



Deming's 'System of Profound Knowledge' in the 21st Century

The world of management is constantly buffeted by different fads and fashions. It is good to learn that there is one view of this world that continues to stand the test of time *and* achieve outstanding results.

Deming's System of Profound Knowledge is an elegant and effective Theory of Management. It is a framework of thought and guide for action that any leader wishing to transform their organisation into one that will thrive and survive through the current century would do well to heed. It requires investment and tenacity, but the output versus the effort is well worth it.

It was devised by Dr W Edwards Deming, an American credited by the Japanese as being a major force in their rise to world economic power in the second half of the 20th Century. Indeed, the most prestigious award for Quality in Japan even now is known as the Deming Prize. From 1979 onwards, Deming also worked with American organisations; his thinking and teaching about leading and managing spread throughout the Western world.

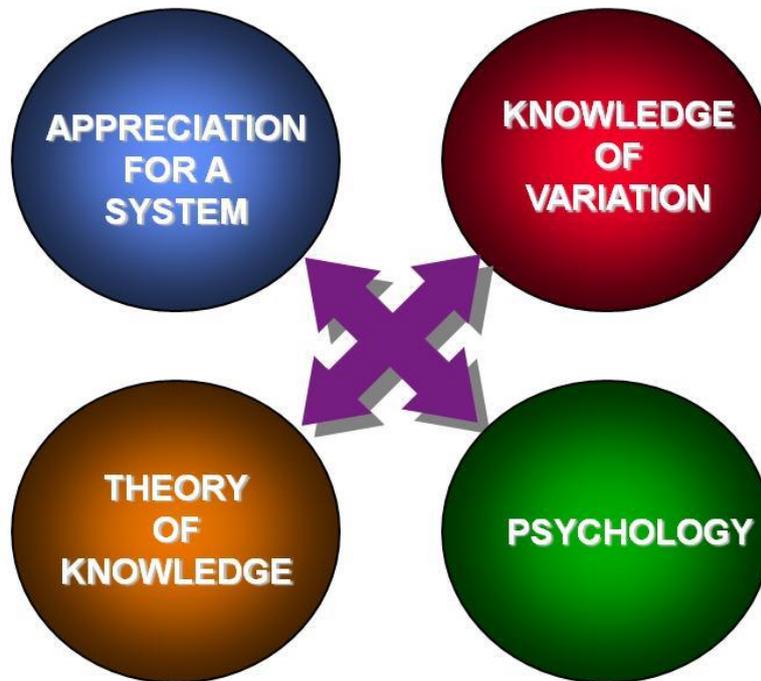
Deming sought to publish his work in a way that was accessible to everyone. The first manifestation of this was Deming's 14 Points or 14 Obligations for Management. This is covered comprehensively in his 1986 book "Out of the Crisis".

He was an incessant thinker and was constantly reassessing and developing his view of the world. His 'System of Profound Knowledge' appeared in his final book "The New Economics" as "*a map of theory by which we can understand the organisations in which we work.*"

This paper seeks to give a brief account of the System of Profound Knowledge, the 14 Points for Management, and its relevance to organisations in the 21st Century.

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An Overview of Deming's System of Profound Knowledge



Deming's System of Profound Knowledge has four elements.

- **Appreciation for a System**
- **Knowledge of Variation**
- **Theory of Knowledge**
- **Psychology.**

Appreciation for a System means taking a holistic view of the organisation, seeking to optimise processes from end-to-end. How does the wider system fit together in terms of its customers, suppliers, employees, managers, shareholders, and the world around it? Action for improvement should strive to optimise the benefit for all players, and not to advantage any one part of the system to the detriment of others.

Knowledge of Variation requires a view of numbers and performance data that is not well appreciated by managers. Does improvement require fundamental review of the very design of the system or process you are examining? Are there occasions when immediate and local action is required to address performance outside the expected range? The concept of Special and Common Causes of Variation, and its implications for improvement are vital here.

Theory of Knowledge seeks to show managers that their focus should be on the future of the system – improvement of existing product and existing process; innovation for new products and services to meet the future needs of customers; innovation for new processes to deliver products and services. Thus the job of management is that of prediction; managers should be constantly and systematically learning about what is necessary for future success.

