Curious Cat
Management Improvement Institute

Deming Redux

By William W. Scherkenbach

William Scherkenbach is internationally recognized as one of the world's foremost authorities on the subject of quality and its implementation. Theory without action is useless. Action without theory is costly. Bill has the rare combination of both state-of the-art theory and the experience of applying it in the real world.

He was in the very privileged position of learning from and working with Dr. W. Edwards Deming in the last 25 years of his life. He was with him on over 1000 meetings, including at least 50 four-day seminars, with leaders of industry and government all over the world.

> *"He was my student, and there's none better in the world... It takes a little ingredient called profound knowledge, and he's got it."*
>
> *W. Edwards Deming*

Address for this paper:
ccmii.org/files/ws/deming-redux.pdf

William Scherkenbach and the Curious Cat Management Improvement Institute have made available a large number of additional files.

Find all the files:

ccmii.org/files/ws

Deming Redux

30 April 2011
Austin, TX
Led by
Bill Scherkenbach

AM

- 0800 Intro and Learning Objectives
- 0815 Who was Deming?
  - Exercise: List some quotes of his.
- Who Deming was.
  - My perspective on the quotes.
- 0900 Profound Knowledge
  - History and overview
- 1000 Theory of Variation
  - What is it and Funnel Exercise
- 1100 Knowledge of Psychology
  - What is it and TED Video©

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PM

- 1300 Appreciation for a System
  - What is it
  - Exercise on Sub-optimization
- 1400 Theory of Knowledge
  - What is it
  - Operational Definitions Exercise
- 1500 Workshop Q & A
- 1645 Wrap up and What to do next
- 1700 Adjourn

Into and Learning Objectives

- Instructor
  - Bill Scherkenbach
- Recognize Deming's relevance in today's environment.
- Better understand the difficult to understand.
- Recast existing management data by understanding variation.

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Who Was Deming?

- Name your favorite quote from him or story about him.
- Write it down.
- Tell your tablemates.
- Select one to share with the class.

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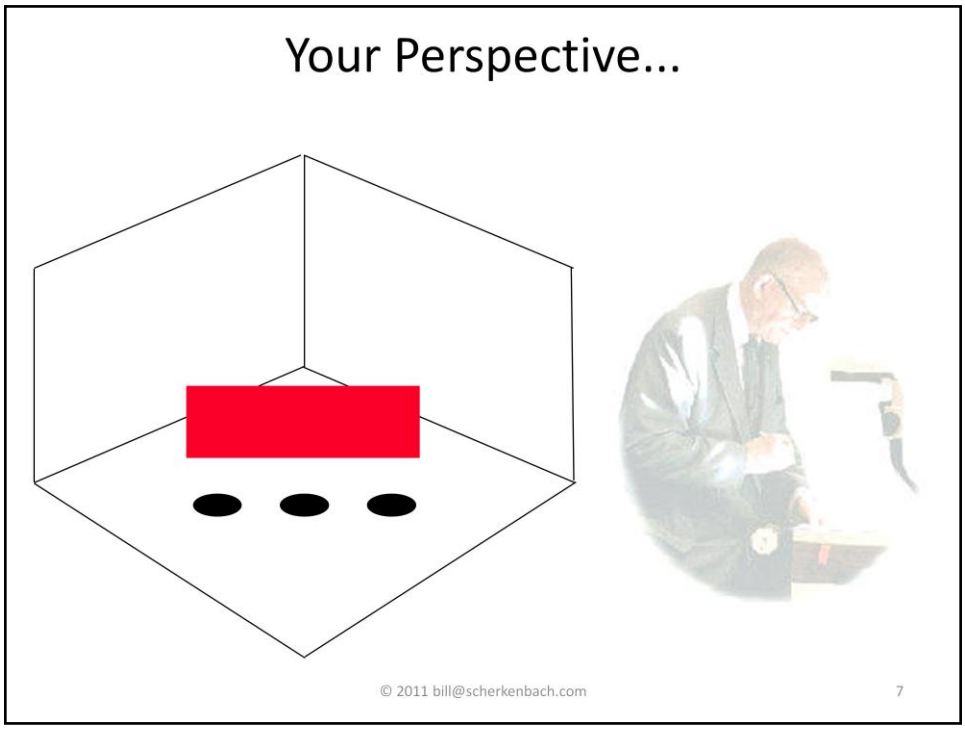
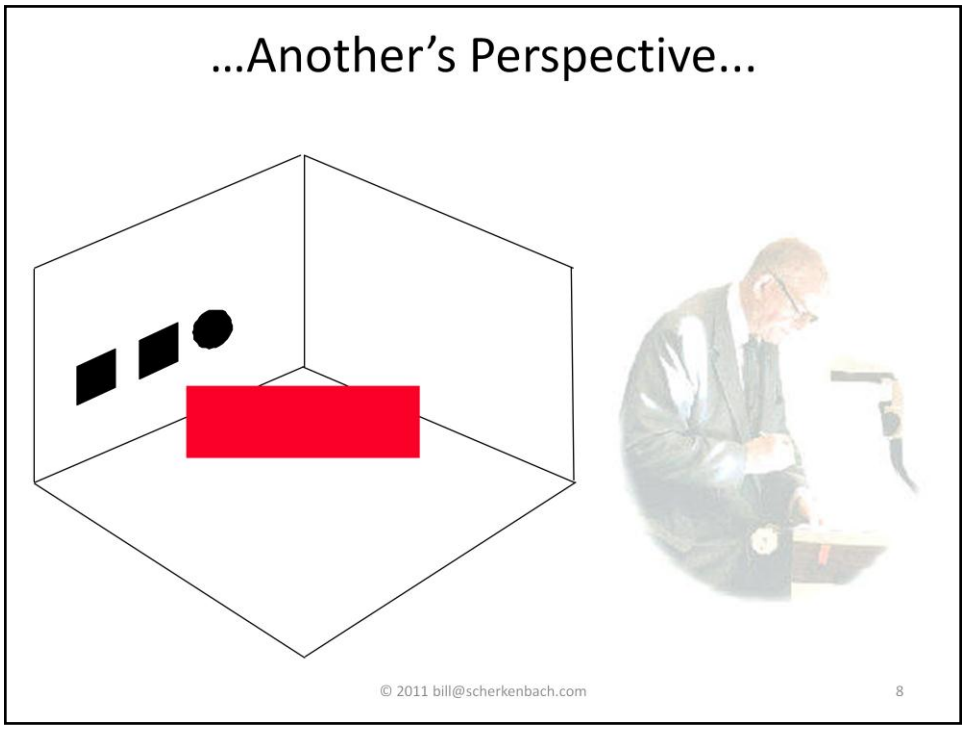
Who Deming Was

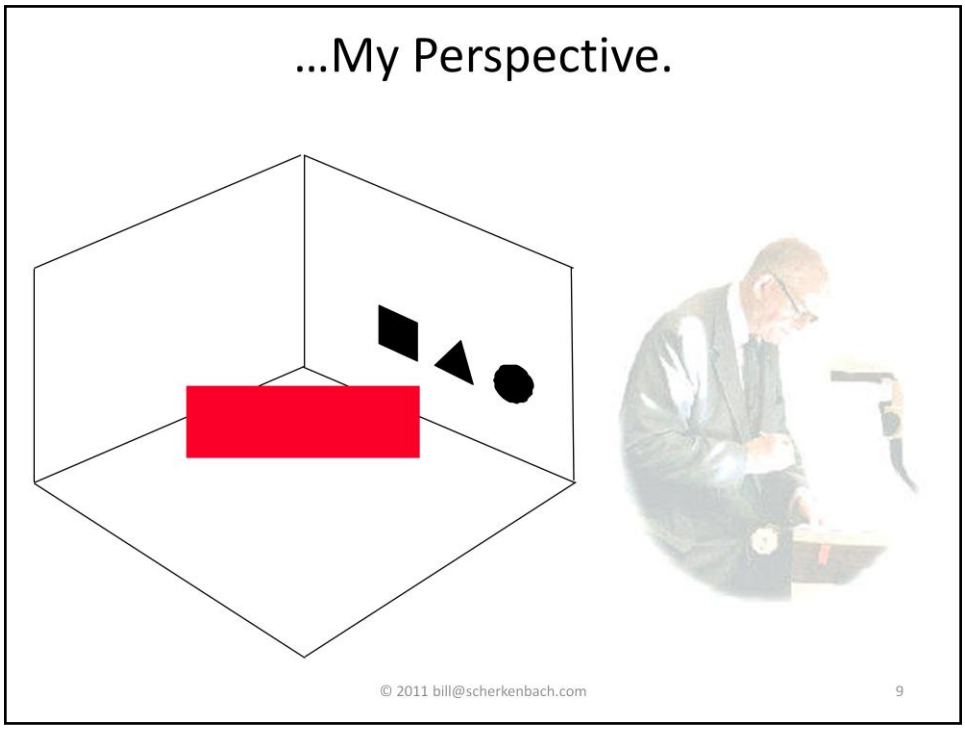
- I will comment and clarify based on my experience with him.
- I will also expand on this during the session so that you will get a better idea of who the man was.



I borrowed the idea from MC Escher's drawings and I want to stress that each of us will give a different perspective on what Dr. Deming taught. We will get other perspectives from other scholars and I urge you to add your perspective so that we might better learn.



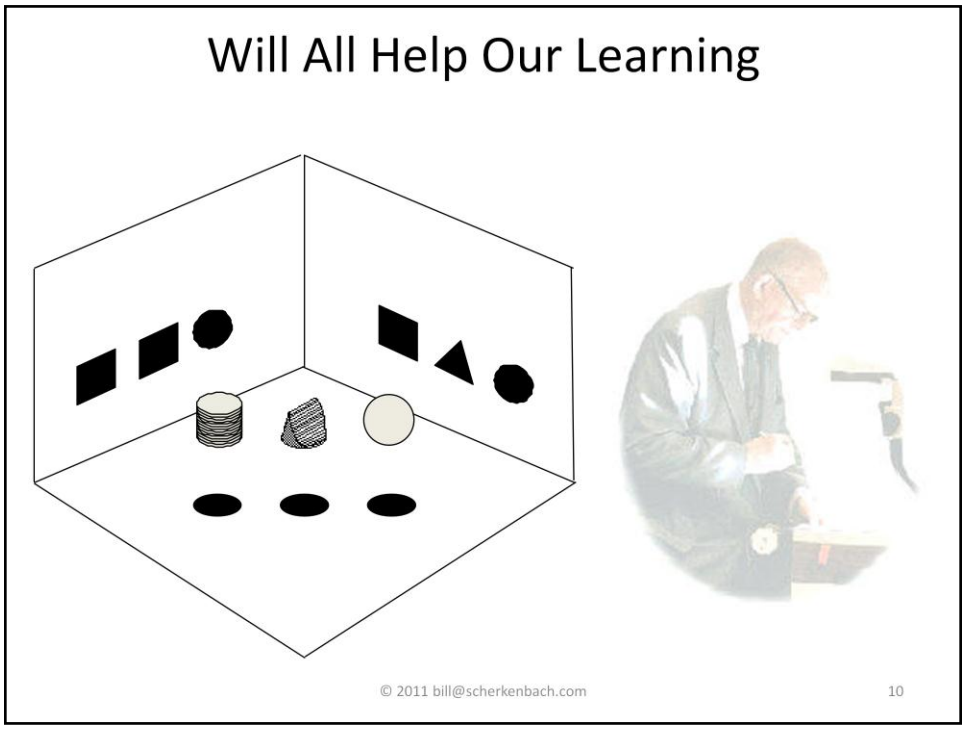
Just as different people have different perspectives, different tools can portray the data in different ways to better assess what we are managing.



I first met Dr. Deming the fall of 1972 at New York University's Graduate Business School. They were just completing the World Trade Center at the time and it towered above the classrooms at 100 Trinity Place. Deming had turned 72 at the time and was the only "old" person that I knew who didn't dwell on the past. "Management's job is the future." Deming focused on it. The course was on statistical methods for business research and was a combination of stories on how the methods were developed and the statistical methods themselves. Dr. Deming had a way of humanizing the mathematics of statistics. He personified kung tse's observation that a man who reviews the old so as to learn the new is qualified to teach. I remember him saying that in order use any of the data in business, one must understand how it was collected and what were its limitations. He gave examples of problems in supply chain delivery were not necessarily solved by logistics, but by accounts payable. In other words, problems seen in one department, are many times caused and solved in another department. He hadn't codified it then, but the seeds for and lessons of Profound Knowledge were in that class.

A quick 10 years went by when we met periodically because we both lived in the Washington, DC area. In early 1982, he recommended that I join Ford Motor Company because he felt that its management was open to learning and improving. I joined Ford in April of 1982 as its Corporate Director of Statistical Methods. The beauty of working for a large company is that they can draw on world-class talent. The day I joined, Dr. Deming was there and he brought along Kaoru Ishikawa to talk to the management of Ford.

Over the years I was privileged to accompany him on over 1000 visits he made to executives all over the world. I also helped him on about 40 of his 4-day seminars.



There is no one way, or tool, or person, or perspective that can be as helpful as a number of perspectives. You cannot do business world-wide if you do not recognize, appreciate, and learn from the different opinions, cultures, and disciplines that occupy our world.

