



Wysowl Pty Ltd
ACN 010 677 022

10 Jacksonia Drive
WARNER QLD 4500
Ph: Intl+ 61 7 3882 1822
Fax: Intl+ 61 7 3882 1800
wysowl@msn.com.au

Wysowl Pty Ltd
Newsletter Number 19
July 2006

SOME THOUGHTS ON THE CHANGE PROCESS

By
John McConnell

*The change process is seldom easy. It is almost never rational.
Always, significant resistance can be anticipated
whenever a new approach must displace
established practices
or beliefs.*

PART 1
The Initial Enormous Mistake

The bald, middle-aged man rushed from one woman to another, muttering incoherently and handing them circulars as they traversed the crowded streets of Budapest. The circulars were addressed to prospective mothers and warned them that they should beware of doctors, who, he warned, would kill them. 'They say I am mad', the circular continued, 'but I seek only to help you. I am your friend, Ignaz Philipp Semmelweis'.⁽¹⁾

Semmelweis was committed. Within a few weeks of his incarceration, the man who discovered not only how infection was transmitted, but also how to prevent it, was dead. Through a combination of accident, analysis, and deduction, Semmelweis had discovered that doctors were unwittingly killing their patients. Failure to properly wash and disinfect their hands before leaving the dissection room in the morgue to attend to their patients spread infection and death. The commonly used term to describe puerperal fever, the cause of these deaths, was 'childbed fever'. Before Pasteur discovered germs, and before Lister had demonstrated the successful use of antiseptic, Semmelweis was saving lives by preventing infection.

Semmelweis gained his medical degree in 1844. He obtained his Master's degree in Midwifery and was appointed to assist Johann Kline, Professor of Midwifery for Vienna's General Hospital in 1847.

The Lying-in Hospital where Kline and Semmelweis worked had two obstetrics wards. The First Division was a charity ward where patients were largely attended by student doctors. In the Second Division, wealthier patients were served by trained nurses and midwives. Several times a day a bell tolled in one of the two obstetrics wards of the Lying-in Hospital. The bell announced the death of yet another patient. A sensitive young man, Semmelweis was horrified by the appalling death rate which was six times higher in his First Division than it was in the Second Division. In some hospitals, the death rate from childbed fever was as high as 26%.

One by one, Semmelweis closely examined and discarded all the published and otherwise listed causes of childbed fever. Included were: 'wounded modesty'; 'guilt and fear complexes' (most of the mothers-to-be were poor and many of the babies were illegitimate); 'sudden variance in weather and temperature', even 'cosmic influences' dwelt amongst the fantastic, imagined causes of childbed fever.

Semmelweis was scientifically as well as medically trained. He was competent at statistical analysis and what we now call the scientific method. He discarded most of the proffered causes of childbed fever as they applied equally to the First and Second Divisions. The only significant difference he could find was that the women in the First Division were treated by student doctors and those in the

Second Division were attended by trained midwives. As Semmelweis struggled to find a reason for the difference in the death rates between the two wards, serendipity intervened. A vital clue emerged when a friend and fellow doctor, Professor Kolletschka, died of symptoms remarkably similar to those that daily carried away Semmelweis' own patients. Kolletschka had been conducting a post-mortem examination and had accidentally cut his finger. Within a few days he was dead.

With no knowledge of germs or infection, Semmelweis had little to guide him. Yet, by skilful analysis and deduction, he correctly concluded that Kolletschka had died from some sort of infection contracted from the corpse and that his patients were being treated by students who regularly dissected corpses as part of their studies. He watched the students conducting their dissections; he saw their hands, dripping with the pus and fluids of putrefied cadavers; he saw those same hands, inadequately cleansed, treating the patients of the First Division, and he concluded that their unhygienic procedures were transmitting infection to the women. Given the complete lack of knowledge of germs or infection that existed in 1847 and that Semmelweis had only deduction to guide him, it was a stroke of brilliance.

