Curious Cat
Management Improvement Institute

Breakthrough Inquiry

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*

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Breakthrough Inquiry

"Why is it that round pizzas come in square boxes?" – Andy Rooney

Background

Back in 1984, when I was Corporate Director of Statistical Methods at Ford, Dr. Deming suggested that we put on a conference to discuss Analytical Methods for Improvement. We invited the many improvement consultants to Ford as well as General Motors. If you are familiar with the field of statistics, you will know the names George Box, Stu Hunter, Bill Hunter, John Tukey, Sir David Cox, Brian Joiner, David Chambers, Don Wheeler, Gipsie Ranney, and others. (they are not rank ordered, although even if they were, it's a nice list to be on) Those of you who knew Dr. Deming know of his work distinguishing Enumerative from Analytical Methods. For those of you who didn't know Dr. Deming, Enumerative methods are the statistics you learned in school: confidence intervals, descriptive and comparative statistics and the like. They are useful for describing and taking action on the sample. (Accepting or rejecting an outgoing lot of goods; approving a financial audit;) ANOVA, t-tests, chi-square are tools you use for Enumerative problems.

Analytical methods, on the other hand, are focused on taking action on the system that created the goods or the audit. Control charts developed by

Shewhart, graphical methods developed by Tukey and looking at data over time by Box are the tools you use for Analytical problems.

What's the point? They answer two different questions. Enumerative methods are used to answer "How can I characterize this sample so that I can take appropriate action on it?" The assumption (theory) of all enumerative methods is that the sample data come from the same unchanging universe.

Analytical methods answer the question "How can I characterize the system that produces what I am sampling so that I can take appropriate action on the system?" The assumption (theory) of analytical methods is that the sample data might come from changing and multiple universes. The only reason you are collecting data is to take action… appropriate action.

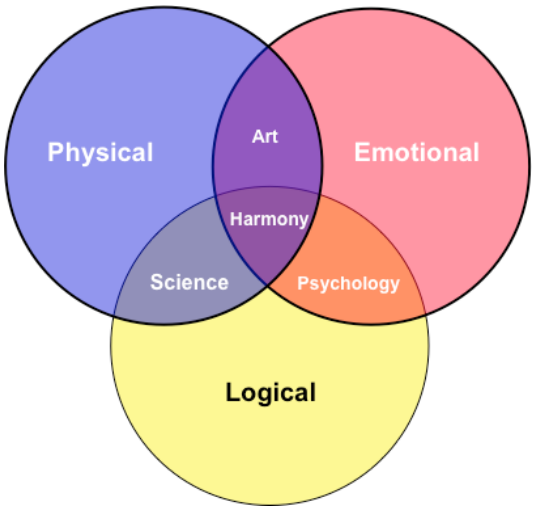
Physical Logical Emotional

A number of years ago I developed an application to Dr. Deming's philosophy that applied to individual improvement. It is based on my work on helping organizations change for the better. Operationalizing what I learned from Dr. Deming.

A number of you are familiar with this Venn Diagram that reflects that change is not hierarchical. It is the result of my research of many disciplines and cultures as

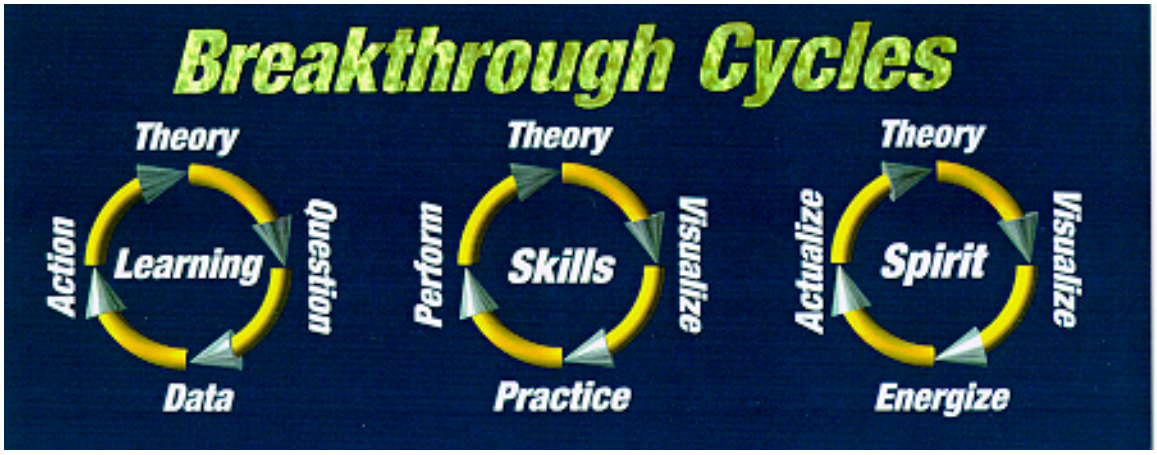
well as the major neural structure in the human brain. They use different names, but the main concepts are the same: Hand, Head, Heart; Position, Knowledge, Charisma; Brains, Brawn, Beauty; Plato's Appetite, Reason, Spirit; Meng Tse's Acts, Knowledge, Will; Jung's Sensing, Thinking, Feeling; Physical, Logical, Emotional.