Profound Knowledge: Background

- Dr. Deming recognized that leaders would say that they had the knowledge, but they only knew the buzz words.
- "Profound" was meant to signal a degree of expertise that could contribute to the advancement of the subject matter.
- "Knowledge" includes the following subjects:

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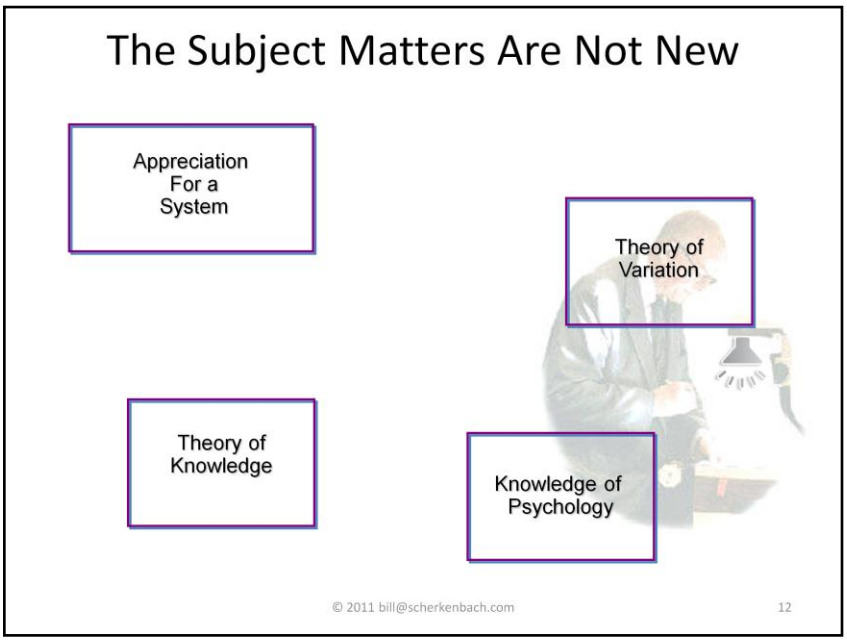
Over the years, Dr. Deming observed that as he talked about what needed to be done, management would nod their heads in agreement and then say to one another "We already do that". We have SPC, teamwork, education, multi-disciplinary business units, we already are doing it. Donald Petersen, who was Ford's CEO said in a meeting of top executives "…As I was thinking about this meeting, it struck me strongly that you are the ones who are going to decide whether we are really successful in making a dramatic change in how we do business. You are the ones…It can be very difficult to make significant changes, especially when you have been in the habit of doing things differently for decades, and especially when the very success that brought you to the positions that you now hold was rooted in doing some things, frankly, the wrong way. It is going to be hard for you to accept that – that you were promoted for the wrong reasons a time or two.

"I seriously suggest that you give that some heartfelt thought as to whether you really understand what we are talking about. I had the experience in January at our Management Review, that most people in the room thought I was talking about something so elementary that we, of course, already do it in the Ford Motor Company. They could not understand what I was talking about it. It left me with the sense that many of us still do not understand what we are really trying to change. So I urge you to ask yourselves, do you really understand what it is we are trying to change…"

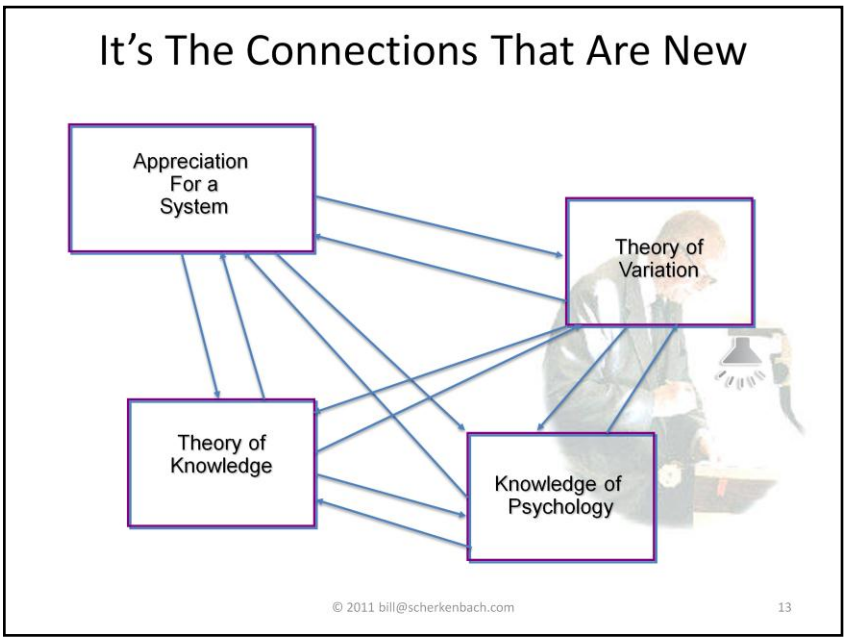
In Dr. Deming's codification of his philosophy he used the word "Profound" to signal a degree of understanding and expertise that one could contribute to the advancement of the subject matter…way beyond buzz words.

Knowledge included an interdependent weaving of Theory of Systems, Theory of Variation,

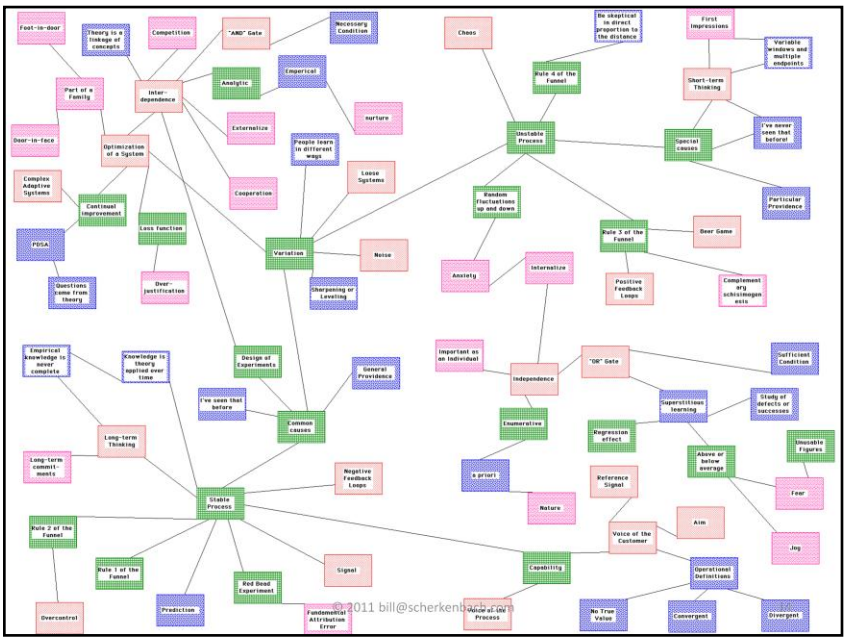
Theory of Knowledge, and Theory of Psychology.



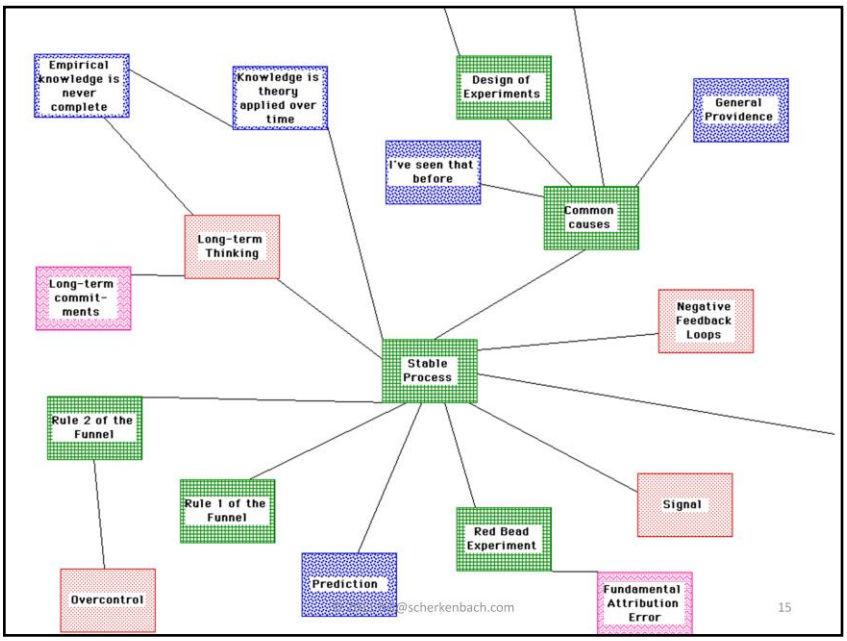
Deming said that one need not be eminent in any or all of the parts of Profound Knowledge, but you had to know far more than the buzz-words. None of these subject matters are new. Each has a long history of development within different world cultures.



Each subject matter is made better by the interaction of the other three. . As I said earlier, but didn't identify the subject: Dr. Deming had a way of humanizing the mathematics of statistics (psychology). The only reason to collect data is to take action. People take the action, so the statistics must be in a form that communicates to the people so that the appropriate action can be taken. I remember him saying that in order to use any of the data in business, one must understand how it was collected and what were its limitations. (Appreciation of a System and Theory of Knowledge) He gave examples of problems in supply chain delivery that were not necessarily solved by logistics, but by accounts payable. (Systems) In other words, problems seen in one department, are many times caused and solved in another department. Psychology can be better understood with Variation (Rank ordering people is counterproductive, if you are statistically predictive, the ranks mean nothing. His famous Red Bead Experiment specifically makes this point.) Theory of Knowledge can be better understood with Variation (Sharpening and leveling).



I have added more detail on the interrelationships. And I present just a sampling of them here. It would take a whole semester to develop all of them.



Blue signifies Theory of Knowledge; Green signifies Theory of Variation; Pink Psychology; and Red Systems Thinking. For instance, a stable process is one that has only common causes of variation. It is linked to the Theory of Knowledge concept of Prediction. Systems Theory links signal to stable process. To be stable, systems theory requires at least one Negative feedback loop. Dr. Deming's famous Red bead experiment is linked to a stable process and to Psychology's Fundamental Attribution Error.

The remaining two lectures will delve into more detail on each of the areas of Profound Knowledge.

The Aim of Profound Knowledge

- Kung Tse said that knowledge without action is useless while action without knowledge is dangerous.
- Deming said that the aim of his system of Profound Knowledge is action.
- The action he advocated was a transformation or change of western style management.

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Kung Fu Tse said that knowledge without action is useless while action without knowledge is dangerous. Dr. Deming said that the aim of his system of Profound Knowledge is action. The action he advocated was a change or transformation of western style management.

One of Dr. Deming's favorite questions was "By what method?" To answer this question, I have developed a framework for change.

A Framework For Transformation

• Coercive	Rational	Normative
• Hand	Head	Heart
• Position	Knowledge	Charisma
• Letter of Law	Understanding	Spirit of Law
• Financial	Intellectual	Good will
• Appetite	Reason	Spirit
• Acts	Knowledge	Will
• Sensing	Thinking	Feeling
• R Complex	Neo cortex	Limbic system

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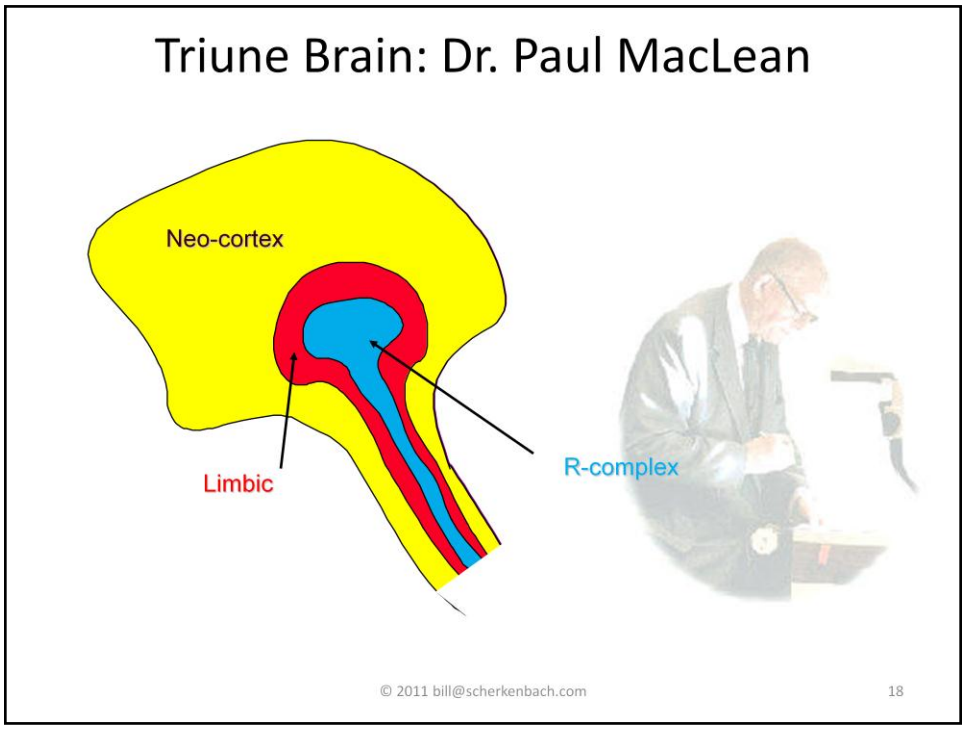
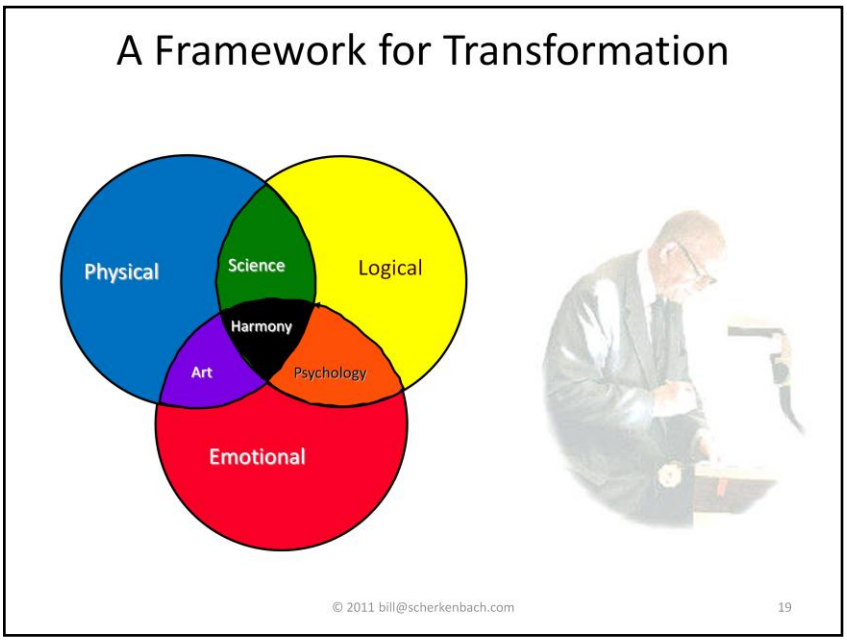
It is a framework that has roots in many cultures and many disciplines:

•Warren Benis defines modes of change as Power-Coercive, Rational-Empicical, and Normative-Reeducative.
•Many cultures recognize Hand, Head, Heart or Body, Mind, Spirit
•Some people have power because of rank or position, some have it because of their knowledge, others because of their personality or charisma
•Yin and Yang are complemented by rational
•Letter of the Law, Understanding of the Law, and Spirit of the Law
•Accountants classify Financial capital, Intellectual capital, and good will
•Plato in Western philosophy speaks about Appetite, Reason, and Spirit
•While Mencius (Meng tse) touts Acts, Knowledge and Will
•Meyers Briggs main type categories are Sensing, Thinking, and Feeling



•These categories go to the core of all people. Human brain structure is composed of three main neural structures: R complex, Neo cortex, and limbic system

Different cultures have different words for these worlds but the concepts are the same. All change that involves people, is triggered by combinations of three worlds: Physical, Logical, Emotional.