Semmelweis insisted that all students and doctors wash their hands in chlorinated lime water before entering the ward. Immediately, the death rate in the First Division began to drop. Before long, it had fallen to the same level as the Second Division where midwives treated the patients. In Semmelweis' own words:

In order to destroy the cadaveric material adhering to the hands, I began about the middle of May, 1847, to employ chlorina liquida with which every student was required to wash his hands before making an examination. After a short time a solution of chlorinated lime was substituted because it was not so expensive. In the month of May, 1847, the mortality in the first Clinic still amounted to over 12 per cent, with the remaining seven months it was reduced in very remarkable degree. In the first seven months mortality was 3 per cent compared to 11.4 per cent prior to introduction of antiseptics. This compared to 2.7 per cent in the Second Division. In 1848 the mortality fell to 1.27 per cent versus 1.3 percent in the Second Division. In 1848 there were two months, March and August, in which not one single death occurred among the patients of the First Division. ⁽²⁾

Many doctors, including Semmelweis' superior, Professor Kline, were frustrated and angered by his constant criticism of hospital administration and medical procedure. Kline believed the high incidence of childbed fever was due to the hospital's ventilation system, an idea that fitted the then popular miasmatic theory of disease. Semmelweis' insistence that even Kline wash his hands before entering the ward angered his superior to the point where Kline eventually refused. Semmelweis continued to harangue Kline and anyone else displaying doubt about his theory. His data and case studies were compelling, but many senior doctors, including Kline, were unable to accept that their own lack of hygiene killed patients. When Semmelweis' appointment expired in 1849, Kline extracted his revenge and refused to renew it. Semmelweis appealed, triggering a faculty feud between Klein and a Semmelweis supporter, Professor Skoda. Klein won. Angry and frustrated, Semmelweis left for Budapest in 1850.

Soon after his return to Budapest, Semmelweis was made head of the obstetrical service at the St. Rochus Hospital in Pest where he conducted a six-year clinical trial of his theory and achieved a mortality rate of 0.85%. In 1855, his academic ambitions were fulfilled by his appointment as Professor of Midwifery at the University of Pest. The obstetrical service he took over was a fiasco. In the first year of his tenure he drove the death rate from puerperal fever to 0.39%, an almost unbelievable record. In 1861, he published a book, *The Etiology, Concept, and Prophylaxis of Childbed Fever*.

Semmelweis' and his theory were attacked by the self-serving Professors of Midwifery who formed the medical hierarchy. The death rates from childbed fever for these esteemed and powerful men ranged as high as a cruel 26%. The statistical evidence suggesting these eminent Professors were angels of death only served to strengthen their opposition to Semmelweis. Semmelweis' criticism of anyone who denied his doctrine in spite of the high mortality rates in their own institutions was direct and incisive. In an open letter to Professor Scanzoni of Würzburg who had demeaned his work he wrote:

Your teaching (that the Würzburg epidemic of childbed fever is caused by unknown atmospheric influences or puerperal miasma is false), and is based on the dead bodies of lying-in women slaughtered through ignorance...I have formed the unshakable resolution to put an end to this murderous work as far as lies in my power so to do...(If you continue teaching your students this false doctrine), I denounce you before God and the world as a murderer, and the History of Puerperal Fever will not do you an injustice when, for the service of having been the first to oppose my life-saving doctrine, it perpetuates your name as a medical Nero. ⁽²⁾

The years of denigration, frustration, and angst took their toll. Semmelweis had a nervous breakdown was relieved of his post. In addition, his recently published book was widely derided and criticised. His condition worsened and he was admitted to an asylum. His death is something of a mystery. Some sources have him dying in the ironic manner of a Greek tragedy, deliberately infecting himself with a scalpel during an autopsy. ⁽¹⁾ Another version has him accidentally cutting his finger during an operation immediately before his commitment. ⁽²⁾ Still others claim he died at the hands of asylum staff. Whichever is true, it was a cruel fate for the father of infection control.

Why?

What went wrong? Why did Semmelweis find it so difficult to convince others in his profession that his approach to hygiene worked well and saved lives? Semmelweis had a lot going for him. Certainly he had good data. Everywhere he went he reduced deaths to amazingly low levels. It would have been difficult to argue with his data, or his compelling case studies. Perhaps our understanding can be improved by an extract from a paper by Dr. Myron Tribus, *The Germ Theory of Management*. ⁽⁴⁾ In part, Dr. Tribus' paper reads:

Doctors administer to the needs of their patients according to what they learn in school and in their training. They also learn from experience. They can only apply what they know and believe. They have no choice. They cannot apply what they do not know or what they disbelieve. What they do is always interpreted in terms of what they understand is, 'the way things work'. As professionals they find it difficult to stray too far from the common knowledge and understanding of their profession. They are under pressure to follow 'accepted practice'. In this regard, Doctors are no worse than the rest of us. We are all prisoners of our upbringing, our culture and the state of knowledge of our teachers, mentors and fellow practitioners. ⁽⁴⁾

Learning is incidental. One does not always have to work at it. We learn much by simply being aware of the world around us. Unfortunately, it is as easy to learn superstition as it is to learn knowledge. Any teacher of adults will attest that one of the greatest barriers to learning that adults face is not ignorance; it is the illusion of knowledge, or the presence of superstitious knowledge. Those students who have no pre-existing beliefs to displace learn faster than those who do. Our children learn that the world is round with much greater ease than did many scholars pre-eminent in the time of Galileo, because they have nothing to unlearn at the outset.

Suppose we return to the year 1847, and to the Vienna General Hospital. Also, imagine that you have been working alongside Dr. Semmelweis and were jointly responsible for the remarkable results discussed earlier. The years of toil have been rewarded with a new approach that demonstrably saves many lives, and, when spread across the hospitals of Europe will save millions more.

Your most obvious task is to spread this new knowledge, and Prof. Skoda has arranged a seminar where your paper on the subject will be presented to several hundred of the most eminent medical men of Europe. They come from universities, hospitals and private practice. Amongst them are the intellectuals whose books and papers on midwifery are compulsory reading for students. At this very moment these men sit and listen to Prof. Skoda introduce you to the audience. From your position behind the curtain you watch the best medical minds Europe has to offer wait for you to enter and present your paper. In a few seconds your job is to step onto the stage and convince these men that they are killing their patients. You have a moral and ethical responsibility to explain to them that because they do not follow the strict hygiene practices detailed in your notes they are spreading infection every time they touch a patient or an instrument. Your task is to persuade them to discard much of their accumulated knowledge and experience and start anew.

How do you feel?

Now, let us turn the tables. Imagine you are a wealthy, successful doctor. You are the superintendent of a large hospital, and are held in high regard not only by your fellow doctors, but also by society. Your advice is sought widely. At the local university, students hang on your every word during your weekly lecture. How do you think you will react to Semmelweis and his associate? How will you feel if the journalist sitting in the wings publishes the notion that you and your practices are a threat to every patient you touch?

How did those who were confronted by the theories of Copernicus and Galileo feel? How did the physicists feel when Einstein shattered their cherished notions of absolute time and space? Some scientists were so incensed at Einstein's theory that they wrote a rebuttal, *100 Authors Against Einstein*. ⁽⁵⁾ Of all people, would we not expect scientists to see that relativity theory was a better way of describing the universe and see the huge potential it offered? Why is it that whenever a breakthrough idea presents itself, we humans have so much difficulty understanding and accepting it (at least initially- a generation or two later it's easy)?

Semmelweis' story led to the creation of the term 'Semmelweis Reflex', meaning the dismissing or rejecting of new ideas, without thought, inspection, or experiment. It also refers to the 'mob' mentality that flows from 'groupthink' and the refusal to consider a new point of view.

The Ultimate Curse

The ultimate curse is to be a passenger on an ocean liner, to know that the ship is going to sink, to know precisely what to do to prevent it, and to realise that no one will listen.⁽⁶⁾ This is the curse visited on men such as Dr. W. E. Deming, Dr. J. Juran and Dr. H. Sarasohn for the last thirty years. It was primarily these men, according to the Japanese, who were responsible for Japan's rise to the status of an economic superpower.⁽⁷⁾

Now we see people trying to convince their company or industry that the approaches developed by Shewhart, Deming, Smith, Juran, Harry and others holds the promise of improved quality and productivity as well as fewer regulatory issues.