In the **Psychology** component an understanding of motivation is needed; in particular, the difference between extrinsic and intrinsic motivation. A certain amount of extrinsic motivation, such as pay, is required for people to gain a level of self-esteem. However, assuming that people are only motivated extrinsically is both incorrect and damaging. People are born with high levels of intrinsic motivation. Children have a high degree of curiosity about the world and a desire to explore. Deming is adamant that to optimise a system means this natural motivation needs to be encouraged and enabled in life at work. People who have “Joy in Work” are people most likely to join in the development and improvement of the whole organisation.

Interactions between the components

The four components of Profound Knowledge are not independent; in fact the interactions between them are probably more important than any of them individually. For example, the performance of anyone is largely governed by the system they work in, which is the responsibility of management. Yet people’s desire to “do well” will generally cause them to try to “do well”, if necessary by finding ways around the system, when really it is the system itself that is in need of reform.

Deming's System of Profound Knowledge - The Components

1. Appreciation for a System

Deming wrote that “A System is a network of interdependent components that work together to try to accomplish the aim of the system.” An essential part of improvement is that the aim must be clear to everyone in the system, and the ‘secret’ is to develop co-operation between components towards achieving that aim.

A great example of a system at work is that of an orchestra. Deming wrote:

“The players are not there to play solos as Prima Donnas, each one trying to catch the ear of the listener. They are there to support each other. Individually, they do not need to be the best in the country. Each of the 140 players in the Royal Philharmonic Orchestra is there to support the other 139.”

“An orchestra is judged by listeners, not so much by illustrious players, but by the way they work together. The conductor, as manager, begets co-operation between the players, as a system, every player to support the others. There are other aims for an orchestra, such as joy in work for the players and the conductor.”

A story from one Region of the West Midlands Region of the Employment Service shows the necessity for having agreement on aim (told by the late Martin Raff, one-time Regional Director). The Region was at the bottom of the league table for a number of different quality indicators, one of which was waiting time to see a claimant advisor. The Region chose to focus their improvement efforts on this, and over a period of weeks and months was able to change their process such that they moved to the top of the league. Any job seeker was effectively able to walk into a job centre and see an advisor immediately. Yet the surveys they carried out showed that customer satisfaction had increased not one iota. The reason? Job seekers were prepared to wait around all day, if necessary. What they really wanted was a *job!* Not simply to see an advisor quickly.

In the long term, the aim for any system should be that everybody gains, not one part of the system at the expense of any other. This includes shareholders, customers, suppliers, employees, the community, and the environment. Within this, of course, the customer holds a special place. Meeting the needs of this group both now and in the future is a basic job of management; failure to do so clearly puts the very survival of the system in jeopardy. The current structure of the railway industry in Britain brings this home very starkly. Much time is spent in activities such as negotiating contracts and apportioning blame for unreliability between the various components of the system. Yet it appears that not enough people are working towards delivering the aim of the system, which is to do with transporting people and goods to places they wish to go in a timely and reliable manner. The freight side in particular sees four different companies competing for a very small slice of the overall transport market in the UK;

yet there is relatively little new business coming in. Many transport writers believe that the overall community and environment would benefit much more if the railways and other agencies were to cooperate to win a much larger slice of the market.

Another example of the need to think in terms of what the broader system is trying to achieve comes in the efforts of a range of public agencies to crack down on the illegal drugs market in Britain. The Guardian reported on 23 May 2003:

“The Home Office has organised a national and international effort to disrupt the supply of crack cocaine. To anybody who works in Whitehall and understands little about drugs markets, that sounds like an obvious move. Cut the supply, cut the consumption, cut the crime committed by the consumers. But is that really what will happen?If you reduce the supply of a commodity on a free market, its price rises. Does consumption then fall? But demand for addictive drugs is notoriously inelastic. So even if the price rises, demand will remain the same. This fuels the crime that addicts have to carry out to fund their addiction.On the basis of studies carried out by the National Economic Research Association, if the Home Office succeeds in raising the price of crack by just 5%, they will inflict an extra £172.5 million of property crime on the communities they are trying to protect”.