My contribution to the field is to use a Venn Diagram to show that there is no predictable hierarchy to these communication frequencies. Holy wars have been fought over which one is best. Physical is no better or worse than Logical or Emotional. A Venn Diagram also shows the intersections of these primary worlds:

1.The intersection of Physical and Logical is Science – the logical explanation of physical phenomena

2.The intersection of Logical and Emotional is Psychology – logic of the soul

3.The intersection of Emotional and Physical is Art – the emotional interpretation of sensory input

Mistakes That Leaders Make

- Don't think that what works for you must work for everyone.
- Don't even think that the sequence that works for you must work for everyone. Change is not a predictable hierarchy.

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Knowing this framework for change helps us deal with mistakes we make as leaders to get others to take action.

Mistake number one is "Do not think that what works for you must work for everyone." The three major Gurus of Quality: Deming, Juran, Crosby each made this mistake. Deming's strong suit was Logical (Profound Knowledge), Juran's was Physical (Organization), and Crosby's was Emotional (Celebrations, wine and cheese parties). Each of them developing a following whose frequency of communication was similar to his. Have you ever tried to explain the rationale for doing something to someone and they don't do it? Maybe logic is not what they need to take action. Maybe getting someone in authority to command it or maybe use emotion or values to get the person to act.

For instance, some of you might only need to be told to do something by the CEO. Because the CEO said it, it will be done. You don't need to understand or to feel that it is right to take action. But, don't think that everyone else responds to this. Others of you might need to understand why the Dean is wanting you to do something and you won't do it until you understand it. You certainly won't do it because the Dean commanded it. Others might need to feel that what is being asked is congruent to your values before you take action.

The second mistake that leaders make is to think that the sequence that works for you must work for everyone else too. What do I mean by sequence? Sometimes there is a hierarchy and one frequency must be preceded or followed by another frequency to get you to take action.

Transformation is Not Hierarchical

- Form follows function...
- Function follows form.
- Seeing is believing...
- Believing is seeing.
- Feelings should drive reason.
- Reason should prevail over passion.

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Some of the more common hierarchies are:
Form follows function (physical follows logical)…if the function of an automobile is to be fuel efficient, it will have a jelly-bean form; if the function of the automobile is to carry passengers in comfort, it will have a shoe-box form. But…
Function follows form (logical follows physical)…if the form of the organization is cut in half, you must figure out what its new function will be. Because you don't have the resources to continue the old function. More up to date, but still an auto example, if the price of petrol is 50NT per liter, the function of an automobile is to take up a parking place.

Seeing is believing (physical leads to emotional)…In Christianity this is "Doubting Thomas" who must see for himself to believe it has happened. In Western Philosophy, Decartes comes to mind. But..
Believing is seeing (emotional leads to physical)…many times our beliefs cause use to see or miss seeing something. The greatest barrier to the advancement of knowledge has been the belief that we know it already and cannot accept another perspective. Our friendship and like of a person can blind us to other qualities.

Feelings should drive reason (emotional drives logical)…Use you "gut" or intuition to make decisions; impulse sales; sizzle not steak. Political battles often play on the heart to get votes. This works for some people. But…
Reason should prevail over passion (logical rules emotional)…Make a decision on the "facts" and logic, do not cloud your decision with emotions. Some people put aside the passion of the moment and vote with their minds.

All of these view-points or perspectives are useful. But just because you prefer one or another, don't think that everyone else makes change the way you find effective.
One of the first things I did at General Motors was to get all of the Policy letters that had been issued over the years. The ones that Alfred Sloan wrote were very telling. His policy letters typically had a paragraph that said "This is what our policy is on this matter, make no mistake about it." He also had a paragraph explaining the reason for this policy so that people could understand it. He also had a paragraph that helped people emotionally

connect because the policy was congruent with the company value system.

Physical World

- Policies, procedures, standards, mission statements
- Physical "error-proofing", positive interlocks, visual controls, pull system, etc.
- Organizational reporting relationships
- Copy of examples, benchmarking
- Carrots or Sticks
- Measurements
- Training or development of skills

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Let's take a look at what each world might be composed of:
If you want change in the Physical World you must change
Policies, procedures, standards, mission statements, contracts for those that are concerned with the letter of the law. In one company the SCM VP wanted to issue long-term contracts with key suppliers for COS reasons. He told his buyers to make it so. He looked at the results the next Quarter and found no change. He told the buyers again, he explained the reason for what he wanted. One quarter later, no change. He looked at the procedures on record and they required two levels of supervisory approval for a long-term contract. No buyer wanted to go through the hassle of documentation and time of the approvals. Therefore no real change took place until the procedure was changed…we changed one word…if a buyer wants to issue a short-term contract, he must go through two levels of supervisory approval…it happened in a month.

Physical error proofing, positive interlocks, visual controls, pull system, other Lean solutions, etc. are obvious. You are physically forcing something or physically preventing something from changing.

Organization chain of command – you will do what your superior wants you to do. Physical power.

Benchmarking – Your organization is doing the best that it can. You might not know that something different can be done. Benchmarking or seeing someone else do what you have not even considered doing can open possibilities of change for you.

Rewards and Punishments Promotions or Demotions – Many people use the carrot or stick to get people to change. It works for some, but not others.
Measurements – physically measuring or quantifying something can lead the way to change. But, Dr. Deming many times warned us that the most important things are not measureable.

Training and Skills – Physical world interventions versus education which is a Logical world intervention.
All of these actions are necessary and sometimes sufficient for change in people who operate in this world.

Logical World

- Case studies or examples
- Explanations of how or why
- Education or improvement of knowledge
- Theory
- Mathematics; Statistics
- Deductive, Inductive, Retroductive reasoning
- Logical fallacies

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Case studies is what Harvard University uses to effect change. If you understand the scenario and are exposed to the logic, you might better implement change in your situation.

Explanations of how or why are very useful interventions for people who respond to logic.

Education or improvement of knowledge complements physical skills development enabling change.

Theory is a connection of concepts. It is the center of logical thought. It is the start of the PDCA Deming cycle.

Mathematics is entirely based on logic. It does not have to have any contact with the Physical or Emotional worlds, but can nevertheless effect and predict change.

Deductive logic from the general theory to the specific; or Inductive logic from the specific observation to a general theory; or what philosopher CS Peirce called retroductive logic which was touted by Einstein in his “mind experiments” dreams.

For every logical argument there is at least one type of fallacy usually Ad Hominem and Argumentum ad Ignorantiam

Emotional World

- Value statements
- Cause marketing
- Celebrations
- FEAR...JOY
- Creativity, Innovation

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In the emotional world:

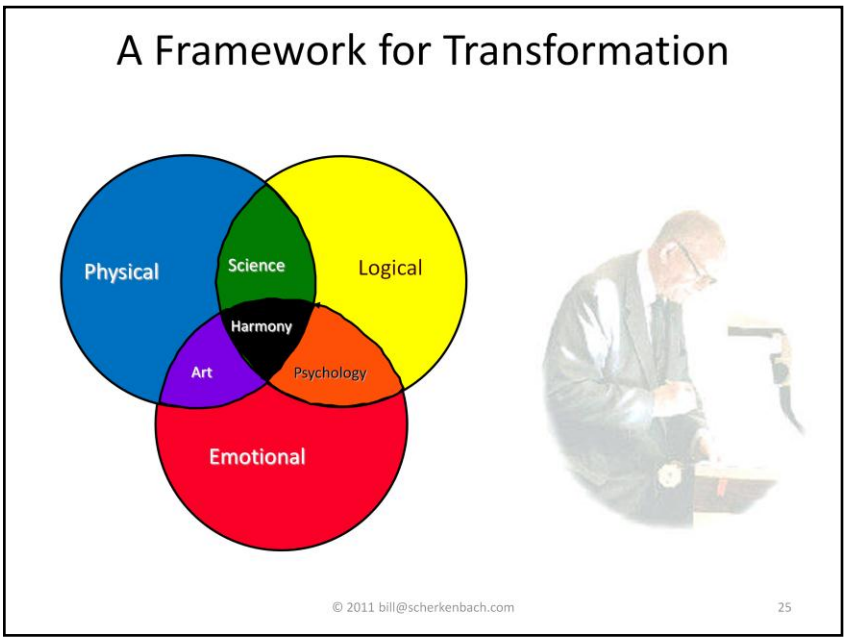
Value statements can be very powerful agents for change. If you can show congruency of the need for change with someone's value system, it can effect change.

Cause marketing is a form of using emotions and good will to sell a product.

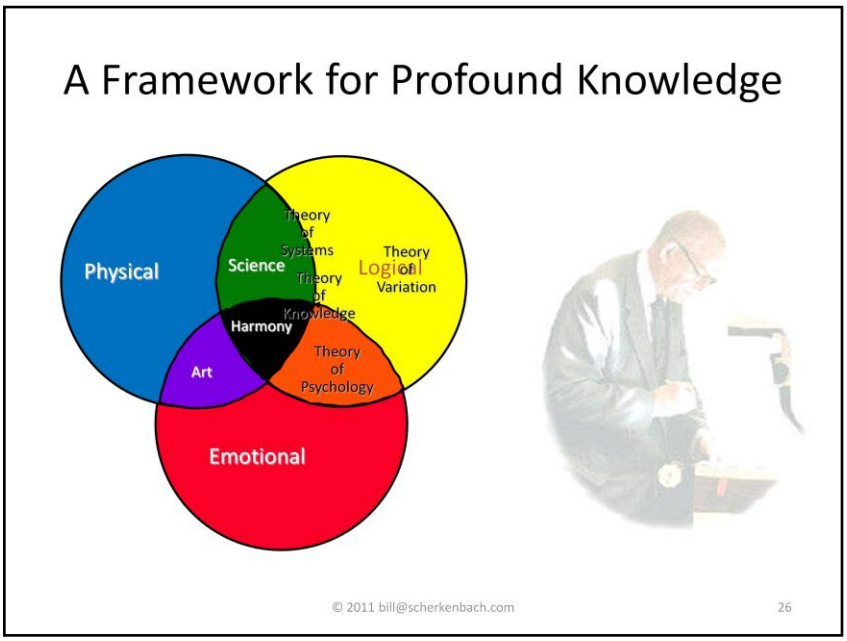
Impulse buying – Marketing and Sales know that sizzle sells the steak. They also bet on a certain percent to buy candy at the checkout counter.

Celebrations – Phil Crosby was an enthusiastic supporter of Wine and Cheese parties to celebrate successes. If everyone feels great, then change should be easier.

Creativity and innovation access your emotions



We have just explained some of the manifestations of my framework for change…now here is where Dr. Deming's Profound Knowledge fits in to this framework.



I said earlier, Deming's forte was logic, he couched each of his elements of Profound Knowledge as Theory of…systems, variation, knowledge, psychology.

Deming said many times that the prevailing style of management must undergo transformation. The current system of management cannot understand itself. The transformation requires a view from the outside.

I will now highlight Deming's view on each of these disciplines.

I am reminded of another of Kung Fu Tse's sayings, "I do not enlighten those who are not eager to learn, nor arouse those who are not anxious to give an explanation themselves. If I presented one corner of the square and they cannot come back to me with the other three, I should not go over the points again."

This also reminds me of Dr. Deming's approach, he would never answer a question. He would always respond to a question with another question. He wanted to get you to think.

I however am not as helpful as Kung Fu Tse or Dr. Deming because I will attempt to answer your questions with answers, recognizing that I do not know as much as when I was younger.

Theory of Variation: Deming's View

- Life is variation.
- There are two mistakes frequently made in attempts to reduce variation.
  - Funnel Experiment
- Management requires knowledge about interaction of forces.
  - Red Bead Experiment

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In a viewpoint that parallels the first Nobel Truth in Buddhist teaching: Life is variation. Deming equated variation to suffering. Variation is everywhere be it a lot or a little.