Science is the logical explanation of physical phenomena. Art is the Emotional reaction to sensory input. While Psychology is simply the root of the word: logic of the soul. The center is non-additive. Eastern philosophies call it Harmony and Western cultures Peak Experiences.



It occurred to me that one might be able to improve their physical skills, emotional spirit, and logical knowledge by some process similar to the Deming

Cycle: Plan, Do, Study, Act. So, after talking to olympic atheletes, charismatic speakers, and some great minds, I came up with these three "Breakthrough Cycles" that all start with Theory and end in Action.



Theory starts the Spirit Cycle. Many times your spirit or attitude in a particular situation is what gets you through it. The theory may be that a calm head will be best in this situation. It may be that an alert and caring attitude will be the best. Given the theory, we try to visualize that spirit of a successful role model in this situation or how we ourselves handled it previously. We then may take a cleansing breath to Energize the parasympathetic systems that calm you down or maybe take frequent shallow breaths to energize the sympathetic systems that make you more alert. You are then ready to Actualize the emotion or attitude.

And completing the cycle, the spirit that you actualize is compared to the theory and the cycle continues over and over again. Each time recording where you are so that the accumulated patterns over time and space can help you improve your spirit even more. The more you cycle through, the more it will be second nature to you.

Theory starts the Skill cycle too. Every skill has a Theory behind it. A theory might be "If you keep your eye on the ball, you will have a better chance of hitting it." The next step is to Visualize how you, yourself are performing the theory. You are on the 18th green. You have a 12 foot put to win the match. You address the ball, keep your eye on the ball, and clink, plunk. Then you do your Chi Chi Rodriguez sword dance and head for the club house. Next you must Practice what you visualize over and over again. And following practice is your Performance. And completing the cycle the performance is compared to the theory and the cycle continues over and over and over again. Each time through the cycle, record where you are so that the accumulated patterns over time and space can help you improve your skills even more.

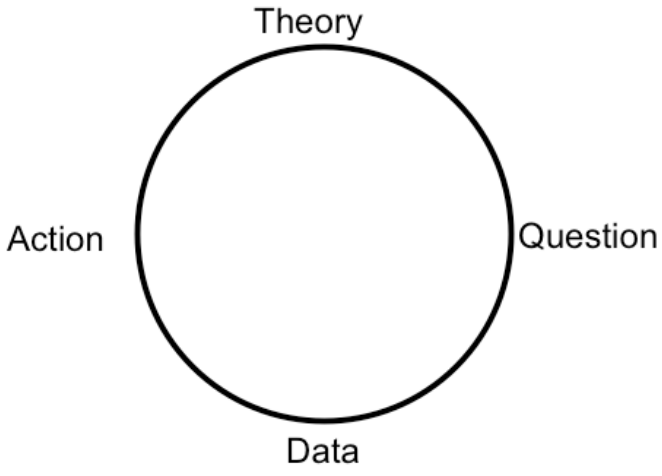
Improvement in the Logical world is driven by what I call the learning cycle. It starts with Theory. An example of a theory is "If I toss this ball in the air, it will