So what is the aim of the intervention by the Home Office? The Guardian article goes on to liken the current activity as akin to a firefighter pouring petrol onto flames.

Once you are at home with thinking of work in terms of a system working in cooperation to achieve its aim, the job of a manager becomes quite different to the traditional “command and control” organisation. Myron Tribus, one-time Director of the American Quality and Productivity Institute and a very influential proponent of Deming’s work, put it very succinctly:

“People work IN the System. The Manager’s new job is to work ON the System and improve it – continuously – with their help”.

Much greater importance is attached to developing knowledge in the organization - the role of the manager changes from supervisor or checker to one who develops people and assists them with their learning.

The customer holds a special place in any system. Deming said *“The consumer is the most important part of the production line. Quality should be aimed at the needs of the consumer, present and future.”*

It will not suffice to have customers that are merely satisfied. An unhappy customer will switch. Unfortunately, a satisfied customer may also switch on the theory that he could not lose much, and might gain. Profit in business comes from repeat customers, customers that boast about your product and service, and that bring friends with them.

An Organisation Viewed as a System

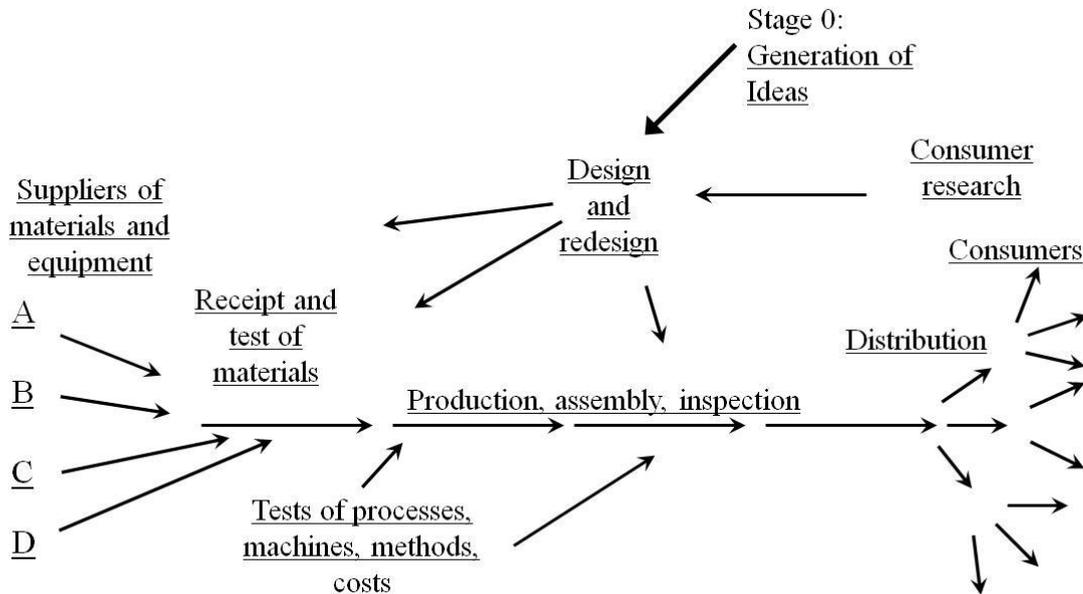


Fig 1

Many people use various forms of flowcharting or process mapping as a tool to help them understand and improve aspects of the system within which they work. Deming himself introduced this idea in Japan very early on in his work there:

"This flow diagram (Fig 1) was the spark that in 1950 and onward turned Japan around. It displayed to top management and to engineers a system of production. The Japanese had knowledge, great knowledge, but it was in pieces, uncoordinated. This flow diagram directed their knowledge and efforts into a system of production, geared to the market – namely, prediction of the needs of customers. The whole world knows the results".

"This simple flow diagram was on the blackboard at every conference with top management in 1950 and beyond. It was on the blackboard in the teaching of engineers. Action began to take place when top management and engineers saw how to use their knowledge".