There are two mistakes that are made when we try to reduce variation: We mistake a Common cause of variation for a Special cause; and we mistake a Special cause of variation for a Common cause. Dr. Deming's famous funnel experiment is an example of what can happen when you mistake a common cause system for being special.

One of Deming's teachers was Walter Shewhart who developed procedures to minimize the mistakes. The procedures are known as Control Charts. Control charts can identify whether we should take action on the Common causes or the Special causes to reduce variation. Dr. Deming said that it will be another 50 years before Dr. Shewhart's work will be appreciated and used by industry. He said this even though every industry thinks they are using Control charts correctly. They are not.

Management requires knowledge about interaction of forces. Dr. Deming's famous Red Bead experiment shows what happens when management ascribes all of the results of the process to the people.

Knowledge of Psychology: Deming's View

- If you understand the Red Beads, you will not rank people. (Fundamental attribution error.)
- Intrinsic motivation is necessary in this new economic age.
- Psychology helps us to understand people as different individuals and as members of teams.
- Fear invites wrong figures.

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We will also learn about Psychology.

Anything we do is through people. That might seem obvious, but you might be the best engineer, statistician, market analyst, accountant, etc. and you will not be able to communicate your ideas much less get them implemented unless you do it through people. Not surprisingly, there are three main schools of western psychology: Skinnerian behavioral, Cognitive, and Psycho-dynamic. (Physical, Logical, and Emotional)

People are different from one another. They are not all like you. Remember one of the biggest mistakes you can make is to think that what works for you will work for everyone else.

One of the differences is that people learn things in different ways. You must be able to communicate with them on their frequency, not yours.

Fear invites wrong figures, and worse.

Appreciation for a System: Deming's View

- The greater the interdependence between components of a system, the greater the need for communication and cooperation between them.
- The obligation of any component is to contribute its best to the system, not to maximize its own production, profit, or sales, nor any other competitive measure.

A system is a network of interdependent components that work together to try to accomplish the aim of the system.

The greater the interdependence between components, the greater the need for communication and cooperation between them. The two extremes are "I'm an individual, I control everything I do, so get out of my face." or "A butterfly flapping it's wings in Brazil caused the typhoon to hit Taiwan last month."

The obligation of any component is to contribute its best to the system, not to maximize its own production, profit, or sales, nor any other competitive measure.

Theory of Knowledge: Deming's View

- Management is prediction; temporal spread is required.
- Knowledge is built on theory.
- Operational definitions are essential.

Management is prediction: yesterday is gone, what is your prediction for tomorrow, next week, next quarter, etc.? Based on this prediction, what are the plans to act on it? As Marshall McCluhan, the Canadian philosopher, said "Management is managing looking through the rear-view mirror."

Knowledge is built on Theory. Dr. Deming's Plan, Do, Study, Act (PDSA) cycle is a learning cycle whose first step in the Plan is stating your theory.

Operational definitions are essential.

No true value of any empirical characteristic.

Break

- Please be back in 10 minutes.

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Theory of Variation: Deming's View

- Life is variation.
- There are two mistakes frequently made in attempts to reduce variation.
  - Funnel Experiment
- Management requires knowledge about interaction of forces.
  - Red Bead Experiment

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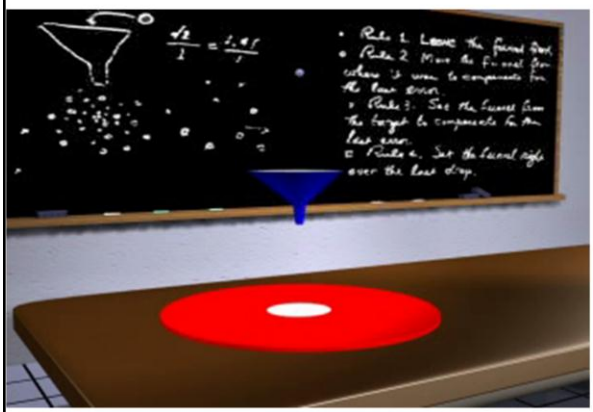
Dr. Deming's Two Famous Experiments

- Dr. Deming is famous for two experiments he always conducted at his seminars. Each of these experiments shows what can happen at the extremes of inappropriate action.
- The Funnel Experiment shows that most everything that you try to do to improve the process will, in fact, cause more variation than you started with.
- The Red Bead Experiment shows that most everything that you try to do to improve the process will, in fact, change nothing.

Rules of the Funnel: Rule 1



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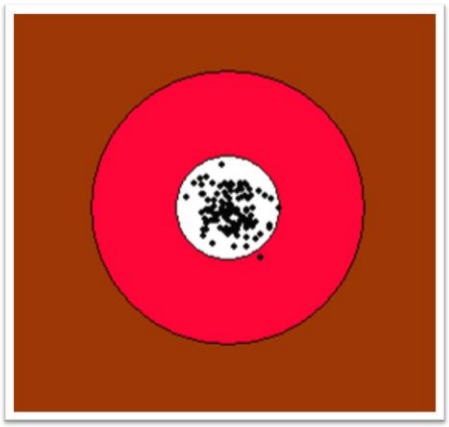
In my DVD, I have a science room where you can observe simulations of the 4 rules of the funnel. What you see is Dr. Deming's handwriting explaining the rules. I am using a high-tech funnel with anti-gravity paint so it doesn't need to be held by a fixture.

His first rule is to leave the funnel alone. Do not move the funnel no matter what you think of the outcome.

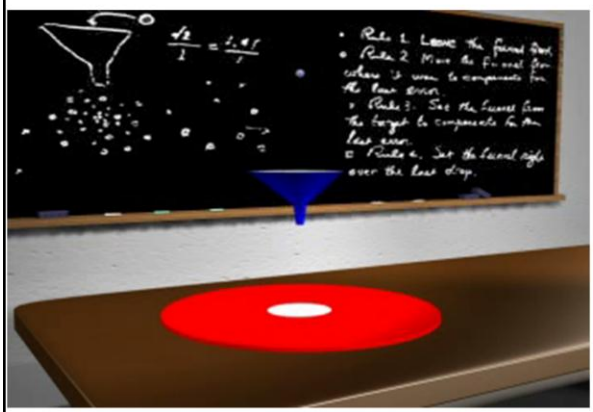
Let's listen to Dr. Deming describe Rule 1. And see the results.

Rule 1 Results in Stable Variation



Do not move the funnel

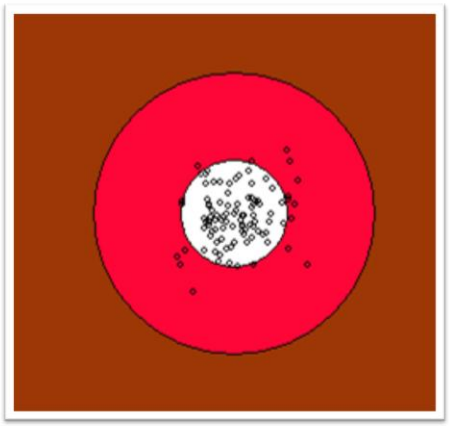
Rules of the Funnel: Rule 2



 36

We try to do better than the results of Rule 1. We won't sit there, we will move the funnel to reduce the variation.

Rule 2 Results in More Variation

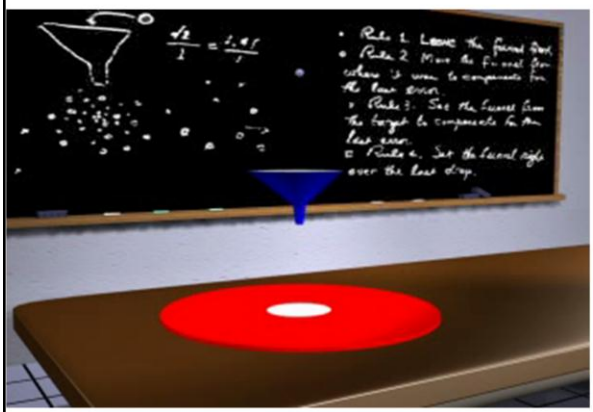


Move the funnel

 37

The results of using Rule 2 end up increasing the variation by 41%.

Rules of the Funnel: Rule 3



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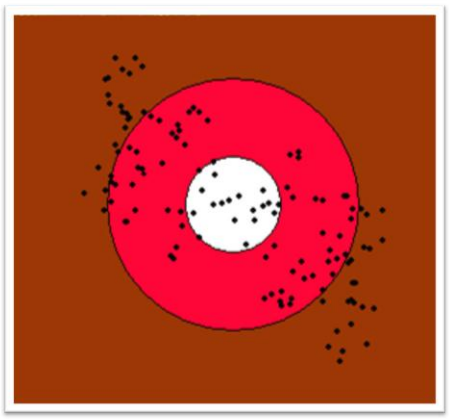
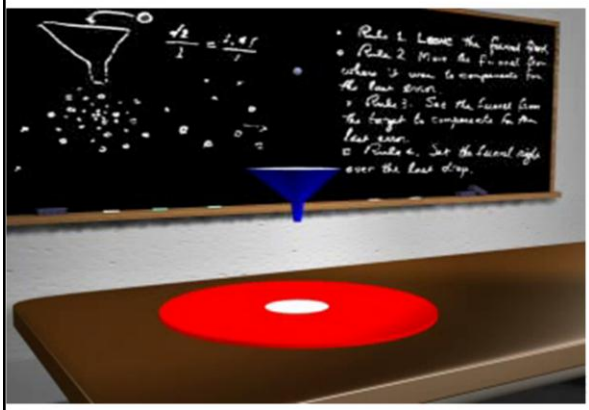
We can do far worse than Rule 2 just by trying to do better. Rule 3 results in the system exploding or ripping itself apart. Acoustic feedback, Tacoma Narrows Bridge collapse, etc are examples of Rule 3.

Rule 3 Explodes the Variation



Move the funnel

Rules of the Funnel: Rule 4



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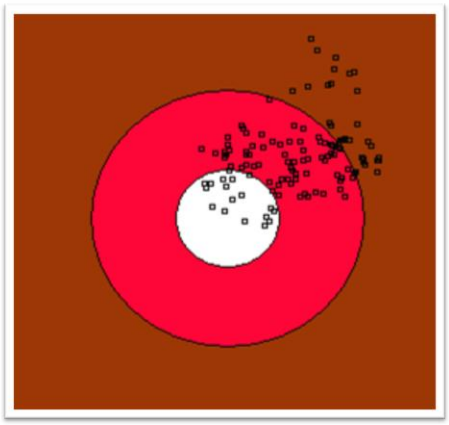
Rule 4 tries to make them all the same, just like the last one. This too fails and ends up in a random walk.

Rule 4 Results in Random Walk



Move the funnel

Examples of Funnel Rules 2, 3, 4

- Following the latest magazine article on management.
- Calibration of an instrument.
- "Eye for an eye" escalation
- Adjust process when a piece goes out of specification.
- Automatic compensating equipment

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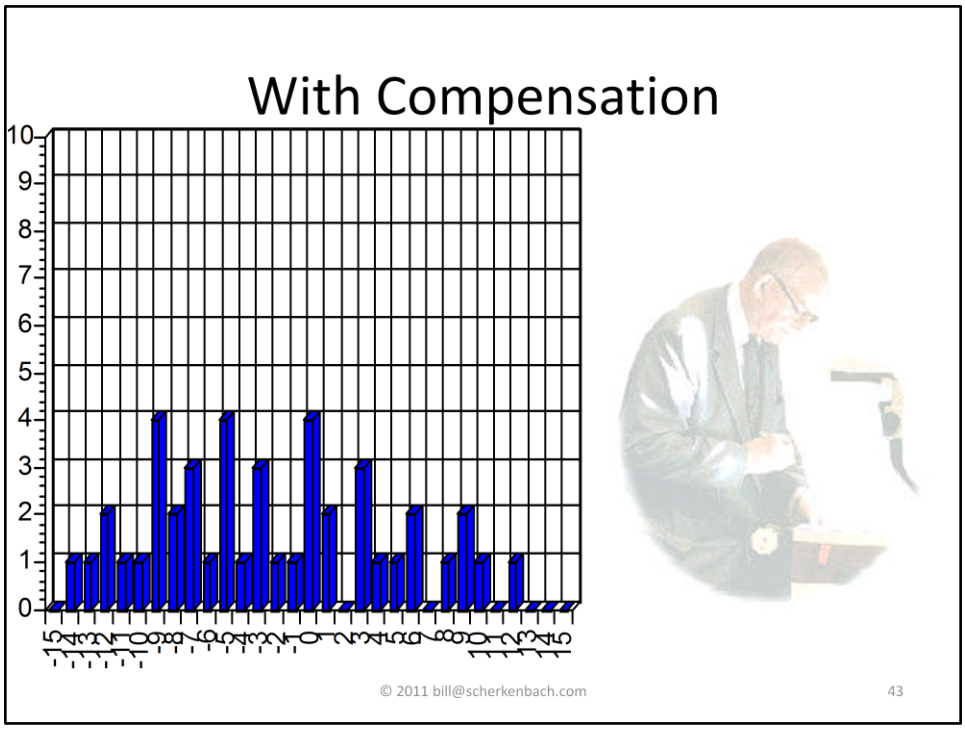
Following the latest magazine article on management (rule 4):

Calibration of an instrument to a standard (rule 2): Time after time when we do MSA's, we see that the measurement error is twice what it should be because new machines have auto calibration routines that unknowingly follow rule 2.

