operations. I had more to learn than the my junior leaders. I had to develop my ability to identify which of them could handle the responsibility and then give them a framework in which they could exercise independent command. Once I mastered these skills the rest fell into place.

Decentralized leadership is not an easy management style to practice because it requires the leader to underwrite mistakes while his junior leaders gain experience. Most leaders claim to be decentralized but few practice it in reality. I thought I was but it took a war and challenging circumstances to make me practice what I preached.

### Management by Fact

QAF: Use realistic measures to help indicate when, where and how to improve our most important processes. Insist on data driven decisions based on quantitative measurement to help break through to a smarter, more productive way of doing business.

TQM uses statistics to show you the types of variation in your processes. These statistics are best understood not by their formulas, but by the information they give you when put into charts. Taken together, these methods are called "statistical process control" (SPC). SPC is simply a means of communication. It is the "voice of the process," telling you what is going on.<sup>15</sup>

Management by fact is difficult to accomplish in combat operations. During the Persian Gulf War I was responsible for managing logistics. At best, I was able to provide a picture of the Division's capabilities. The statistics we gathered did not address the stability of the process or reduce the normal variation. Most of the senior officers whom I have observed do not use metrics effectively. Metrics are usually used as evidence to praise or criticize the actions of subordinates. When you add to the collection process the friction and fog of war just getting facts becomes difficult. Information in the hands of a skilled commander is a force multiplier. In order to use it

effectively a leader must be able to look at information unemotionally and deal with it as fact. Management by fact can be harmful because in many situations fact is filtered by a faulty system of communication and the predisposition of the individual receiving the data. Good leaders know that it represents pieces of a puzzle.

Another problem with management by fact is the factor of time. During combat the pace of decision making is fast paced and unrelenting. Commanders who cannot make decisions without all of the facts are soon overtaken by events. In the weeks before the ground campaign thousands of hours were spent outlining a detailed plan. The plan was rehearsed and briefed to all levels. It contained all of the facts as we knew them. As soon as battle was joined most of its details were no longer operative. In the 100 hours that followed modifications were made on the fly and orders were issued with the best information available. The flexibility required to make these calls was made at the expense of management by fact. War is chaotic by nature. To succeed a commander must know how to work within the chaos and know when to throw away the charts and rely on intuition.

#### Points Left Out

Quality Air Force does not include all of Deming's fourteen points. The points that are not included are significant. Some of Deming's points are followed in cohesive units during combat operations. Including them in

the Principles of Quality Air Force would make quality more useful in combat operations.

Deming's Point Six and Thirteen involve training. Deming regards training as the cornerstone. Training has to be correct, the danger is in the blind leading the blind - which is akin to taking piano lessons from someone who does not know how to play.<sup>16</sup> Deming looked at training as the best way to help people improve. Colonel Maggart said that cohesion in combat was the direct result of the Army's leader development (training) programs of the last decade. These programs developed creative, adaptive people into professional leaders, trained to fight. QAF does not speak to the importance of training. This is unfortunate because training plays a critical role in the Air Force. Training is truly a cornerstone in the Army. Training does not end when combat operations begin. The 1<sup>st</sup> Infantry Division (Mech) trained and rehearsed up to the beginning of the ground campaign. Ignoring the importance of training is a mistake. I think that training is more important to the military than industry. Our soldiers are younger than the general industrial or commercial workforce and our turnover is much more rapid. For soldiers and military units in general the principle of training is more important than management by fact. Improvement is a key principle of quality. Without training improvement simply cannot happen.

### Drive Out Fear

Deming: People are afraid to point out the problem (any problem within any process) for fear they will start an argument, or worse, be blamed for the problem.<sup>17</sup>

Maggart: The brigade commander must establish an atmosphere in which subordinates have the freedom to speak their mind without fear of reprisal or public embarrassment. This can be, and often is, a very painful way to operate. However things seem to work better if all of the facts, fears and opinions of subordinates are in the open.<sup>18</sup> The commander must have and foster a sense of humor in the organization. A little bit of humor goes a long way in speeding up the integration process and providing the lubrication necessary to reduce the friction of interpersonal relations humor relieves tension.

In his book Crusade: the Untold Story of the Persian Gulf War, Rick Atkinson described General Schwarzkopf's leadership style as follows: Like Leo Tolstoy's famous observations about families, all happy military headquarters are alike but every unhappy headquarters is unhappy in its own way. And dispirited it was. The low morale shocked Waller (Schwarzkopf's deputy), despite his experience in working with Schwarzkopf he was astonished at the extent to which even senior generals were intimidated by the CINC.

The staff was terrified of the commander's wrath. The CINC could excoriate younger officers. (One group of majors and lieutenant colonels kept count of how many generals' stars had been in the room at the moment of their greatest humiliation by Schwartzkopf; the winner claimed twenty-two).<sup>19</sup>

Driving out fear is very difficult to do during combat operations. It exists on several levels and pervades a soldier's existence. On the most basic level is the unspoken fear of death and injury. Next you are afraid of losing the family and friends you leave behind. For leaders there exists the fear of failure. It was this last fear that contributed most toward making my day to day life in combat an unpleasant and stressful. It degraded my efficiency and that of most leaders. Deming is right on target when he says that people are afraid to identify problems because they will be blamed for them. In some units the silence was deafening. Not only did people refuse to come forward to identify issues, in many cases they withdrew into themselves and avoided all responsibility. While this phenomenon can exist in a peacetime or training environment, it was magnified by war. I believe that two factors make it happen. First, while war is a relatively rare event, the way a soldier performs in combat defines success in your chosen profession. I have twenty one years of service, twenty years and six months were spent preparing

for war while six months were spent conducting combat operations and four days were spent in battle. It is difficult and frightening to deal with the unknown. Secondly, our army does not tolerate any errors in its combat leaders. Our culture is replete with examples of general officers taking extra lieutenant colonels with them during visits of front-line units in case they need to fire any battalion commanders. Most leaders follow the example of their superiors. Most of us, the author included, followed the sorry example of driving and abusing our subordinates in order to accomplish the mission. The mission was accomplished but I believe we could have attained better results with a different approach.