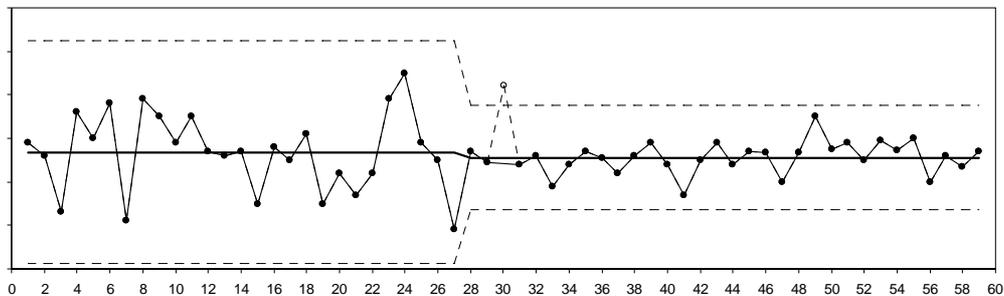
Already some of these change agents have experienced their own Semmelweis Reflex. One man, a highly regarded Ph.D., led a thrust to reduce analytical error in a laboratory. Under his guidance, one of his laboratory statisticians had conducted a project to stabilise and reduce variation for a problematic laboratory test. She was spectacularly successful. Test error plummeted. They were prevailed upon to present the results of this project to colleagues and peers, with a view to spreading the methodology. The audience was almost as unresponsive as were the physicians hearing Semmelweis' case studies for the first time. They could not see a problem. Generally speaking, they were meeting the required standards. Even if a similar project in their laboratories might yield similar results, why should they bother to drive analytical error to even lower levels?

No argument moved the detractors. Neither improved service to customer departments nor the potential to reduce regulatory deviations impressed them. At the time of writing, the status quo remains. It is likely to remain in place until senior management remove options to conquering variation because they have made it a strategic imperative.

A Metamorphosis is Possible

In order to illustrate what is possible, a chart from another operation is presented at Figure 1. It shows laboratory controls plotted as a control chart for the period immediately before and after a drive to conquer test error was made.

Figure 1
Laboratory Controls as a Shewhart Control Chart



Readers are free to draw their own conclusions, but one cannot help but feel confident that Dr. Semmelweis would have approved of the work done.

The Enormous Initial Mistake

Schopenhauer wrote:

Almost without exception, philosophers have placed the essence of mind in thought and consciousness; man was the knowing animal, the animal rationale. This ancient and universal radical error, this enormous initial mistake, must before everything be set aside.⁽⁸⁾

Deming's approach and the six sigma concept are rooted in the rational world of statistics, but the world of business is not a wholly rational place.⁽⁹⁾ Business is about people, so management theory is about people. People are not always rational. Each of us leads an emotional existence. Semmelweis tried to convince others based with an argument based on fact, data and logic. He failed. Leaders and change agents would be well advised to take into account the emotional aspects of change.

Only a storm of hot passion can turn the destinies of peoples, and he alone can arouse passion who bears it within himself.

It alone gives its chosen one the words which like hammer blows can open the gates to the heart of a people. ⁽¹⁰⁾

So wrote Adolf Hitler in *Mein Kampf*. Hitler was a monster. However, it would be a mistake to allow his evil mind to blind us to the fact that he was one of the most successful transformational leaders in history. When he came to power, Germany was an economic mess. Inflation was rampant; six million people were unemployed and national morale was at low ebb. Hitler transformed Germany and her economy. He may have been a cruel monster, but he understood well that emotional impact was an essential ingredient for rapid and profound change.

Many business leaders face a similar situation as they prepare to transform their businesses. A clear lesson from the history of approaches such as six sigma and the Deming approach is that emotional impact, the withdrawal of options to participating and alignment of the organisational structures to the new philosophy (as opposed to a bureaucratic ticket punching exercise) will be essential. In particular, conquering variation must become a primary and non-optional strategic objective for managers and technical people throughout the business. When industries pursued statistical process control as an improvement methodology, some companies got a lot of pretty charts and not much else. It is the outcome, reducing variation, which is important. One of the strengths of Deming's approach is the establishment of a unifying objective for everyone in the business. Leaders and change agents who ignore the vital elements of aligned aims and structures as well as the creation of emotional impact are in peril of suffering a fate similar to Semmelweis.

