



lean

software development

A History of Process

Detailed Command vs. Mission Command

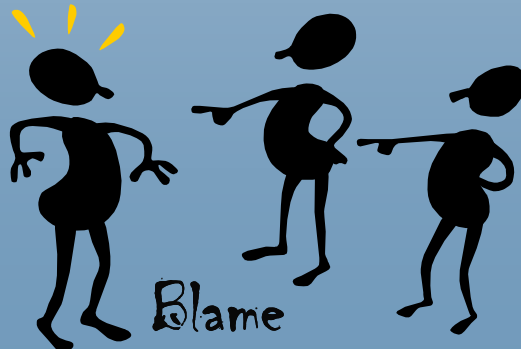
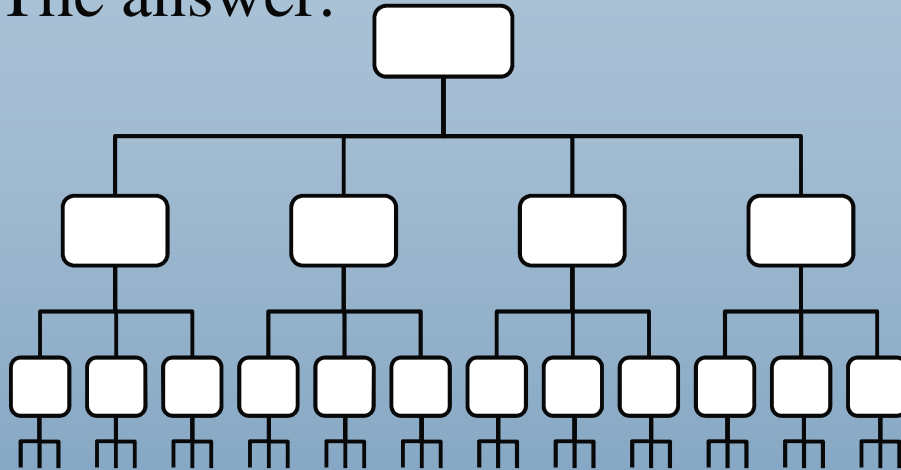


1850's Train Wreck Management

October 5, 1841 – First serious train wreck in the US.

Question: How to run a large, dispersed organization?

The answer:



*Six Principles of Administration:**

1. Proper division of responsibilities
2. Sufficient power conferred to enable same to be fully carried out
3. The means of knowing whether such responsibilities are faithfully executed
4. Great promptness in reporting all derelictions of duties
5. Information obtained through a system of daily reports and checks
6. Adoption of a system to enable the General Superintendent to detect errors immediately and point out the delinquent

**The Leader's Handbook* by Peter Scholtes, quoting *The Visible Hand: The Managerial Revolution in American Business* by Alfred D. Chandler, (1977)



1880's *Command Intent*

Helmut von Moltke, Chief of the General Staff
Prussian Army, 1857 – 1888 (30 years)

“No plan of operations extends with any degree of certainty
beyond the first encounter with the main enemy force.”

Auftragstaktik (literally, “mission tactics”)

Delegation of decision-making authority to
subordinate commanders within the context of
the higher commander's intent.

The heart of mission command:

*“The advantage which a commander thinks he can attain through
continued personal intervention is largely illusory. By engaging
in it he assumes a task that really belongs to others, whose
effectiveness he thus destroys. He also multiplies his own tasks
to a point where he can no longer fulfill the whole of them.”*



Helmut von Moltke
1800 - 1891

**Mission Command: Command
and Control of Army Forces**
Field Manual No. 6-0
Department of the Army
Washington, DC, 11 August 2003