There were exceptions to the rule of fear. The command climate in Colonel Maggart's brigade was generally positive. As an outside observer I can verify that Colonel Maggart did work hard to drive out fear from his brigade. He did this by absorbing stress and not passing it along to his subordinates. To the untrained eye he sometimes appeared casual in his approach to the task of command. His after action report shows that he was anything but casual about his duties. Combat operations create their own stress. Colonel Maggart did not add to the climate of fear. If anything his sense of humor kept people loose and most importantly it kept them in the game. When necessary Colonel Maggart could be severe, and he certainly held

people accountable. The fact that he used these tools sparingly made their use more effective. The result was a highly successful and cohesive brigade that was driven not by fear but by dedication to mission, self confidence, and faith in its leaders.

## CHAPTER V

### CONCLUSIONS

Do quality concepts and principles apply to combat operations? Does "quality" end when the shooting begins? I believe that in good units quality concepts and principles do apply to combat operations and the payoff happens when the shooting begins. Colonel Maggart did not have a formal quality program but the unit he took to war exemplified the best principles of Quality Air Force and Total Quality Management. He called it cohesion. His brigade operated closer to Deming's ideal than many units with formal quality programs. Quality Air Force is a good program that can be improved. It should champion leader development (train and retrain) and promote a healthy environment in units (drive out fear). Quality Air Force is a relatively new program that represents change. Because of this many mid-level leaders and some senior leaders are afraid of it and believe it challenges the values they grew up with. While I do not agree with all of the core principles of Quality Air Force I believe that it would be a tragedy to terminate the program. I intend to bring quality with me to my next assignment and to use it as a senior leader. I am a believer in the need to train and retrain leaders, to provide constant feedback to my soldiers in order to help them improve themselves, and most importantly I want to drive out fear. I wish I had been trained in quality before I had to go to war, I would

have been a better leader. I believe that commanders leading cohesive units can use quality and to attain victory in combat.

<sup>1</sup> David K. Carr and Ian D. Littman, Excellence in Government, Total Quality management in the 1990s, (Arlington: Coopers & Lybrand, 1993), p. 18.

<sup>2</sup> David K. Carr and Ian D. Littman, Excellence in Government, Total Quality management in the 1990s, (Arlington: Coopers & Lybrand, 1993), p. 22.

<sup>3</sup> The Quality Approach, (United States Air Force, Air Force Quality Center, Maxwell AFB, 1993), p. I-1.

<sup>4</sup> The Quality Approach, (United States Air Force, Air Force Quality Center, Maxwell AFB, 1993), p. II-6.

<sup>5</sup> Mary Walton, The Deming Management Method, (New York: Perigee Books, 1986), p. 71.

<sup>6</sup> Colonel Lon E. Maggart, "A Leap of Faith," Desert Shield/Storm History, (Fort Riley, Kansas, 1991), p. 13.

<sup>7</sup> The Quality Approach, (United States Air Force, Air Force Quality Center, Maxwell AFB, 1993), p. II-6.

<sup>8</sup> Mary Walton, The Deming Management Method, (New York: Perigee Books, 1986), p. 55.

<sup>9</sup> Colonel Lon E. Maggart, "A Leap of Faith," Desert Shield/Storm History, (Fort Riley, Kansas, 1991), p. 11.

<sup>10</sup> The Quality Approach, (United States Air Force, Air Force Quality Center, Maxwell AFB, 1993), p. II-6.

<sup>11</sup> Mary Walton, The Deming Management Method, (New York: Perigee Books, 1986), p. 83.

<sup>12</sup> Colonel Lon E. Maggart, "A Leap of Faith," Desert Shield/Storm History, (Fort Riley, Kansas, 1991), p. 13.

<sup>13</sup> The Quality Approach, (United States Air Force, Air Force Quality Center, Maxwell AFB, 1993), p. II-7.

<sup>14</sup> Colonel Lon E. Maggart, "A Leap of Faith," Desert Shield/Storm History, (Fort Riley, Kansas, 1991), p. 14.

<sup>15</sup> David K. Carr and Ian D. Littman, 993), Excellence in Government, Total Quality Management in the 1990s, (Arlington: Coopers & Lybrand, 1993) p. 75.

<sup>16</sup> Mary Walton, The Deming Management Method, (New York: Perigee Books, 1986), p. 69.

<sup>17</sup> Mary Walton, The Deming Management Method, (New York: Perigee Books, 1986), p. 72.

<sup>18</sup> Colonel Lon E. Maggart, "A Leap of Faith," Desert Shield/Storm History, (Fort Riley, Kansas, 1991), p. 11.

<sup>19</sup> Rick Atkinson, Crusade: The Untold Story of the Persian Gulf War, (Boston: Houghton Mifflin Company, 1993), p. 69.

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