PART 2

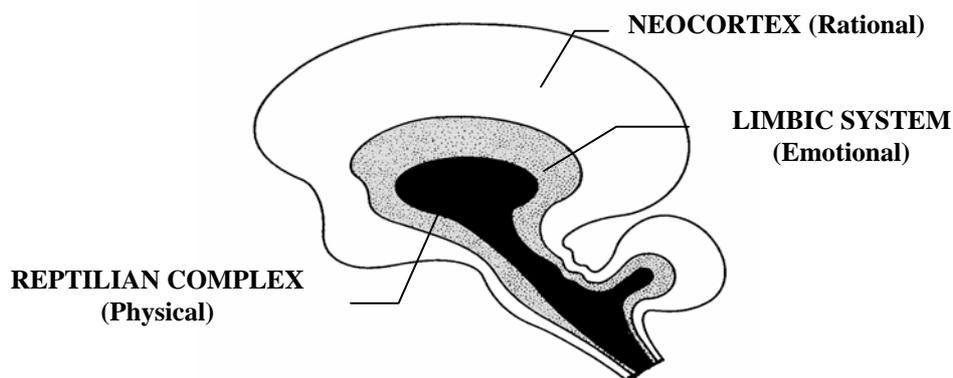
The Change Process

Developing an Operating Philosophy

The Triune Brain

A famous brain researcher, Dr. Paul MacLean, developed the triune brain concept, which may be simplified by the drawing at Figure 2. The drawing shows how the process of evolution first developed the reptiles, and therefore the reptilian brain, or as it is commonly known, the R-complex. This organ is estimated to be about 200-250 million years old. Much later, about 60-100 million years ago, the mammals evolved, and with them the limbic system or old mammalian brain. Quite recently, about 3-10 million years ago, high order primates and then prototype humans evolved, as did their huge neocortex or new mammalian brain. The drawing is a much simplified representation of the triune brain concept, but it serves lay people quite well. Because nature can't easily cast away old structures that are deeply alloyed into the stuff of life, it has followed its own evolutionary laws and either modified old structures or built new over the old, or both.

Figure 2
The Triune Brain Concept⁽¹¹⁾
(After Maclean)



Our rational side has transformed our environment and our lives; not always for the better, but few of us would choose to live before the ages of science, medicine and law. New ideas are born every day, and so our stock of knowledge grows at an ever accelerating pace. Nevertheless, it seems that many breakthrough ideas meet savage resistance. If humans are so clever, so rational, how do we explain the treatment of men like Semmelweis, Galileo and Einstein? How can it be that supposedly rational creatures which have been clever enough to discover the origins of life have been unable to stop killing each other?

It seems that there is a lot of truth in the ancient idea that there is a side to humans that is anything but rational. Most readers will find nothing new or unusual in that statement. However, it is quite surprising to note the number of people who are offended when that notion is taken a step further to suggest that our non-rational side is responsible for more of our behaviour than is our rational side.

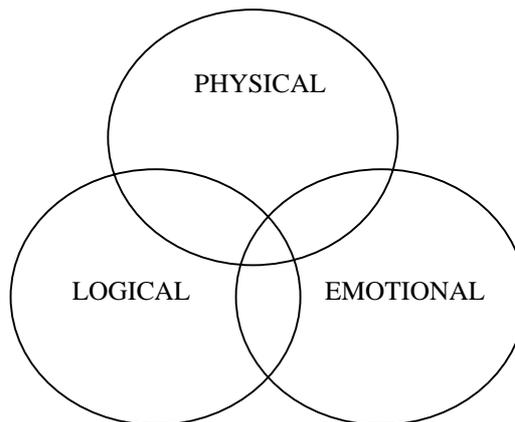
An excellent lay summary of these three human existences can be seen in Chapter 3 of Mr. W.W. Scherkenbach's book, *Deming's Road to Continual Improvement*.⁽¹²⁾ Table 3 is an expanded version of one found in Mr. Scherkenbach's book. It illustrates well how humans have long known of these three existences, even if we have failed to make good use of the knowledge. Doubtless, readers would be able to add to the table.

Table 3
Three Human Existences ⁽¹²⁾

<u>PHYSICAL</u>	<u>EMOTIONAL</u>	<u>RATIONAL</u>
Appetite	Spirit	Reason
Doing	Feeling	Thinking
Skills	Attitude	Knowledge
Body	Mind	Soul
Capital(\$)	Good Will	Intellectual Property
Practice	Values	Theory
Percepts	Emotives	Concepts
Aims	Values	Knowledge
Behavioural	Psychodynamic	Cognitive
Perceiving	Valuing	Thinking
Masculine	Feminine	Rational
Formal Power	Personality	Knowledge
Psychomotor	Affective	Cognitive
Physical	Spiritual	Logical
Hand	Heart	Head
Government	Church	Academia
Acts	Will	Knowledge
Actions	Feelings	Thoughts

Dr. MacLean's discoveries have helped us to understand why we are the way we are. Also, they correlate closely with much of the breakthrough work in anthropology and psychology assembled during the last hundred years. For now it is sufficient to summarise these three human existences through a model first developed by Mr. W.W. Scherkenbach, seen at Figure 4.