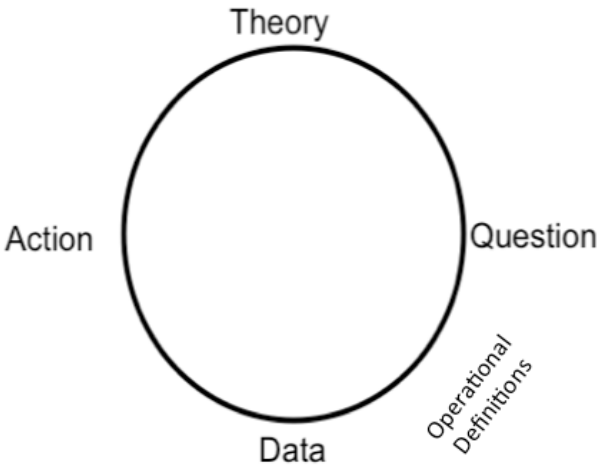
rise and then it will fall." Given Theory and only given Theory can you ask a Question. "How fast will it fall? Will it fall if I tossed it in Knoxville?" Given a Question, you can come up with the Data for an answer. "It will fall too fast." "Yes, but not on Toole Avenue." The only reason you should be collecting data is to take Action. The action I want to take is to toss three balls in the air so that I can become an accountant. And completing the cycle the action is compared to the theory and the cycle continues over and over and over again. Each time recording where you are so that the accumulated patterns over time and space can help you improve your knowledge even more.

Where do questions come from?

"What if there were no hypothetical questions?" – George Carlin

Theory <> Question <> Data <> Action





The only reason to collect data...is to take ACTION! DATA in business exists because someone somewhere asked a QUESTION. “Did we ship our production quota yesterday?” “Is OPEX on target today?” “Were there any customer returns last shipment?” “Will you make this quarter’s budget?” “Yada, yada, yada?”

Some questions are better than others because they are based on more useful THEORY to the situation. Whether you realize it or not, every question is preceded by a THEORY or point of view: (If this, then that.) “If I make my quota, then I will not need help from corporate.” “If there are few customer returns, then they will continue to buy from me.” “If Yada, then Yada.”

Every learning or improvement or problem-solving cycle has the equivalent of these four steps. They use different words for these steps to appeal to different

constituencies or egos: PDCA, DMAIC, TQDA, PDSA, etc. but conceptually they are all the same.

Improvement works counter-clockwise in these cycles: If you want to improve your ACTIONs, you must get better DATA. If you want better data, you must ask better QUESTIONS. If you want better questions, you must embrace better THEORY.

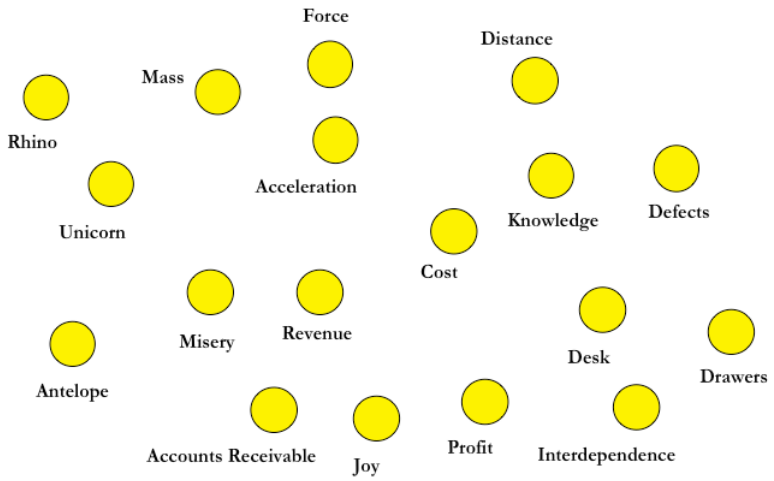
Better THEORY requires you to “see” more.

Expand your concepts

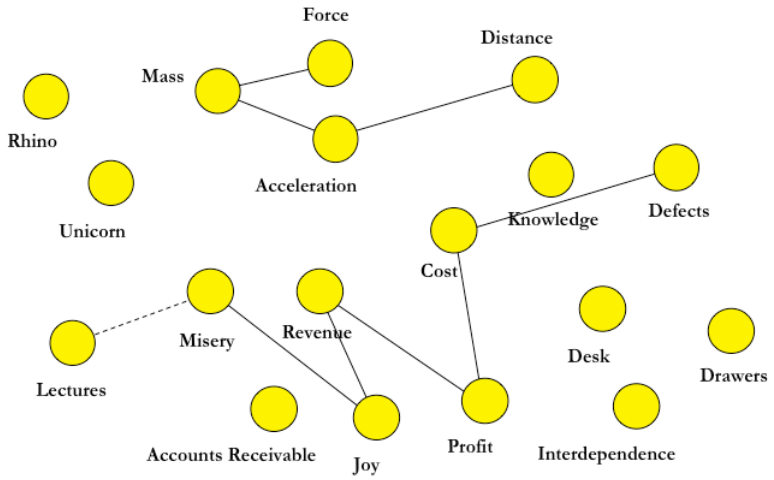
Every place that Deming went, the management didn’t think they had any problems. Deming saw opportunities because he was looking through a different theory and was able to ask questions the management could not imagine. How could they know? How can you know? For one, you can ask better questions through better Theory by first expanding on the number of concepts that you hold.