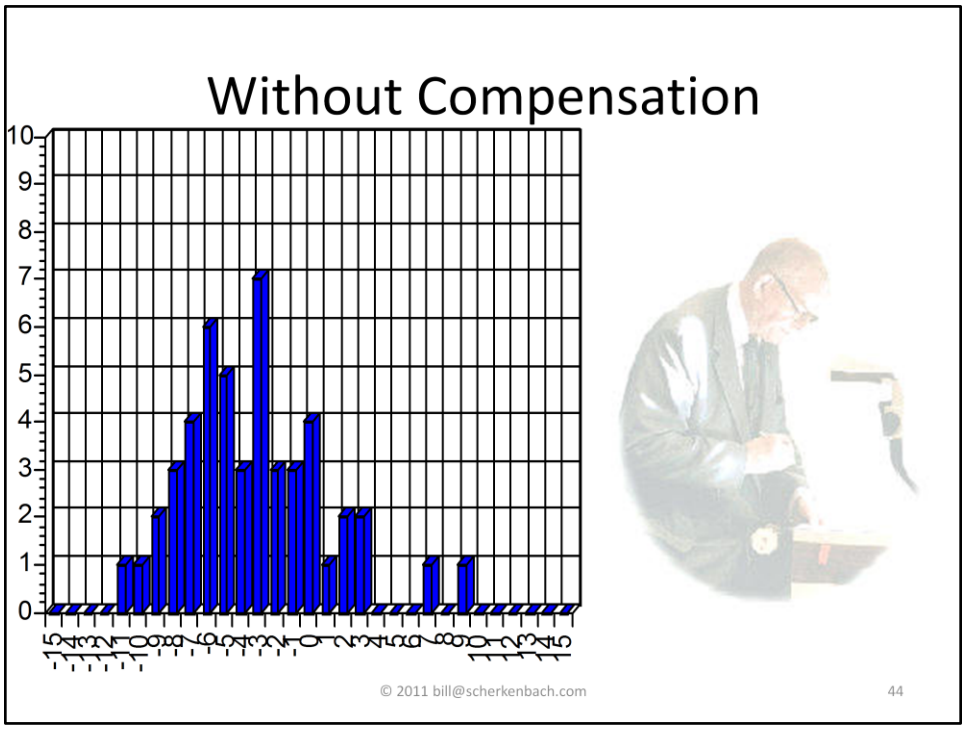
"Eye for an eye" escalation (rule 3):

Adjust a process when a piece goes out of specification (rule 2):

Automatic compensating equipment (rule 2 usually): What follows are actual data from an automatic compensating device on a metal micro finish machine. We had just spent a lot of money for that machine and all the parts were to specifications.



We ran 50 pieces with the auto-compensating device turned on and we got everything to print. No problems. No defects.



I asked them to turn the auto-compensating device off and run 50 more pieces. This is what we got. A more peaked distribution of parts that were also within specs. Less variation by not adjusting according to rule 2.

Give Examples of the Funnel

- Write down examples of Rules 2, 3, and/or 4 in your life or organization.
- Share the examples with your table.
- Select an example of each Rule to share with the class.

Red Bead Experiment

- The Red Bead Experiment shows that most everything that you try to do to improve the process will, in fact, change nothing.

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I accompanied Dr. Deming on about 40 4-day seminars when he did the “Red Bead” experiment with the members of the audience. If you have a chance, you should participate in this experiment. There is a lot of emotional baggage that plays out that is not seen in the numbers.

I had mentioned earlier that these experiments are at the extremes of management situations. The red bead experiment shows you that almost everything unenlightened management and your workers do to improve the quality, doesn’t change anything.

Red Bead Experiment: Dr. Deming Explains

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This was the first time that his Bead experiment was video taped. I bought a camera and wireless mic in DC and went onstage to capture close up what was happening. At first he was self-conscious, but he worked through it and permitted other whole seminars to be taped for posterity.

Red Bead Management

- You must follow the precise instructions of your foreman, or you will lose your job.

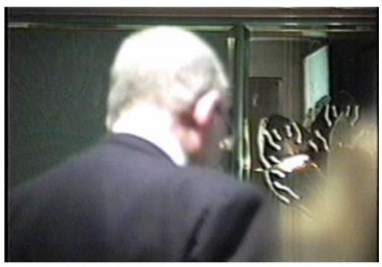
Red Bead Management

- First quarter results are disappointing "Take pride in your work."
- Effective immediately, there is an employee of the quarter award.

All to no avail. And finally…

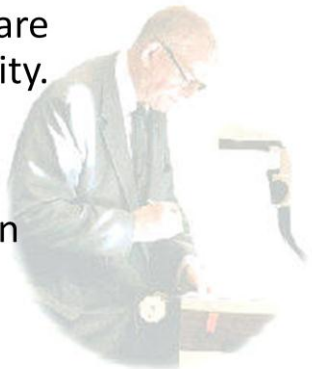
Red Bead Management

- We will retain only above average employees.



Lessons of the Red Bead Experiment

- Quality is made at the top.
- Rigid and precise procedures are not sufficient to produce quality.
- People are not always the dominant source of variation.
- Data that are rank-ordered can be misleading.
- Numerical goals are often meaningless.



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Where are Your Red Beads?

- Write down an example of how the Red Beads apply to your work.
- Tell your table.
- Choose one to share with the class.

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Deming, Tukey, Box, Cox

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At Ford, I started an annual conference to bring in the best minds on improvement. I was able to coral this group for a few seconds in front of my camera. Five great statisticians: W E Deming, John Tukey, George Box, and David Cox. Not in the picture were Stu Hunter, Bill Hunter, and me. The Hunters didn't arrive until the next day, and I was taking the picture and was the Red Bead.

Theory of Psychology: Deming's View

- If you understand the Red Beads, you will not rank people. (Fundamental attribution error.)
- Intrinsic motivation is necessary in this new economic age.
- Psychology helps us to understand people as different individuals and as members of teams.
- Fear invites wrong figures.

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We will also learn about Psychology.

Anything we do is through people. That might seem obvious, but you might be the best engineer, statistician, market analyst, accountant, etc. and you will not be able to communicate your ideas much less get them implemented unless you do it through people. Not surprisingly, there are three main schools of western psychology: Skinnerian behavioral, Cognitive, and Psycho-dynamic. (Physical, Logical, and Emotional)

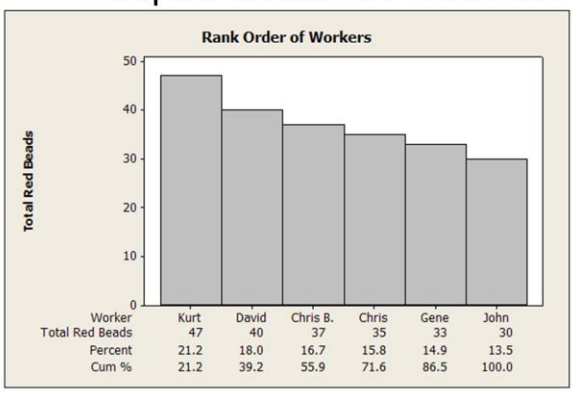
People are different from one another. They are not all like you. Remember one of the biggest mistakes you can make is to think that what works for you will work for everyone else.

One of the differences is that people learn things in different ways. You must be able to communicate with them on their frequency, not yours.

Fear invites wrong figures, and worse.

Fundamental Attribution Error

- People? Material? Method? Equipment?



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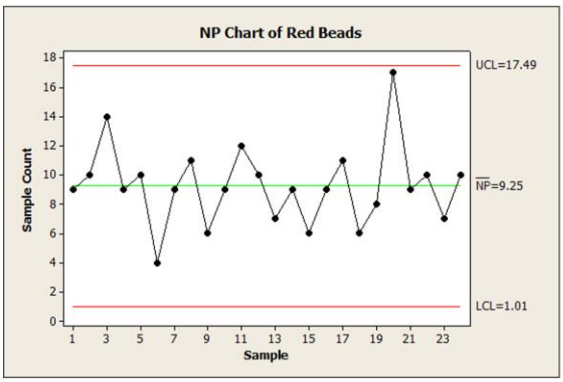
The fundamental Attribution Error is mistaking the person out of context with the situation. This flat Pareto diagram is a clue that no one of them pops out as dominating the production of Red Beads.

Workers Didn't Make the Defects

- Stable Process



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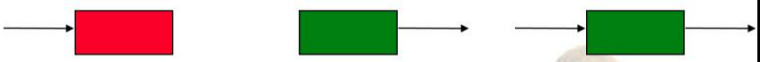
This control chart shows that we have a stable system for producing Red Beads. We can now use methods to improve the process.

People Are Different



	Dependent	Independent	Interdependent
Physical	Do it for me	I do it	We do it
Logical	Teach me	I understand what to do	I understand how what I do helps to optimize our process
Emotional	Love me	I take joy in what I do	I take joy in belonging to a team

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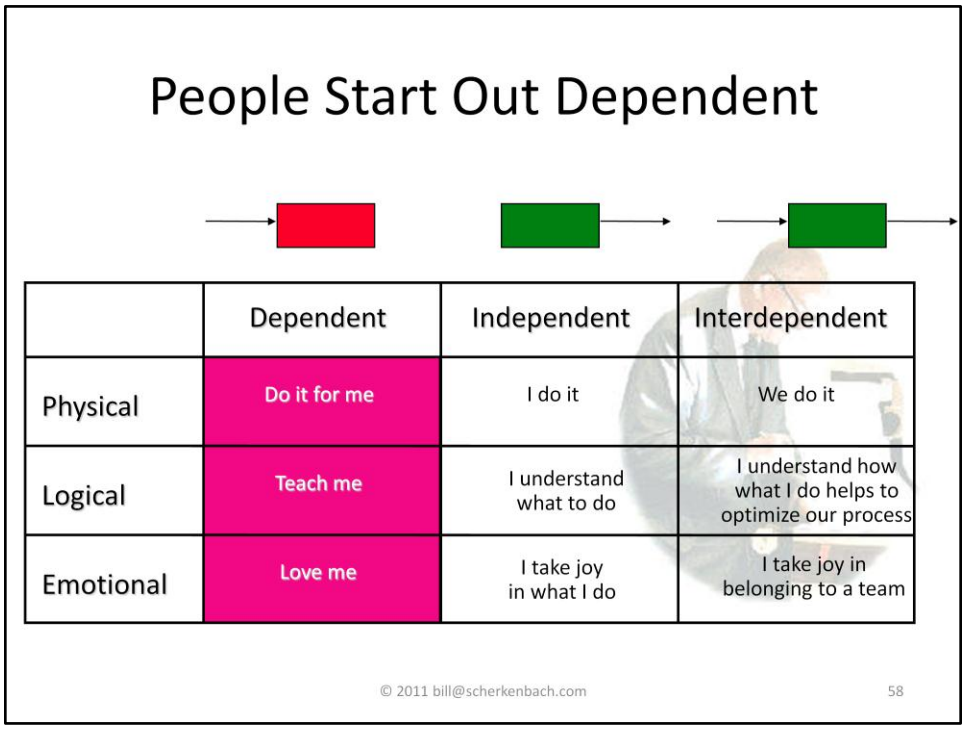
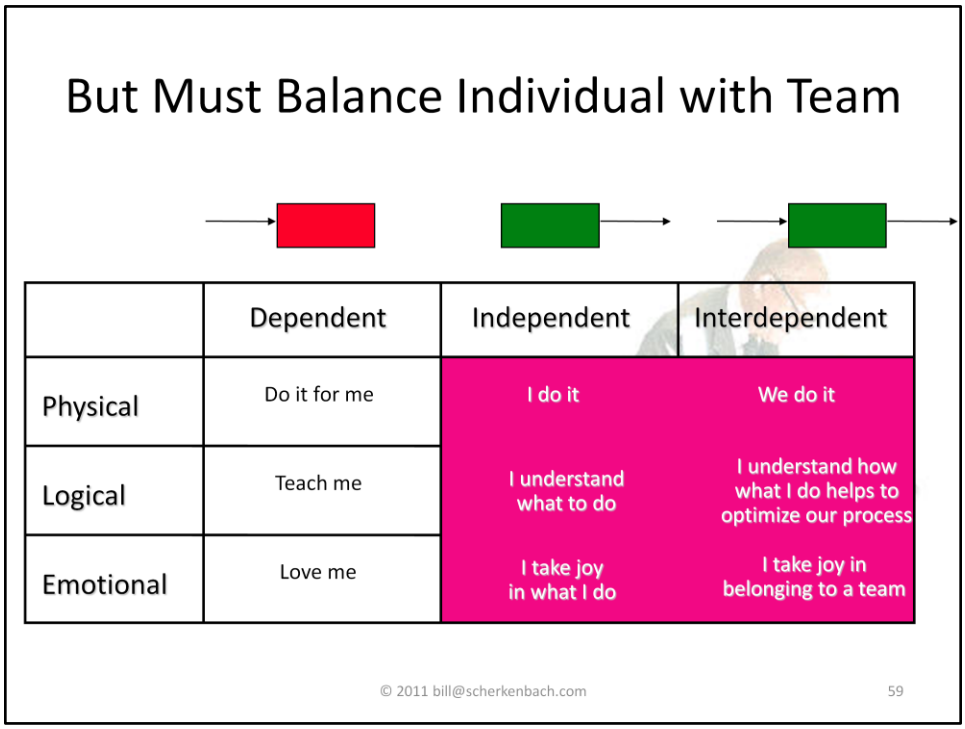
This should be familiar to you all. The matrix of physical, logical, and emotional with dependent, independent, and interdependent relationships.



The Dependent relationship is supplier dominated. It is essentially, Feed me, Teach me, Love me.



Balance is important here. We all find ways to be important as individuals and as members of connected groups.

Fear Invites Wrong Figures

- Flinching
- Halo Effect
- Shoot the Messenger
- Operational Definitions
- Flexible Baseline
- Definition of Integrity

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Flinching happens when production volume or PPH costs are more important than Quality. The data will show no parts just outside of the specification limits, but will show a whole bunch just inside the spec limits. The parts really were outside the specs, but production needed the numbers to be shipped.