1910's

The One Best Way

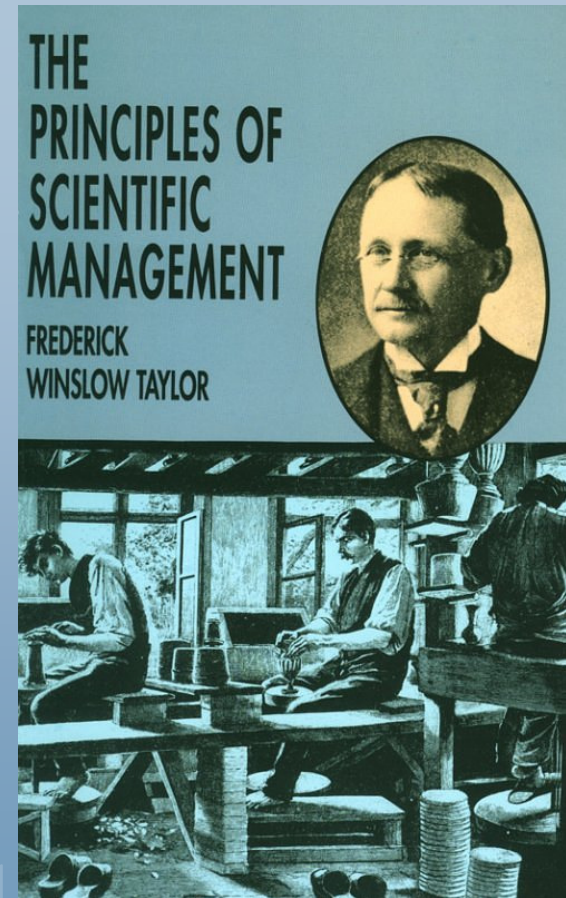
Frederick Winslow Taylor

Assumptions:

- ✓ Workers will do as little as possible
- ✓ Workers do not care about quality
- ✓ Workers are not smart enough to know the best way to do their job

Taylor's View of Efficiency:

- ✓ Efficiency comes from “knowing exactly what you want men to do and then seeing that they do it in the best and cheapest way.”
- ✓ Expert defines the best way through breaking down the job into parts and finding the best way to do each part
- ✓ Pay workers extra for following the method determined by the experts



See: *The One Best Way: Frederick Winslow Taylor and the Enigma of Efficiency*, Robert Kanigel, 1999



1920's Industrial Training

Charles R. Allen – New Bedford, Massachusetts

- ✓ On-the job training
- ✓ By a master at the job
 - ✗ Second class trainers produce second class learners
 - ✗ Experts know how to do the job
 - ❖ But they need training in how to train
- ✓ Four Step Method
 - ✗ Preparation, Presentation, Application, Testing

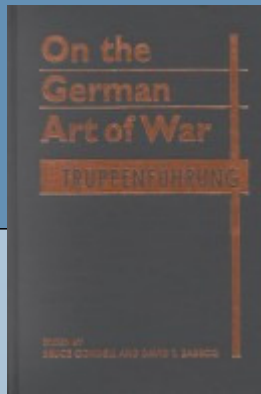


1917 – War Ships were needed

- ✓ Allen: Training for shipbuilders
 - ✗ 1,000 supervisors trained how to train
 - ✗ 88,000 shipbuilders trained
- ✓ Wrote “*The Instructor, the Man and the Job*”

**THE INSTRUCTOR
THE MAN AND THE JOB**
A HAND BOOK FOR INSTRUCTORS
OF INDUSTRIAL AND VOCATIONAL
SUBJECTS

BY
CHARLES R. ALLEN
SOMETIME AGENT FOR INDUSTRIAL TRAINING OF BOYS AND MEN, MASSA-
CHUSETTS BOARD OF EDUCATION, AND SUPERINTENDENT OF INSTRUCTOR
TRAINING, U. S. S. B. EMERGENCY FLEET CORPORATION



1930's *Unit Command*

Truppenführung (“*Unit Command*”) German Army field manual, 1933/1934

Section 4: Lessons in the art of war cannot be exhaustively compiled in the form of regulations. The *principles must be applied in accordance with the situation*. Simple actions, logically carried, out will lead most surely to the objective.

Section 6: The command of an army and its subordinate units requires *leaders capable of judgment, with clear vision and foresight, and the ability to make independent and decisive decisions*.