This view of an organisation may seem obvious to you, until you think about how many organisations don't actually operate in this way. Too many seem to break themselves into competitive components, either formally or by simple lack of co-operation, and thus severely weaken the overall system.

One organisation selling gifts and toys set its sales force up to compete with one another. Instead of working together to share ideas about attracting customers, improve the sales process, and build the business, the managers set up league

tables to compare sales people against one another. One sales person told me that she covered an area containing some of the most rural areas of England and Wales and was well down the league. The person at the top of the table held the key account for a nationwide chain of gift shops. This was supposed to motivate her to try harder! An extract from the staff newsletter tells the story more graphically:

“Susan is our STAR ROOKIE. In her short time on the road she has beaten all her fellow salespeople who started with her in the UK.....bottle of Champagne to you...enjoy!”

Today we see frequent press reports telling us how similar destructive devices, especially that of performance targets, are being used in our schools, hospitals, and other parts of the public sector.

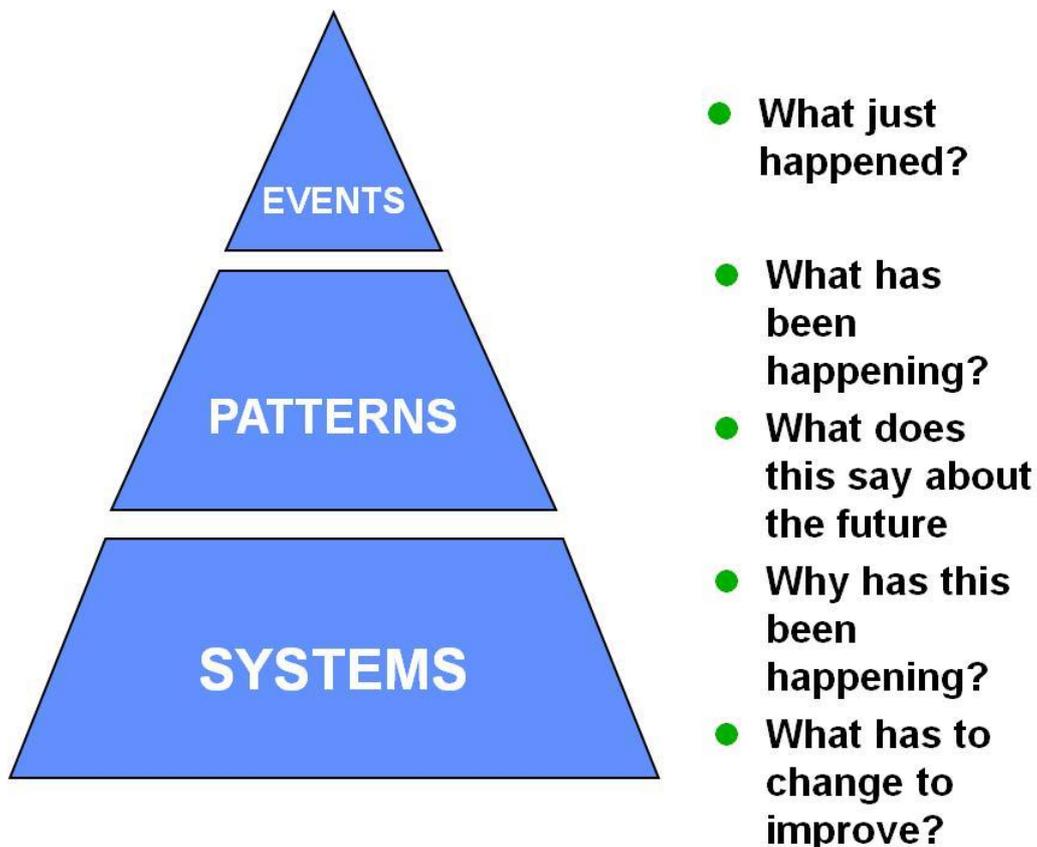


Fig 2

Systems Thinking will have a significant effect on management style and practice. Fig 2 shows that management is not about merely reacting to events. It is about recognising how events fit into patterns, and what these patterns indicate about the operation of the systems that cause such patterns.