Fear invites wrong figures.

The halo effect is caused by fear of what someone might think about their answer. For example, What newspaper do you read? Your answer is a very respected newspaper…Zhong Guo. When you really read Ping Guo.

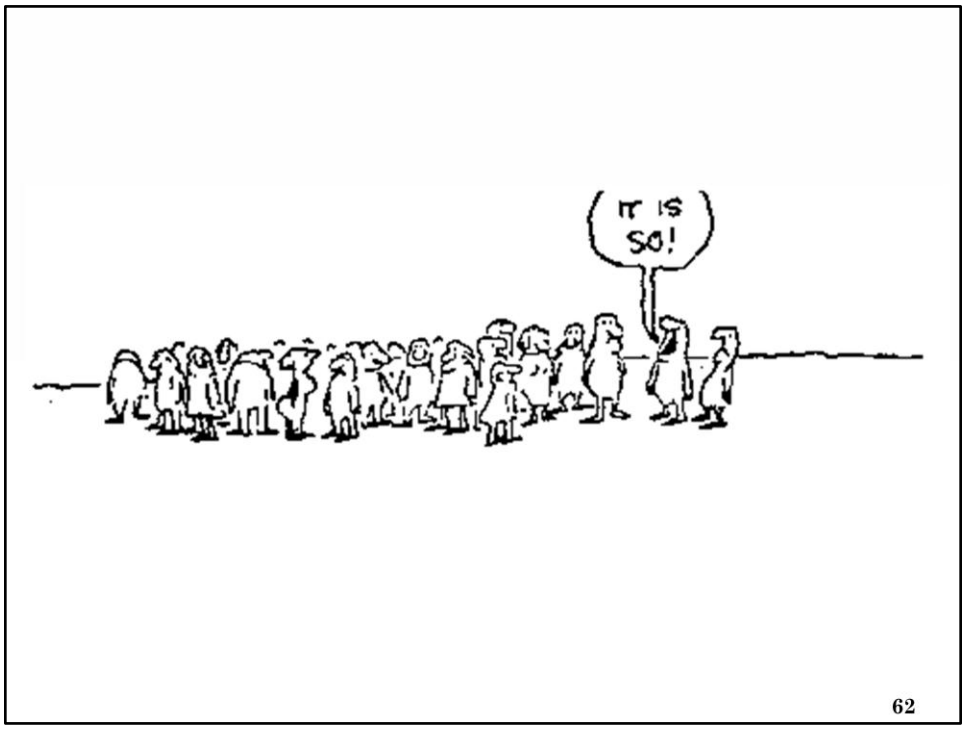
Shoot the messenger…no bad news.

Operational Definitions (which I will cover in the next lecture) are needed because fear

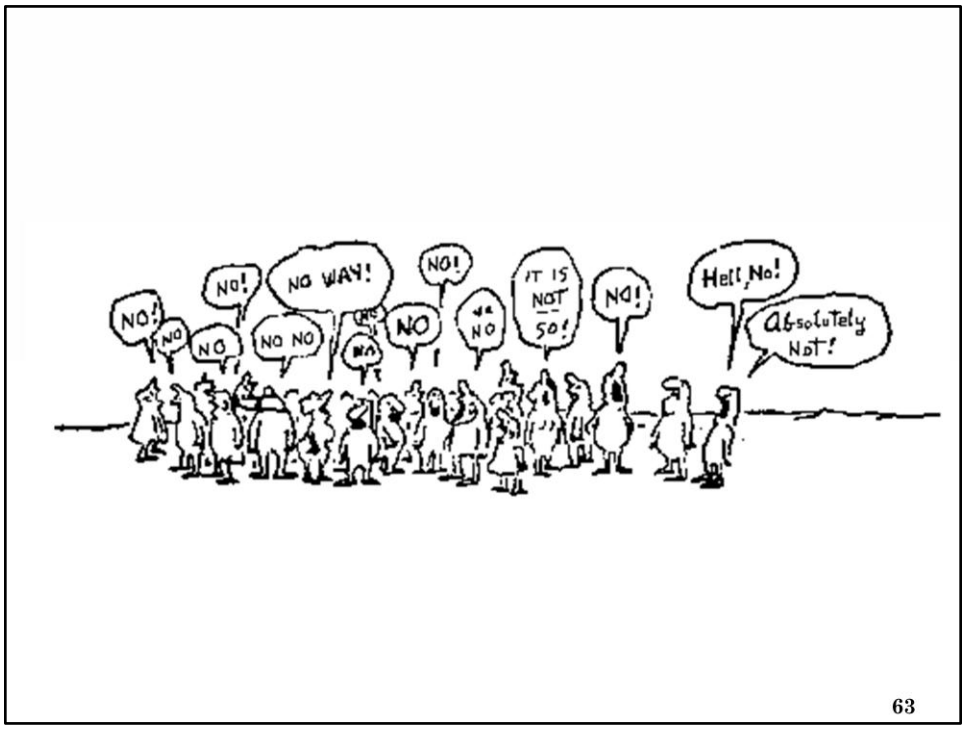
Drive Out Fear

 61

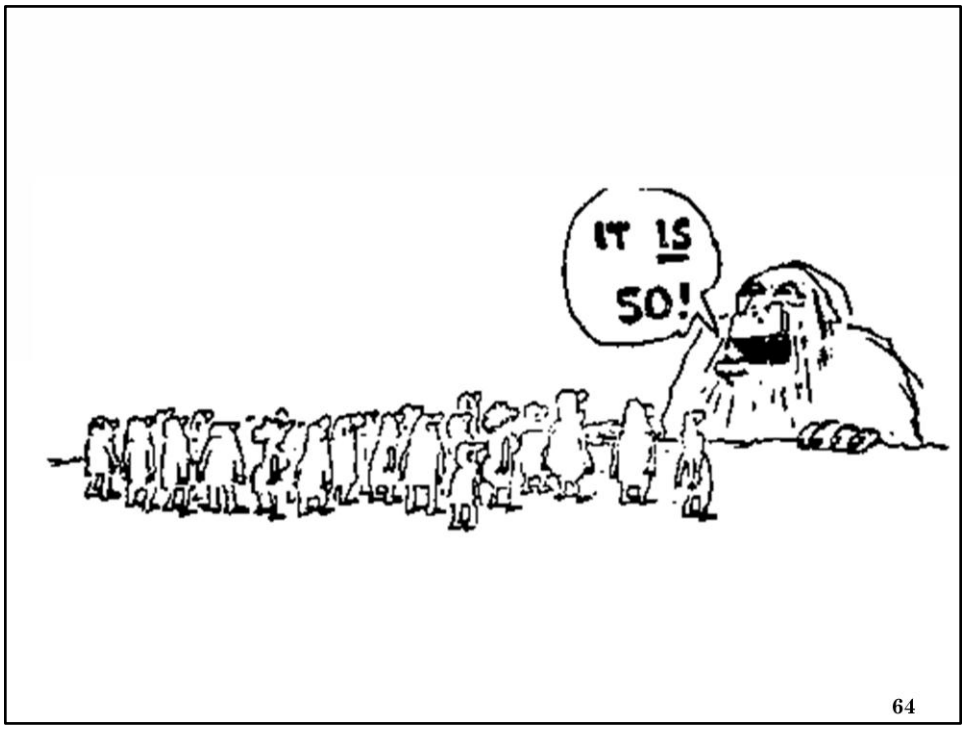
This is a picture of Deming at lunch in one of Ford World Headquarters dining rooms. He was not pleased with a response from one of the professors from Oakland University. The lighting was perfectly ominous. I had the picture framed and I hung it in my office at Ford. Deming smiled when he saw it.



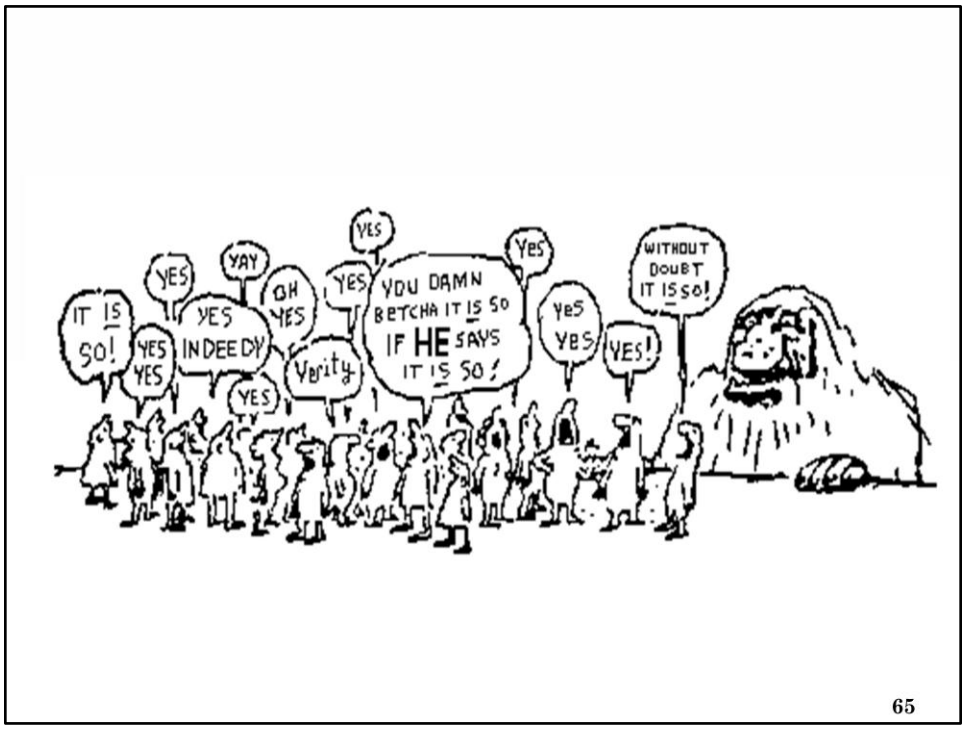
Sometimes you are this person trying to influence others.



Transformation, for some, is difficult.



Years ago, we could call in Dr. Deming to explain a few things.


IT IS SO!
YES YES
YES
YES INDEEDY
YES
YAY
OH YES
YES
Verity
YES
YOU DAMN BETCHA IT IS SO IF HE SAYS IT IS SO!
YES
YES YES
YES!
WITHOUT DOUBT IT IS SO!
65

TED on Intrinsic Motivation

- http://www.ted.com/talks/dan_pink_on_motivation.html

Lunch

- Please be back by 1300

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Systems Theory: Deming's View

- The greater the interdependence between components of a system, the greater the need for communication and cooperation between them.
- The obligation of any component is to contribute its best to the system, not to maximize its own production, profit, or sales, nor any other competitive measure.

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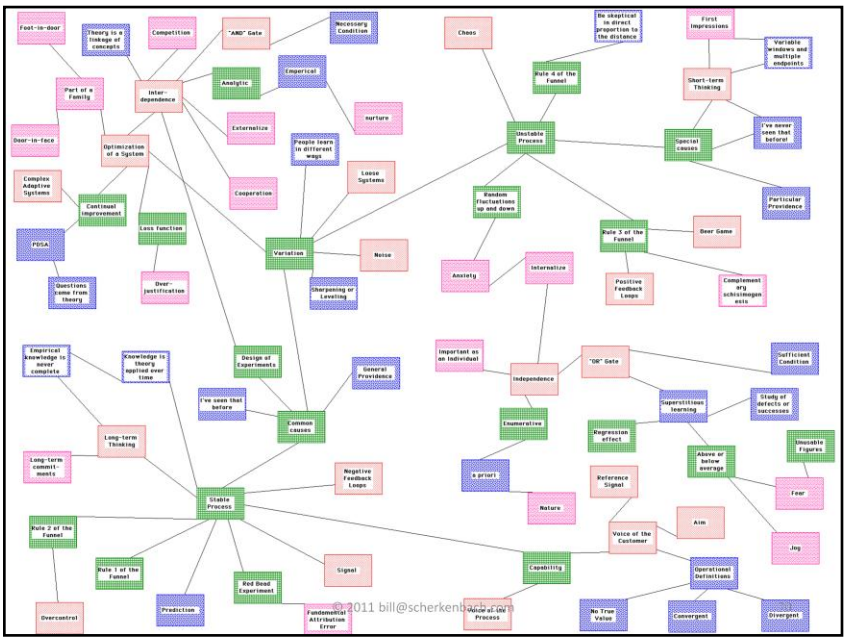
A system is a network of interdependent components that work together to try to accomplish the aim of the system.

The greater the interdependence between components, the greater the need for communication and cooperation between them. The two extremes are "I'm an individual, I control everything I do, so get out of my face." or "A butterfly flapping it's wings in Brazil caused the typhoon to hit Taiwan last month."

The obligation of any component is to contribute its best to the system, not to maximize its own production, profit, or sales, nor any other competitive measure.

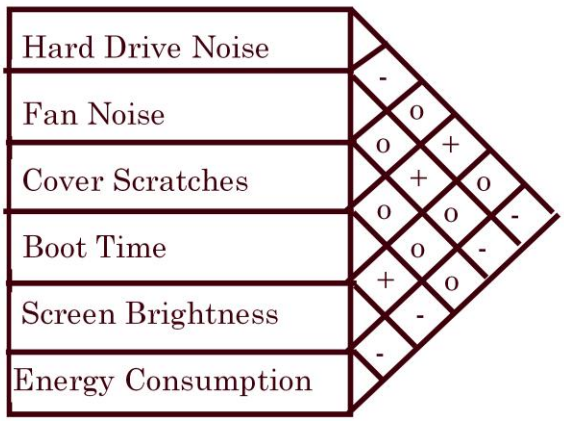
Deming's View of Systems

- A system is an interconnected complex of functionally related components that work together to try to accomplish the aim of the system.
- There is in almost any system interdependence between the components thereof.