There are billions of neurons and millions of billions of synapses or connections of neurons in your brain. These paths of connected neurons from the concepts that we hold in our minds. Concepts are of your mind and they do not have to have any contact with your physical world. You may have the concept of a desk, or

mass, force, and acceleration which do make contact with your physical world. You may also have the concept of a Unicorn or Puff the Magic Dragon which do not make contact with your or even my physical world.



Theory is a connection of concepts. The concepts of Mass and Force and Acceleration had been around for ages. It took Newton to connect them F=ma and begin to ask questions to quantify and predict.



Some businesses have a theory that Profit, Revenue, and Cost are related. If you are a government contractor, Cost + Profit = Revenue; while other businesses use the model Profit = Revenue – Cost. Still others have linked Joy in Work to Revenue…Joy is linked to Misery…and to my lectures. A Theory of Management!

There are very predictably 3 approaches to increasing your concepts...Physical, Logical, and Emotional.

- Increase your physical sensory awareness, and you will see, hear, feel, smell, and taste your way to more concepts.
- Brush up on the rules of logic and its fallacies and you will reason your way to more concepts.
- Empathize with how others feel and use creative methods and you will imagine your way to more concepts.

I will explain these approaches one at a time.

First, physical sensory awareness:

Focus on describing things using one sense at a time. For instance: Describe the chair you are sitting on using only your sense of vision, then only your sense of taste, then only your sense of hearing, then only your sense of smell, then only your sense of touch.

Sight - Color, focus, motion: Focus can be improved by spectacles. Color maybe improved by filters but mostly you're stuck with what you were dealt (colorblindness, etc.) Motion can be best detected using peripheral vision. Painters (artists) learn how to see the lines, disassociated from the object and move the hand with the pen, brush, pencil, or chisel as the eye moves across the lines of the object. Look carefully at another person's face for 5 minutes. (I know that is an eternity.) What do you see? Take a class in photography or drawing. Read Sherlock Holmes stories, it's elementary. You might watch a scary movie or read an action-thriller book. Just do something that makes you hair stand on end.

Touch – largest sense organ of the body: Most of the input is dulled, that is, put in background because it would overwhelm you. i.e. sitting – most of the input is censored out so that you can concentrate on stuff other than the millions of nerves in your butt. If you want to improve your sense of touch, blindfold yourself and try to identify various objects. Attend a class that teaches Braille. Wash the dishes twice a day to soften and sensitize your fingers. Try to identify objects and then draw objects hidden from view but touchable. Pretend that you will lose your sight. How will you get around the room? Where are the obstacles?

Taste – Four taste buds: Sour, Sweet, Salt, Bitter: Don't overwhelm your taste buds. For some of us it may be too late. Do you remember the taste of pabulum? What are your favorite foods? Why are they your favorite? What memories to they conjure up when you taste them? Eat salmon or drink ginseng tea to heighten your senses.

Hearing – Hearing aids boost selective frequencies. I lost my hearing in my right ear on the gunline in Viet Nam. All I hear are high frequencies ringing in that ear. I have learned to read lips and smile a lot. People can distinguish the different sounds of people walking down the corridor. Airline pilots can distinguish troubles in the equipment by their sounds. What are your favorite sounds?

Smell – Lots of olfactory sensors, major interaction with taste. If you have a stuffed nose, you really can tell the absence of the interaction with taste because a lot of foods "taste" bland without the olfactory sense. It helps memory. Associate a particular smell with an event and you will better imprint it in your memory. I have not found a Naval Academy graduate that doesn't remember the smell of Bancroft Hall in the summer. I love to smell wine. I was struck by a comment made by the philosopher Charles Sanders Pierce, that a man who is able to discern the amount of attar of roses in wine is a man worth making an

acquaintance. What smells do you prefer? What Perfumes or colognes? Do you recall your first smell? How has smell helped you do a better job? Can you associate smells with events in your life? Take a whiff of L'air du Temps or some other pheromone. Sure does it for me.