Figure 4
Three Human Existences ⁽¹²⁾
(After Scherkenbach)



Mr. Scherkenbach uses this model also to demonstrate the outcomes of the overlapping areas. The combination of rational and physical produces science; link rational and emotional to find psychology, and when we overlap emotional and physical we get art and some other forms of creativity. Where all three intersect we find what Abraham Maslow called peak experiences, what many Eastern cultures call harmony. Also, some see it as an area of conflict and tension, being painfully aware of the numerous occasions where their rational and emotional sides were pulling in differing directions. Rarely do we approach any given situation with all three existences balanced. Usually, one will dominate at any given moment.

Was the reaction of the doctors of Europe to Semmelweis' ideas on infection control largely a rational, physical or emotional reaction?

Which existence dominated the priests' actions when they hauled Galileo before the Inquisition? Was it physical, emotional or rational?

Were those who wrote *100 Authors against Einstein* operating in a mostly rational, physical or emotional mode?

If we wish to create change in any organisation, and we appreciate that every person is a unique blend of the three existences, then we will ensure that we plan to create physical, emotional and rational change. As one would expect, any aspect of a plan for change is likely to affect more than one category. Here some aspects are listed in those categories where their import is most obvious.

1. **Physical change:** Policies, procedures, methodologies, organisational changes, aims, goals, objectives, reporting and information systems, pay and promotion systems, skills, equipment, material and the environment are all things that leaders can physically change. Having formal authority allows leaders to make these changes.
2. **Rational change:** Knowledge (including: epistemology; technical knowledge; psychological knowledge; statistical theory; knowledge of both analysis and synthesis), promotion or demotion (to set examples), education to explain new ideas, theory and logic are all components of rational change. However, as Schopenhauer observed: 'Nobody ever convinced anybody on the basis of logic. Even logicians use logic only as the source of income'.⁽¹³⁾
3. **Emotional change:** Values, relationships and beliefs largely belong in this category. Many people use their personal values and relationships as the primary bases for decision making. Often, such people are less impressed with logic, fact, data, case studies and the need to meet corporate objectives than they are with their own intrinsic values and the close relationships they have formed, or would like to form. Even logical constructs that have been deeply internalised belong in this category, at least in part, because our strong emotional investment in them will persist long after a Semmelweis, a Galileo or an Einstein has proven the construct incorrect. Other emotions such as joy, pride, delight, sorrow, fear, commitment, passion and anxiety also belong in this category.

For example, a successful approach to safety will encompass all three elements:

1. **Physical.** There will be an effective safety policy that accepts no level of accidents. There will be comprehensive procedures, audits and improvement methodologies.
2. **Rational.** There will be across the board safety training and education.
3. **Emotional.** Good safety will become part of the cultural values. It is something that is pursued not because it makes good business sense, but because it is 'the right thing to do,' or, 'just the way we do things around here.' People who refuse to participate effectively in the drive to improve safety are likely to experience a 'significant emotional event.'

The culture of any organisation contains all three elements. So too should its Operating Philosophy. One way to illustrate an Operating Philosophy is to use a series of questions as a template or test, as follows.

AN EXAMPLE OPERATING PHILOSOPHY

Will this philosophy, policy, theory or practice:

1. Encourage a 'process' or 'systems' approach to the management of departments, divisions, companies and industries? (PROCESS).
2. Help managers understand and reduce variation and use this knowledge and ability to improve product, service and processes? (VARIATION).
3. Improve the knowledge and application of the theory of psychology, with particular reference to psychology of leadership? (L'SHIP/PSYCH).
4. Create an environment of continual improvement and innovation? (IMP/INN).
5. Contribute to improving the understanding and application of the theory of knowledge? (KNOWLEDGE)

Further illustration can be provided by more detailed questions as follows below. To show the interdependence of the different elements, the abbreviated form of the above five questions is shown in brackets after a point to which it has a strong relationship.