I have added more detail on the interrelationships. And I present just a sampling of them here. It would take a whole semester to develop all of them.

Interrelated System



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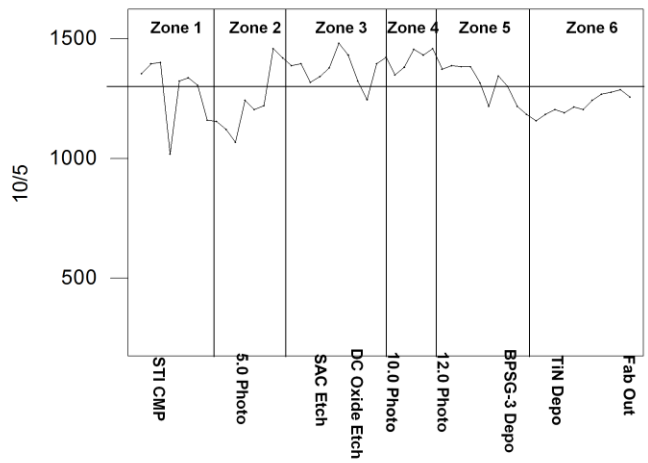
Production Flow is Interrelated



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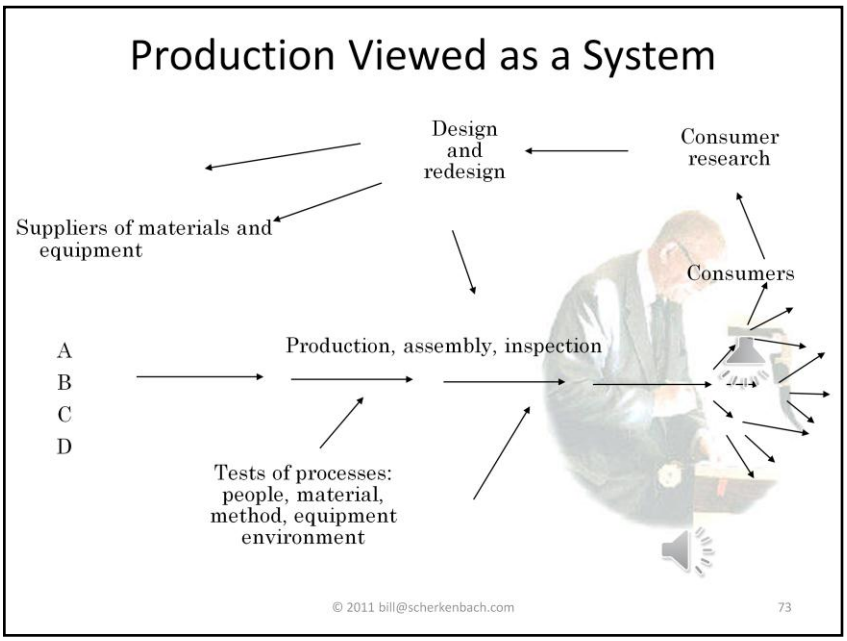

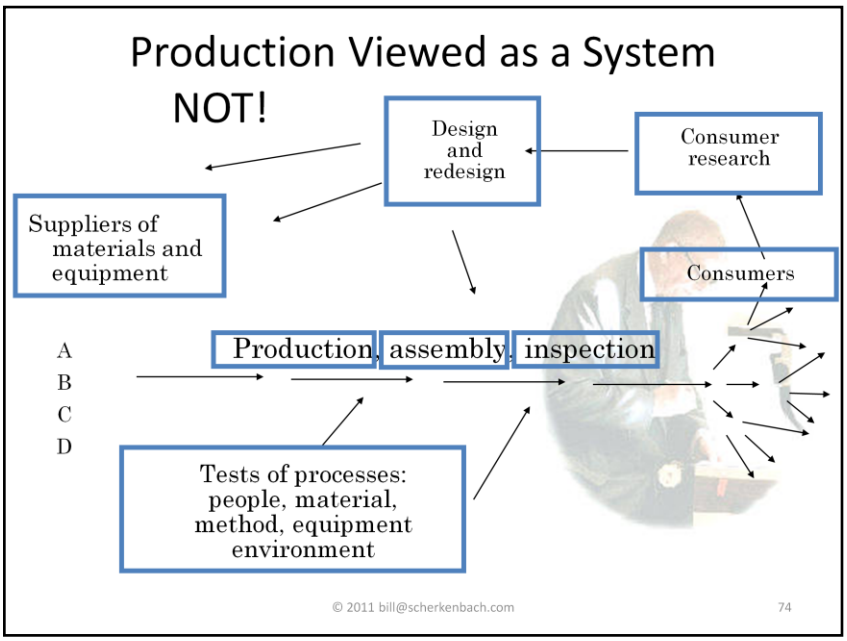

Some Examples of Sub-Optimization

- Travel Department saves money on ticket that has traveler leave home at 0030 to catch cheap flight.
- Turn out the lights in hallways to be green and save money…accident rate goes up
- Powertrain Sub-Optimization…

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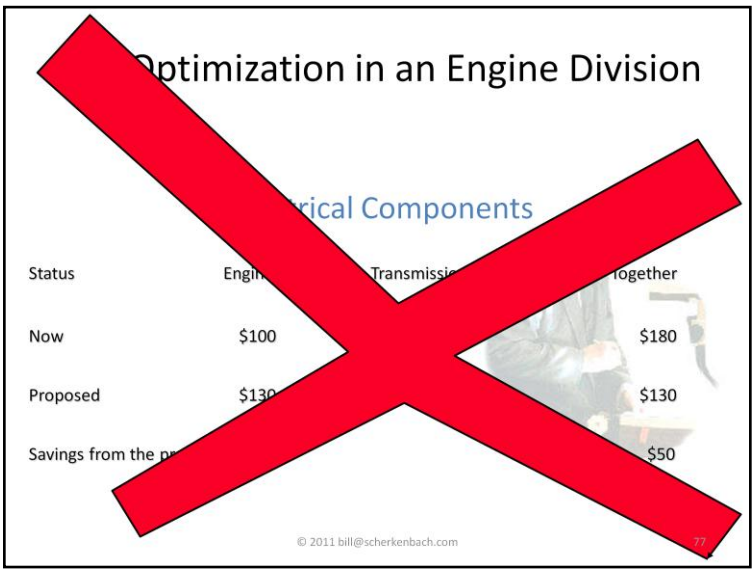
Sub-Optimization in an Engine Division

Electrical Components

Status	Engine	Transmission	Together
Now	$100	$80	$180
Proposed	$130	$0	$130
Savings from the proposal			$50



Some Examples of Optimization

- Company Cafeteria operates at a loss to keep people on site and benefit the Company.
- A great orchestra is not comprised of the best soloists. Each must blend with the others for the best orchestral performance.

Juran, Scherkenbach, Deming

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This was taken at Ford's North American Headquarters when we invited Juran to speak to management with Deming in attendance. I had to keep them apart.

Sub-Optimization?

- What are examples of sub-optimization in your organization?
- What are examples of optimization in your organization?
- Talk to your table about them.
- Pick one for the class.

Break

- Please be back in 10 minutes.

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Theory of Knowledge: Deming's View

- Management is prediction; temporal spread is required.
- Knowledge is built on theory.
- Operational definitions are essential.

Throughout history, the greatest barrier to the advancement of knowledge has not been ignorance, but the illusion of knowledge itself.

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Management is prediction: yesterday is gone, what is your prediction for tomorrow, next week, next quarter, etc.? Based on this prediction, what are the plans to act on it?
Knowledge is built on Theory. Dr. Deming's Plan, Do, Study, Act (PDSA) cycle is a learning cycle whose first step in the Plan is stating your theory.

Operational definitions are essential.

No true value of any empirical characteristic.

Management is Prediction

- Management looks through a rear-view mirror. It's the only data they have…last month's sales figures, last quarter's financials, yesterday's shipments.

- But management's job is prediction, yesterday's gone…next month's sales, next quarter's PBT, tomorrow's shipments should be the focus.

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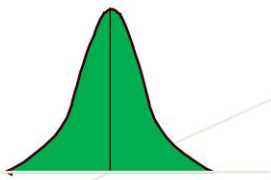
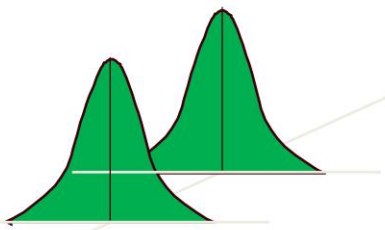
As Marshall McCluhan, the Canadian philosopher, said "Management is managing looking through the rear-view mirror."

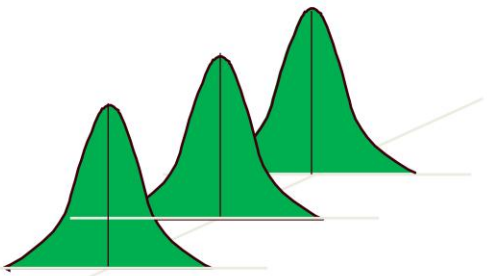
If the Voice of the Process...



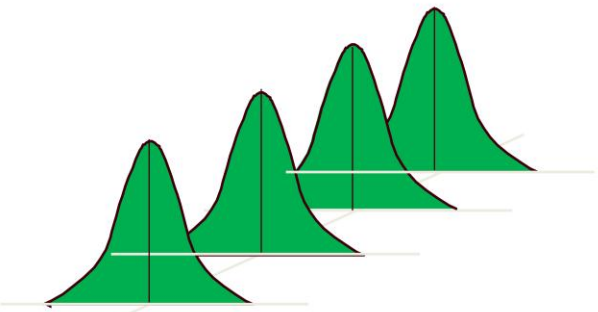
Is Stable...



Over Time,



Then it Aids Your Ability...



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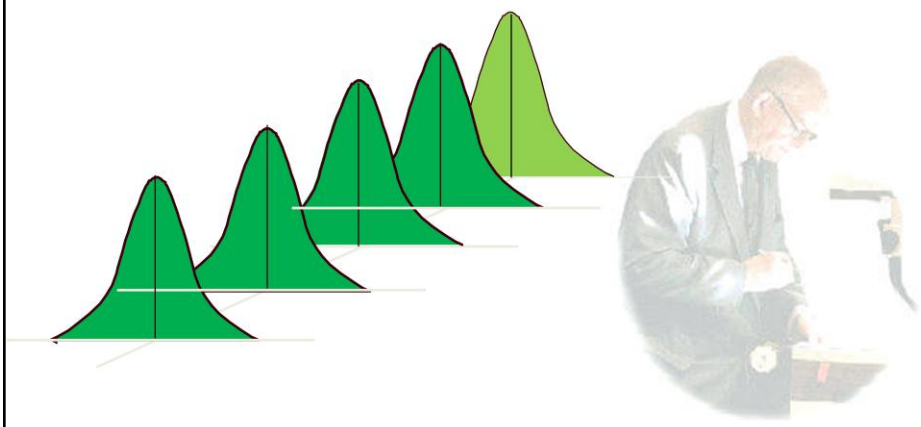
To Predict Future Outcomes



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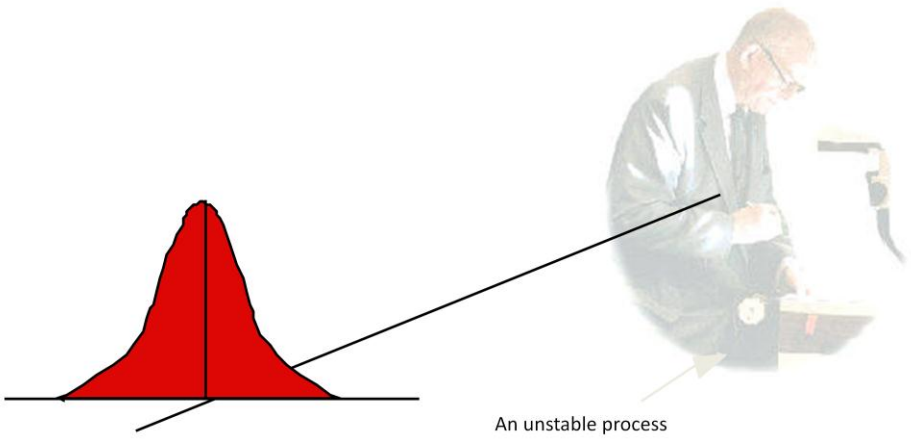
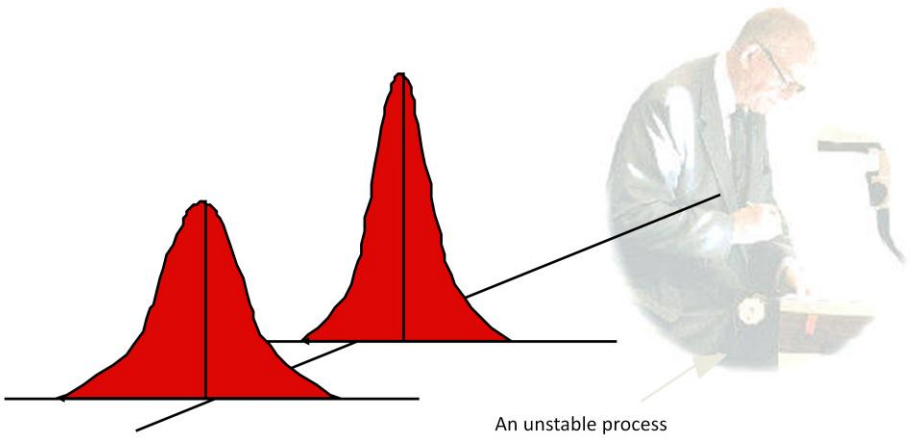
An Unstable Process...