Brian Joiner, a statistician and founder of the Deming-based consulting group Joiner Associates, sums this up neatly when asking managers which “level of fix” they are addressing when events demand action:

Level 1: Fix the Output – promptly correct problems that appear in existing output or that occur during the delivery of a service.

Level 2: Fix the process - change the process that allowed the problem to occur; develop ways to prevent its recurrence

Level 3: Fix the System - change the system that allowed the faulty process (that led to the faulty product or service) to operate with these flaws.

The notion is that many problems in an organisation arise from the same deep causes. Thus the deeper you can push for a fix, the more problems you'll be able to solve or prevent, and the more rapidly you'll improve. Level 3 fixes can be the most cost effective, often being changes of *policy* - not extra machinery, nor retraining or major physical changes - just a change in the way managers *think* .

2. Knowledge of Variation

Effective managerial action also demands a knowledge of variation. Deming said:
“Variation there will always be, between people, in output, in service, in product. The question is, ‘what is the variation trying to tell us about a process, and about the people that work in it?’”

The output of a system will very often be measured. Over time, these values will be recorded and managers will periodically pore over the figures to ascertain how well things are going. The issue is that the recorded values will not be unchanging over time. They will differ – perhaps hour-to-hour, day-to-day, or week-to-week. They will *vary* .

All processes have variation. You will need to understand the causes of variation in a process if you are to predict its behaviour and act to improve it. Improved processes will exhibit reduced variation as output becomes more predictable and costs will reduce. The problem is, that without knowledge of variation, you may well (with the very best intention) take action that actually makes things worse.

Knowledge of variation, just like appreciation of a system, will result in a significant change in management style and practice. Equally, an understanding of variation is necessary wherever figures are looked at, not just in production processes, but also, most importantly, in management data, such as finance, sales, distribution, safety, and all forms of key performance indicator data.

There are two types of variation – Special cause and Common cause.

Common causes of variation arise out of the process, or out of the way the process is organised and operated. Because they are an inherent part of the system, they are the responsibility of those who control the system — the managers! A system exhibiting only common cause variation is said to be stable, and will be predictable within limits. The limits are defined by the Shewhart Control Chart (named after its originator, Walter Shewhart of Bell Laboratories. He was a big influence on Deming's work).

Note: The Shewhart Control chart is now usually referred to as a Process Behaviour Chart (PBC)

Sometimes something impacts on a process that is outside its natural range of operation. These are causes that are **not an inherent part of the system and should be considered "special"**. These deserve special treatment — sometimes by local supervisors or operators, though sometimes only a manager can take or authorise the appropriate action.

It is vital to respond appropriately to the two sources of variation. There are two mistakes possible;

Mistake 1: to react to an outcome as if it were from a special cause, when actually it came from common causes of variation.

Mistake 2: to treat an outcome as if it were from common causes of variation, when actually it came from a special cause.

Taking the wrong action serves to increase variability and makes things worse.

If a process is continually altered in response to common cause variation it will not be able to achieve its natural capability. This is called "tampering" with the process. Managers taking action based on single points of data that come from a stable system will have similar but wider-reaching and damaging consequences. Examples might be sales figures and budget outturns.

If variation due to special causes is ignored, opportunities for learning will be missed. Learning that might lead to improvement.

The Process Behaviour Chart (PBC - fig 3) is a vital statistical tool that all managers need to understand and use. It is a simple device, but hugely powerful. It enables us to differentiate between special and common causes, and so avoid making the mistakes set out above.