Does this philosophy, policy, theory or practice:

1. Delineate between common and special causes of variation, and help people to understand and reduce variation. (VARIATION) (IMP/INN)
2. Allow people, at all levels, to take pride and joy in their work and their enterprise; does it help develop self esteem? (L'SHIP/PSYCH)
3. Create an environment of mutual support, confidence and trust between organisational elements as well as between leaders and their people? (L'SHIP/PSYCH) (PROCESS)

4. Show respect for human dignity and recognise and utilise people's ability to think? (L'SHIP/PSYCH)(IMP/INN)
5. Understand the importance of the invisible figures (for example: customer satisfaction; employee morale; contribution of knowledge; education and training)? (KNOWLEDGE) (L'SHIP/PSYCH) (VARIATION)
6. Avoid mortgaging the long term future of the enterprise to gain a desirable short term result? (IMP/INN) (L'SHIP/PSYCH).
7. Encourage continual improvement and innovation of product, service and process; or does it encourage people to work to a target and stop? (IMP/INN) (L'SHIP/PSYCH) (PROCESS)
8. Encourage leaders to develop new leaders, in the hope that the student will surpass the teacher? (L'SHIP/PSYCH) (IMP/INN)
9. Cause people at all levels to examine every plan process and action to ensure it is consistent with the aim of the organisation. (PROCESS) (L'SHIP/PSYCH)
10. Encourage cooperation between individuals, departments, divisions and other enterprises within the system to optimise the system for the benefit of all; or does it drive people towards self-preservation and win-lose mentality or zero-sum game. (L'SHIP/PSYCH) (PROCESS) (KNOWLEDGE)
11. Appear consistent with the idea that ultimately performance is a function of leadership? (L'SHIP/PSYCH) (VARIATION) (PROCESS) (INN/IMP) (KNOWLEDGE)
12. Improve quality (see all of above)? Quality is not achieved by the application of tools and techniques, although these are necessary. First a new theory of governance and management, based on profound knowledge, is required.

A SIMPLIFIED VERSION

WILL THIS:

1. Help people take pride and joy in their work?
2. Encourage a 'systems' or 'process' approach to the management of industries and companies?
3. Help people understand and reduce variation?
4. Create a culture of continual innovation and improvement?
5. Drive out fear?

One Point Learning:

1. All organisations contain elements of superstitious learning. For most people, unlearning old beliefs and relinquishing established methods requires emotional impact.
2. Change occurs at three levels, Rational (new knowledge), Physical (new physical structures, including information, financial, pay and promotion systems as well as organisational structures and methodologies) and Emotional (new value systems and the creation of emotional impact). Leaders and change agents must address all three. ⁽⁹⁾
3. In particular, having the achievement of six sigma levels of performance as a non-optional and organisation wide objective is necessary.

References:

1. *Historical feature*, Daily Mirror, Sydney, 2nd November, 1989
2. *W.J.Sinclair*, Semmelweis, His Life and His Doctrine, 1909, Manchester University Press
3. *J. L. Wilson*, Stanford University School of Medicine and the Predecessor Schools: An Historical Perspective, 1999, Lane Medical Library Digital Document Repository <http://elane.stanford.edu/wilson/>
4. *M. Tribus*, The Germ Theory of Management, taken from 'Quality First', fourth edition, National Society of Professional Engineers
5. *Albert von Brunn*, 100 Authors Against Einstein (13 Mar 1931) in *Klaus Hentschel*, ed., Physics and National Socialism; An Anthology of Primary Sources, Birkhäuser, 1996
6. *M. Tribus*, Quality First, 1988 TQMI
7. *K. Ishikawa*, QC Circle Koryo, 1980, JUSE
8. *W. Durant*, The Story of Philosophy, 1926, Touchstone
9. *W. Scherkenbach*, Deming's Road to Continual Improvement, 1991, SPC Press
10. *A. Hitler*, Mein Kampf, 1992, Pimlico
11. *C. Sagan*, The Dragons of Eden, 1977, Ballantyne Books
12. *W. Scherkenbach*, Deming's Road to Continual Improvement, 1991, SPC Press
13. *W. Durant*, The Story of Philosophy, 1926, Touchstone