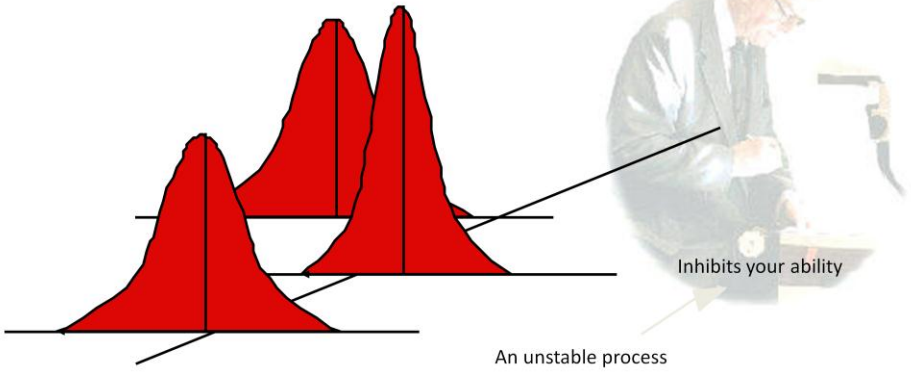
An unstable process

Inhibits

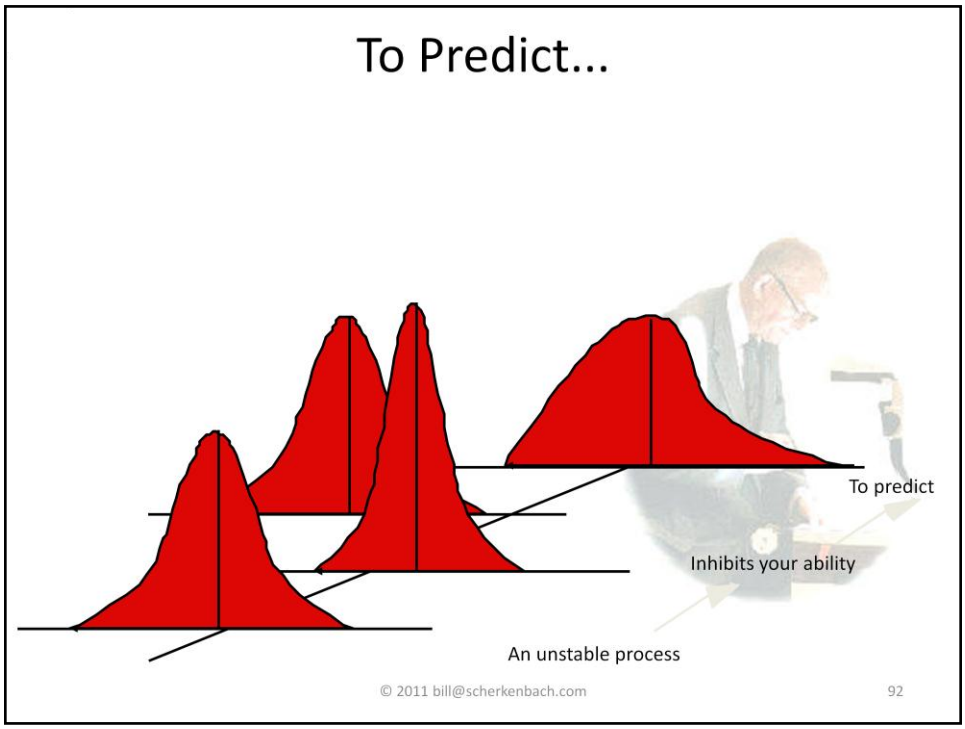


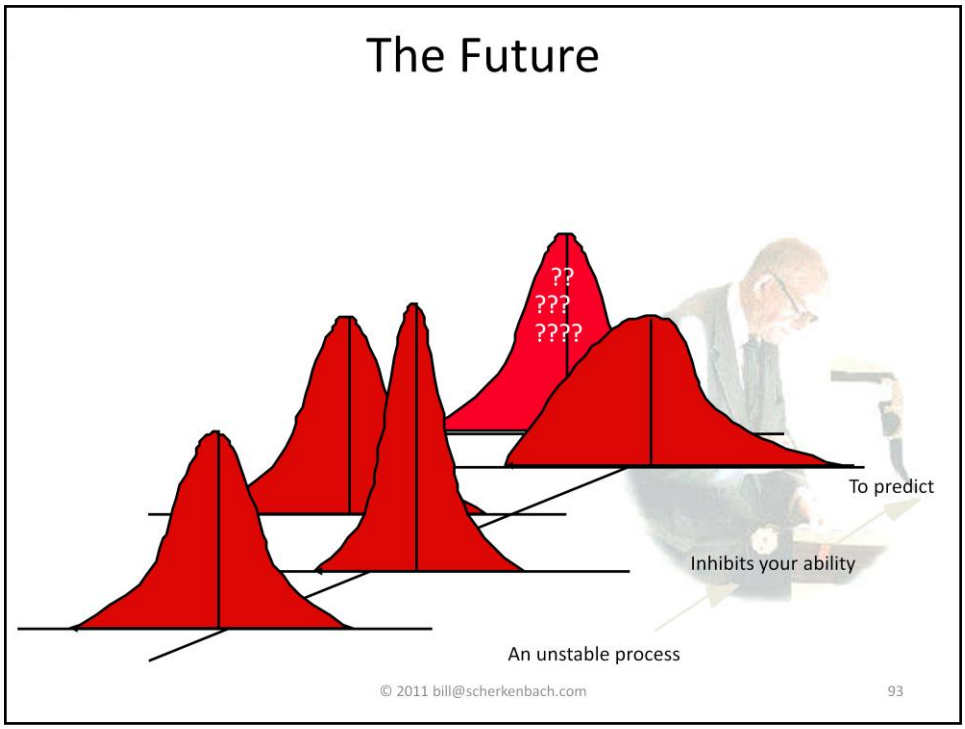
An unstable process

Your Ability...

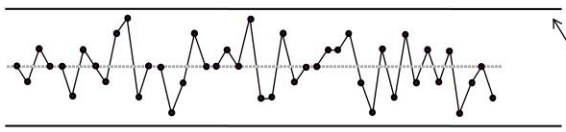


An unstable process

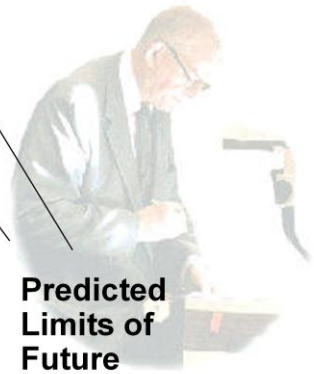




Control Charts Aid in Prediction



In control or stable



Predicted Limits of Future Variation

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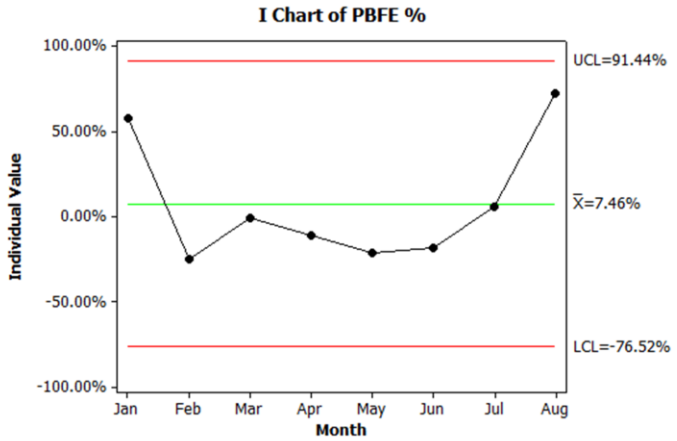
PBFE Predictably Averages 7.46%

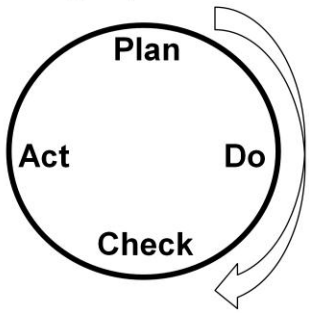


 95

Profit Before Fixed Expenses is predictable. A goal to make it higher without changing the system, would be useless.

Knowledge is Built on Theory

- PDCA: Deming Cycle



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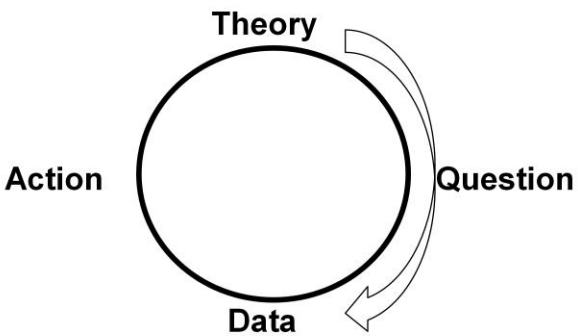
Knowledge is Built on Theory

- The Logical World Cycle starts with Theory and ends with Action



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Operational Definitions

- Term coined by PW Bridgman who won the 1946 Nobel Prize for physics.
- "What is the meaning of the law that butter for sale must be 80 per cent butterfat?
- What is the meaning of "visionary source of quality and progress towards excellence"?
- What is the meaning of "length of a moving object"?

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P W Bridgman

...it is ambiguous to talk about the "length" of a moving object until we have specified exactly how the length is to be measured; and when we have specified the exact procedure, the results we get are generally different, depending on what the exact procedure is.

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Operational Definitions: Deming

"What is the meaning of the law that butter for sale must be 80 per cent butterfat? Does it mean 80 per cent butterfat, or more, in every pound that you buy? Or does it mean 80 per cent on the average? What would you mean by 80 per cent butterfat on the average?...

Obviously, any attempt to define operationally 80 per cent butterfat runs headlong into the need for statistical techniques and criteria. Again, the words 80 per cent butterfat, by themselves have no meaning."

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Deming and Koestenbaum

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Deming spoke of C I Lewis often when discussing Theory of Knowledge. C I Lewis wrote, among other things, "Mind and the World Order". One of the questions that Deming asked Walter Shewhart was "What books influenced you?" Shewhart replied "Mind and the World Order, but it was a difficult read." Deming tried reading it, several times before it started to sink in. His recommendation was to start with Chapter 4.

Peter Koestenbaum studied under C I Lewis at Harvard. Peter was giving a section on philosophy at Ford's week-long Top Management Course which is where I met him. I immediately got Deming and Koestenbaum together for a chat which we video taped. This is one of the still pictures that I took during the session.

I still don't understand what they talked about.

Ford Gang

These are the people in my office at Ford. They all went on to lead improvement in other companies. Just as Deming said he did, I've been very privileged to work with only great people. As Deming also said, "Learn something, have fun, make a difference."

GM Crowd

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This was part of the Crowd at General Motors. I formed two groups at GM: the Gang and the Crowd. The Gang was a group of about 9 senior business unit statisticians that led the improvement efforts through their respective General Managers. The Crowd was a group of about 200 process improvement professionals that were eager to learn from Deming when he visited us each month.

Break

- Please be back in 10 minutes.

Workshop Q & A

- We have time to go deeper into some areas.
- Please write down some questions you would like answered.
- Talk to your table.
- Pick one to ask.
- Then we'll open it up.

I Have Done My Best

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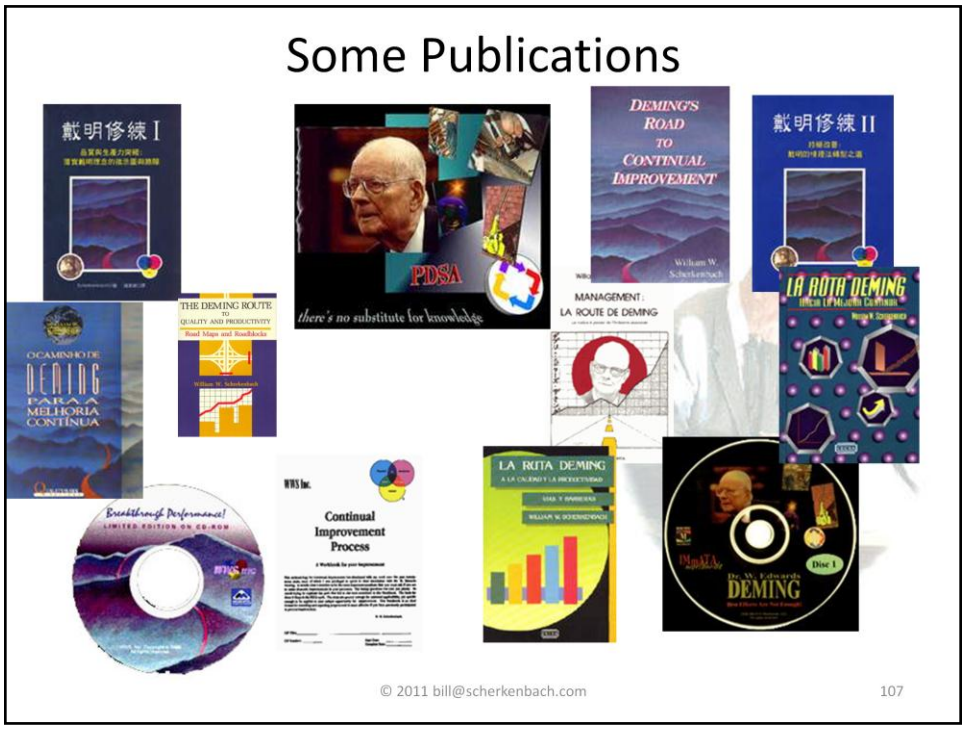

Over the years I have tried to communicate how to improve yourself and your organization. As you can see, Dr. Deming had great influence on those publications.