Section 7: *An officer is in every sense a teacher and a leader.*

Section 10: The decisive factor, despite technology and weaponry, is the value of the individual soldier. The battlefield requires *soldiers who can think and act independently*, who can make calculated, decisive and daring use of every situation and who understand that victory depends on each individual.



1940's Wartime Production

Wartime Production

✓ Training within Industry (TWI)

✗ Train first line supervisors

- ❖ Job Instruction – how to train workers
- ❖ Job Methods – how to improve the way work is done
- ❖ Job Relations – how to treat workers with respect



✓ Statistical Process Control (SPC)

✗ W. Edwards Deming

- ❖ Taught defense contractor engineers & technicians
- ❖ Over 30,000 trained

✗ Widely used in defense production



TWI & SPC were ignored by manufacturers after 1945.

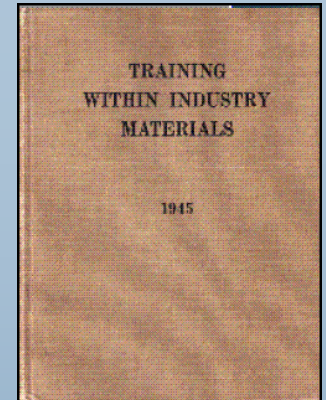


1950's

TWI & SPC move to Japan

TWI was introduced to Japan in 1947-48. Toyota adopted Job Instruction (JI) in 1951, Methods (JM) 1952, Job Relations (JR) in 1953. JI widely used to this day.

JM did not drive deep enough into Kaizen and the elimination of waste strong enough to suit Taiichi Ohno, so he had Shigeo Shingo to replace it with a course on industrial engineering and productivity.



W. Edwards Deming System of Profound Knowledge

- ✓ *Appreciation for the system*
- ✓ *Knowledge of Variation.*
- ✓ *Theory of Knowledge*
- ✓ *Psychology*



Prof. W. Edwards Deming



1960's *Toyota Production System*

Taiichi Ohno

- ✓ Just-in-Time Flow
 - ✗ Eliminate Waste
- ✓ Stop-the-Line Culture
 - ✗ Mistake-Proof the System
- ✓ Relentless Improvement
 - ✗ Learn Through Experimentation



Taiichi Ohno
(1912-1990)

✓ Books:

The Toyota Production System, 1978 (1988)

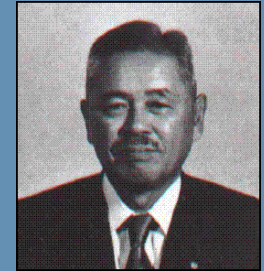
Workplace Management, 1982 (2007)





Taiichi Ohno

Standard Work



There is something called standard work, but standards should be changed constantly. Instead, if you think of the standard as the best you can do, it's all over. The standard work is only a baseline for doing further kaizen. It is kai-aku [change for the worse] if things get worse than now, and it is kaizen [change for the better] if things get better than now. Standards are set arbitrarily by humans, so how can they not change?

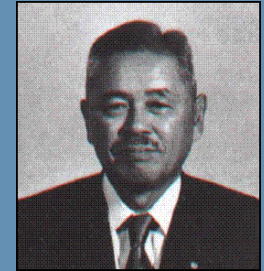
You should not create these away from the job. See what is happening on the gemba and write it down.

From *Workplace Management*, by Taiichi Ohno, originally published in 1982, from translation by Jon Miller, Gemba Press, 2007.



Taiichi Ohno

Motivation



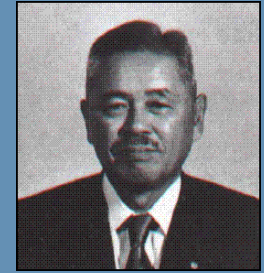
When creating Standard Work, it will be difficult to establish a standard if you are trying to achieve ‘the best way.’ This is a big mistake. Document exactly what you are doing now. If you make it better than it is now, it is kaizen. If not, and you establish the best possible way, the motivation for kaizen will be gone.