The simple and easy act of walking will freshen your senses.

Second, you can use the rules of Logic to increase the number of Concepts and Theories. I am going to use some Latin here for some important logical fallacies that you should avoid and what is more fun, be able to catch others in the act. Fallacies are really physical or emotional tricks that logicians say are out-of-bounds in a good logical argument.

- Ad bacullum is a physical appeal to authority. Because Aristotle said so. Because the boss says so.
- Ad hominem is an emotional trick of name calling.
- Ad populum is a physical trick of going with the crowd.
- Ad misericordiam is an emotional trick appealing to self-pity.
- Ad ignorantiam is actually a logical trick that plays on absence of evidence is not evidence of absence.

- Ad verecundium is the ultimate physical ruse. Not only is it an appeal to authority, it is an appeal to an irrelevant authority. Nothing like movie stars testifying before the US Congress on anything under the sun.

Third, you can use creativity to increase the number of concepts. There are many versions of how to harness creativity. Whether it is Michalko or DeBono or Von Oech or Da Vinci or Einstein or others, they all boil down to three approaches: Maximize, Randomize, Minimize. Maximize the number of underlying concepts. Maximize the importance or size of a particular concept. Assume a concept is the only one. Assume that you can take all the time in the world.

Randomize the connections between concepts. Mix them up, flip them, rotate them, turn them inside-out.

Minimize the importance or size of a particular concept. Assume the concept reduces to nothing. Assume instantaneous results.

Some questions that I recommend

Deming's favorite question: How do you know?

What are you going to do with the answer?

What is your Theory behind the question?

What process did you use to come up with these data?

What is the Operational Definition?

What are great minds thinking?

Red Poling's favorite question: What are the tradeoffs?

What is the variation over time?

What gives you joy in work?

Is this point the result of a special or common cause?

Some questions that I don't recommend

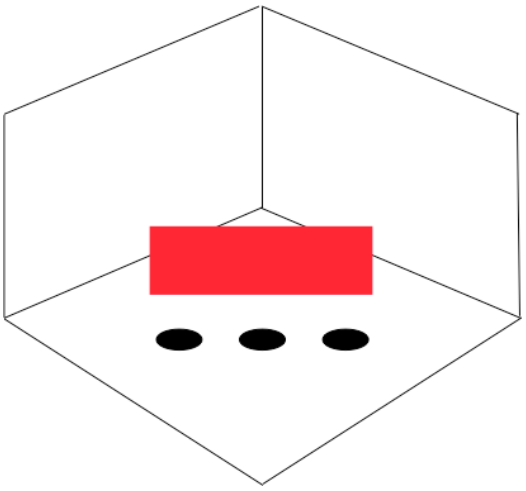
"Who did it?"

"Why can't we?" instead ask "How might we?" - Bakken

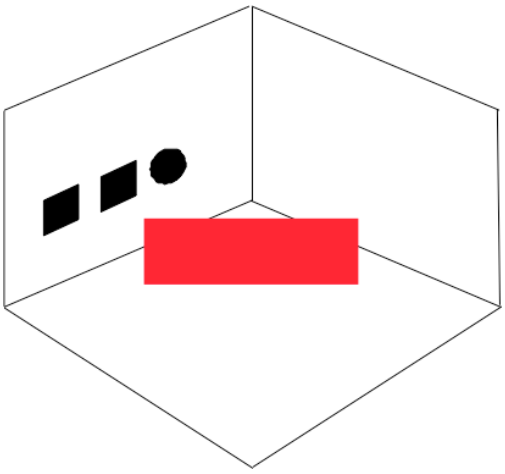
What questions do you find useful?

Out of all the questions that you ask, name one that you have found useful. What is the theory behind it? Tell the person next to you. Get their feedback.