That is why one way of motivating people to do kaizen is to create a poor standard. But don’t make it too bad. Without some standard, you can’t say ‘We made it better’ because there is nothing to compare it to, so you must create a standard for comparison. Take that standard, and if the work is not easy to perform, give many suggestions and do kaizen.

From *Workplace Management*, by Taiichi Ohno, originally published in 1982, from translation by Jon Miller, Gemba Press, 2007.



Taiichi Ohno Ownership



We need to use the words ‘you made’ as in ‘follow the decisions you made.’ When we say ‘they were made’ people feel like it was forced upon them. When a decision is made, we need to ask who made the decision. Since you also have the authority to decide, if you decide, you must at least follow your decision, and then this will not be forced upon you at all.

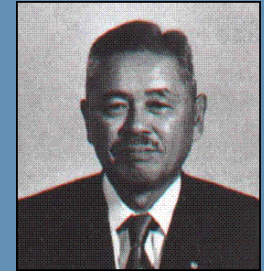
But in the beginning, you must perform the Standard Work, and as you do, you should find things you don't like, and you will think of one kaizen idea after another. Then you should implement these ideas right away, and make this the new standard.

From *Workplace Management*, by Taiichi Ohno, originally published in 1982, from translation by Jon Miller, Gemba Press, 2007.



Taiichi Ohno

Changing Standards



Years ago, I made them hang the standard work documents on the shop floor. After a year I said to a team leader, ‘The color of the paper has changed, which means you have been doing it the same way, so you have been a salary thief for the last year.’ I said ‘What do you come to work to do each day? If you are observing every day you ought to be finding things you don't like, and rewriting the standard immediately. Even if the document hanging there is from last month, this is wrong.’

At Toyota in the beginning we had the team leaders write down the dates on the standard work sheets when they hung them. This gave me a good reason to scold the team leaders, saying ‘Have you been goofing off all month?’ If it takes one or two months to create these documents, this is nonsense.



1970's Theory X – Theory Z

Theory X

1. Most people dislike work and don't give their best efforts at their job.
2. Therefore people must be encouraged with financial incentives or threats to work towards organizational objectives.
3. Generally people would rather avoid responsibility and prefer to be directed.

Theory Z

People are motivated by:

1. The satisfaction of a job well done
2. The enjoyment of cooperating with others and being recognized by them
3. The satisfaction of using one's abilities to the fullest

Theory X : Douglas McGregor
Theory Z: Dr. William Ouchi

Kaoru Ishikawa

The fundamental principle of successful management is to allow subordinates to make full use of their ability.



Everyone who is connected with the company ... must be able feel comfortable and happy with the company, and to make use of his capabilities and realize his potential.

Top managers and middle managers must be bold enough to delegate as much authority as possible. That is the way to establish respect for humanity as your management philosophy.

Mission Command
vs.
Detailed Command
A Comparison

Mission Command: Command and Control of Army Forces
 Field Manual No. 6-0
 Department of the Army
 Washington, DC, 11 August 2003



<ul style="list-style-type: none"> • Probabilistic • Unpredictable 	Assumes war is	<ul style="list-style-type: none"> • Deterministic • Predictable
<ul style="list-style-type: none"> • Disorder • Uncertainty 	Accepts	<ul style="list-style-type: none"> • Order • Certainty
<ul style="list-style-type: none"> • Decentralization • Spontaneity • Informality • Loose rein • Self-discipline • Initiative • Cooperation • Acceptable decisions faster • Ability all echelons • Higher tempo 	Tends to lead to	<ul style="list-style-type: none"> • Centralization • Coercion • Formality • Tight rein • Imposed discipline • Obedience • Compliance • Optimal decisions, but later • Ability focused at the top
<ul style="list-style-type: none"> • Implicit • Vertical and horizontal • Interactive 	Communication types used	<ul style="list-style-type: none"> • Explicit • Vertical • Linear
<ul style="list-style-type: none"> • Organic • Ad hoc 	Organization types fostered	<ul style="list-style-type: none"> • Hierarchic • Bureaucratic
<ul style="list-style-type: none"> • Delegating • Transformational 	Leadership styles encouraged	<ul style="list-style-type: none"> • Directing • Transactional
<ul style="list-style-type: none"> • Art of war • Conduct of operations 	Appropriate to	<ul style="list-style-type: none"> • Science of war • Technical/procedural tasks

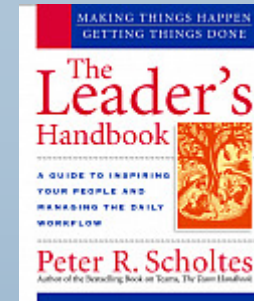


1980's Total Quality Management

1987: ISO 9000 – The Generic Quality Standard

What's Wrong with ISO 9000?

- ✓ ISO 9000 does not make sure you are doing the right thing, only that you are doing things consistently.
- ✓ Certification is expensive and bureaucratic.
- ✓ Constant improvement of processes may be discouraged because it might require recertification.
- ✓ ISO displaces internal motivation to do good work with external motivation to pass the inspection.



From The Leader's Handbook
by Peter R. Scholtes, 1998

ISO 9000 certification fits the mental model of Direct Command:

- | | |
|------------------|--------------------------------|
| × Deterministic | × Imposed discipline |
| × Predictable | × Obedience |
| × Order | × Compliance |
| × Certainty | × Optimal decisions, but later |
| × Centralization | × Ability focused at the top |
| × Coercion | × Explicit Communication |
| × Formality | × Hierarchic |
| × Tight rein | × Bureaucratic |

Discipline is essential.
Learning is fundamental.
Documentation is incidental.





1990's CMM & CMMI

Point:

- ✓ Disciplined organizations do a better job.
- ✓ CMM and CMMI present a good set of process areas to consider.

Counter Point:

- ✓ Kaizen (Relentless Improvement) is the 1st – not the 4th – step.
 - ✗ The purpose of standards is to provide a baseline for change.
- ✓ Building-Quality-In is not optional.
 - ✗ Finding defects during final verification indicates a defective process.
- ✓ You *can* have it all: high speed, high quality, and low cost.
 - ✗ The maturity of an organization is measured by the speed at which it reliably and repeatedly executes its core processes.
- ✓ Using feedback to discover value is better than following a plan.
 - ✗ Plans are made when we are the most ignorant.
- ✓ KLOC's and Function Points are a measure of complexity.
 - ✗ The fewer lines of code and function points, the better.

**L
E
A
N**

- ✓ Assessment has the same problems as ISO 9000.



High Reliability Organizations

High Reliability Organizations

- ✓ Where a mistake is a matter of life and death
 - ✗ Firefighters
 - ✗ Nuclear Power Plants
 - ✗ Power Grid Dispatching Centers
 - ✗ Hospital Emergency Rooms
 - ✗ Air Traffic Control
 - ✗ Aircraft Carriers



High Reliability Organizations...

- ✓ Have more than their fair share of unexpected events
- ✓ Persistently have less than their fair share of accidents

Common Characteristic
Mindfulness*

* See *Managing the Unexpected: Assuring High Performance in an Age of Complexity* by Karl E. Weick and Kathleen M. Sutcliffe, 2001

Mindfulness

Preoccupation with Failure

- ✓ Anticipate and become aware of the unexpected
 - ✗ Anything that can go wrong will eventually go wrong

Reluctance to Simplify

- ✓ Learn to live in a complex, unpredictable world
 - ✗ “Standard Procedures” cannot replace thinking people