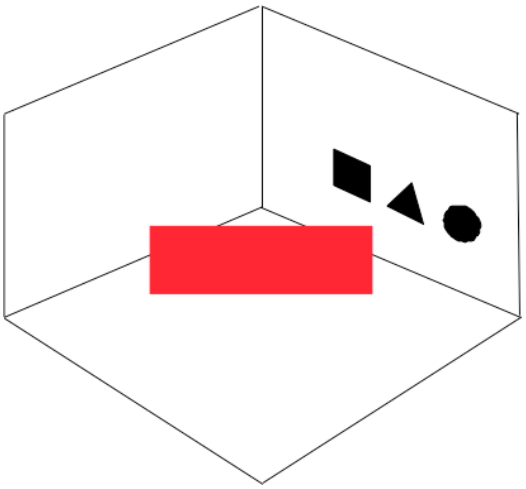
Each speaker in this Conference…



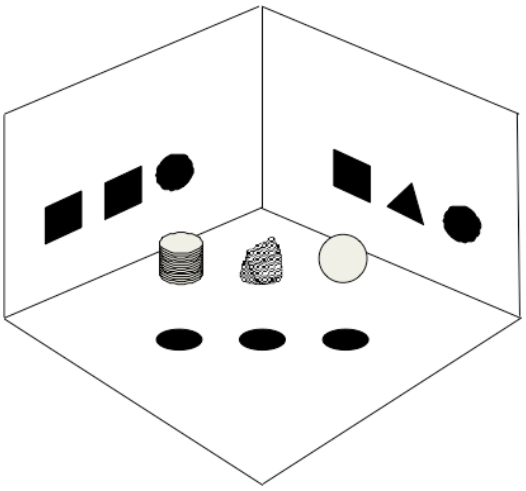
…Offers a perspective on Inquiry.



Learn something from everyone here.



None of us has the whole picture.



Empirical Knowledge is never complete.

Why were we here?

You should have a set of superordinate questions at the same level you have Vision, Mission, and Values statements. They don't have to be answered right

away, but should be in the background of everyone's mind as they do their daily work.

Ask the same question to different people to get different perspectives.

Ask a different question to the same person to get different perspectives.

Operational Definitions "What means 50% wool?"

Questions are more important than the answers

- Who should be on the Improvement Team? Even if the process boundaries are within your organization, you should consider including some customers and suppliers on the team.
- Do you have experts outside of the subject area on the team? If you want a better chance for a Breakthrough improvement, make sure that an outsider is on the team.
- Who will be the senior sponsor or champion for the team? This is very important for getting resources and synergy as well as avoiding interference with other projects.
- What will get delayed so that the team may meet? Its' a zero sum game with time. If the team is meeting, other things are not going to get done. Make it visible.

- What is the budget in financial terms? Do you consider the people cost sunk? Not necessarily. The important thing here is for consistent operational definitions of all criteria to avoid the hiding the pea.

- What are the projected savings? In time, money, people, or whatever measures your Constancy of Purpose Statement considers superordinate.

- Will the team make the decision or a recommendation or what? This is very important for future improvement. Many teams do not try again if there is a Gap between what they expected the rules to be and what they got.

- Is there a no-fault policy in effect? Numerous teams have not made all of the improvement that they could because they did not want to be blamed for the current state.

- Is there a sense of urgency? If not, create one.

- What arrangements must be made to keep the team together for the duration? Nothing slows the team down or adversely impacts the quality of the improvement as losing a team member and having to bring another up to speed. Make the arrangement up front.

- What is your prediction of how much the Gap will be reduced? This sets the stage for comparing how many resources are needed and how many will be saved.

- What are the boundaries in space and time? You don't want to have a project team answering the question "Why is there air?" too many times. Who do you include? What is the timeframe?

- What are the short-term countermeasures that protect the customer but don't interfere with the long-term improvement efforts? You must be careful here because many countermeasures do interfere with the data that you collect to determine long-term improvements.

Aristotle's Rhetoric: compare and contrast

Ask questions that require continuous data, not attribute data.

'sup?

Koestenbaum, CI Lewis, CS Peirce

Timing of the question, cadence, delay

Body language

Do you have the knowledge to ask the question?

Business is less forgiving than research. In research if you are stumped, you just cut the problem out, assume it is not there, and procede. In business you have to make a decision and live with the consequences. – Deming

Greek word historie knowing by inquiry

Logic training

Emotional – dreaming Einstein

Better THEORY includes asking for variables data over time.

Constancy of Purpose … Continual Improvement

Management is prediction

Empirical under test, under questioning