Sensitivity to Operations

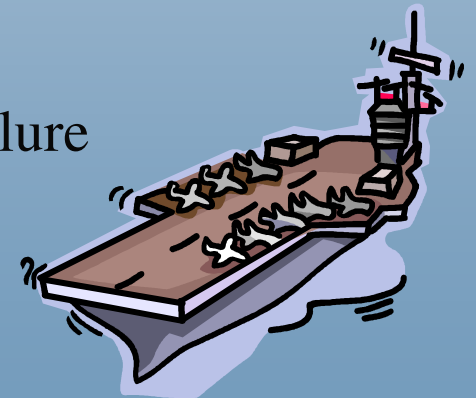
- ✓ Be attentive to the front line where the work gets done
 - ✗ Go “to the Gemba” and see for yourself

Commitment to Resilience

- ✓ Learn to detect, contain and bounce back from failure
 - ✗ **STOP** – Investigate – Find Root Cause – Rectify

Deference to Expertise

- ✓ Move decisions to the front line
 - ✗ Use Mission Command, not Detailed Command



From *Managing the Unexpected: Assuring High Performance in an Age of Complexity* by Karl E. Weick and Kathleen M. Sutcliffe



2000's Six Sigma

Point:

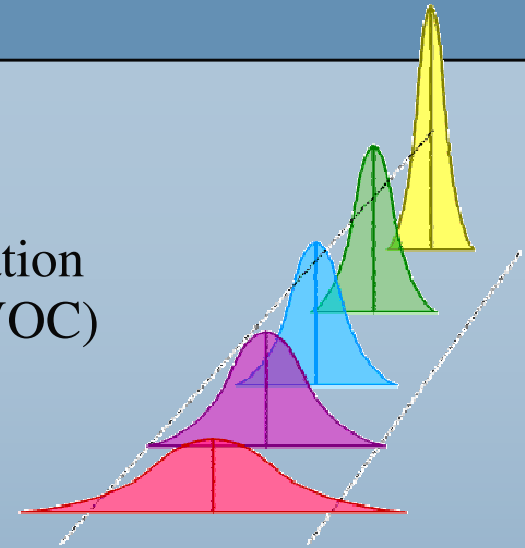
- ✓ Excellent tool set for using the Scientific Method
- ✓ Broad education in toolset throughout the organization
- ✓ Defines Quality as the “Voice of the Customer” (VOC)
- ✓ Closer to mission control than detailed control

Counter Point:

- ✓ Focus on Variation
 - ✗ Variation comes in two forms: Assignable Cause & Chance Cause
 - ❖ Trying to eliminate “chance cause” usually makes the situation worse
 - ✗ In a development process, variation is desirable – it creates knowledge.
- ✓ Focus on VOC
 - ✗ VOC drives sustaining technologies, but not disruptive technologies

*“The truth is that no system seems all that good at picking winners in advance. What makes a system successful is its ability to generate lots of losers and then to recognize them as such and kill them off.” – James Surowiecki, *The Wisdom of Crowds**

“Nothing will kill innovation faster than trying to manage it, predict it, and put it on a timeline.” – Vishva Dixit, vice president for research of Genentech





Plank Road Fever

USA: Late 1840's – mid 1850's

Massive boom in plank road construction

- ✓ High capital investment
 - ✗ Numerous large and small investors
- ✓ To be paid for with tolls

Immediate, positive results

- ✓ Far superior to muddy, rutted roads
- ✓ Dramatic decrease in travel time
- ✓ Expanded rural markets

BUT

- ✓ Roads deteriorated in 4 years
 - ✗ Half the projected lifespan
- ✓ Maintenance costs were very high
 - ✗ Annual costs were 20-30% of initial cost
- ✓ Most plank roads were soon abandoned

Information Cascade

“The first plank roads were a huge success. People looking for a solution to the road problem found one ready-made at hand. As more people built plank roads, their legitimacy became more entrenched and the desire to consider alternate solutions shrank. It was years before the fundamental weakness of plank roads – they didn't last long enough – became obvious.”

James Surowiecki, *The Wisdom of Crowds*

Of 58 large companies that have announced Six Sigma programs, 91 percent have trailed the S&P 500 since.



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software development

Thank You!

More Information: www.poppendieck.com