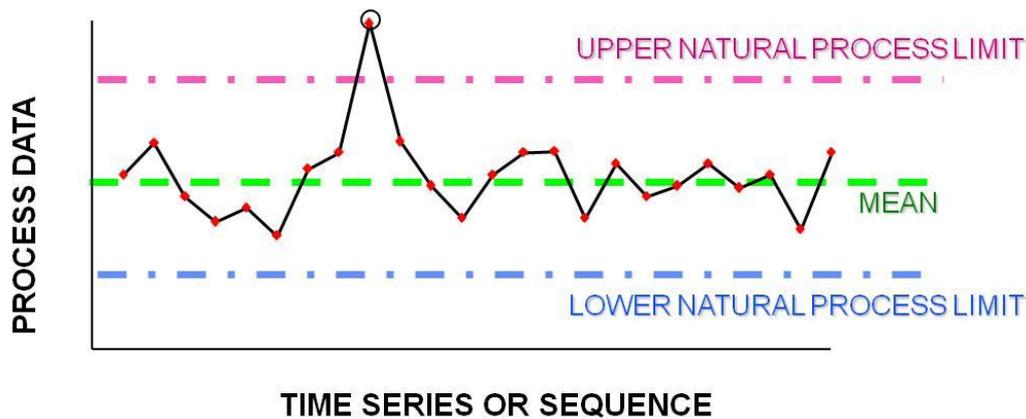


Fig 3 The Process Behaviour Chart (PBC)

In its basic form, it is a simple plot of values in the time-order in which they were collected, together with three additional lines. These are the average, upper natural process limit (UNPL) and lower natural process limit (LNPL). These process limits determine statistically the range of variation to be expected if there were only common cause variation present. They are calculated from the data. They are not targets. They are not set where you would like them to be; they simply are where they are! (they are 3 “sigma-units” from the average, where *sigma* is a measure of statistical spread. They are not difficult to calculate.) Data points that lie outside the limits are almost certainly due to special causes & are thus worthwhile investigating.

Thus the lines give you an operational definition of when to look for a special cause, and when to stand back and say, “this point of data does not surprise me. Our improvement effort will need to concentrate on understanding our systems that deliver this amount of variation, and redesigning them for improvement”.

Yet many organisations are run without this understanding of variation. Most of us were taught at school an *arithmetic* view of numbers i.e. one number being bigger or smaller than another means something. We compare numbers one with another; this month compared to last month; this month compared with the same month last year; this quarter compared to last quarter; this number compared with a target or budget. This is a breeding ground for tampering!

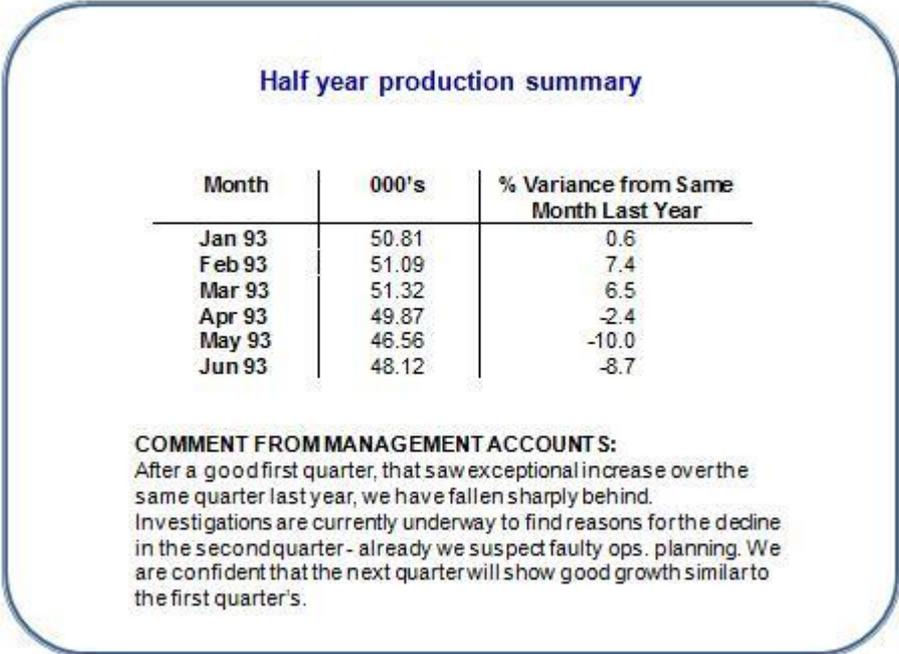


Fig 4

Consider a typical management report (Fig 4). Someone has written a considered commentary, which seeks to blame some department, which is probably already preparing its action plan to remedy the situation. Such action is for action's sake, and is not based on knowledge.

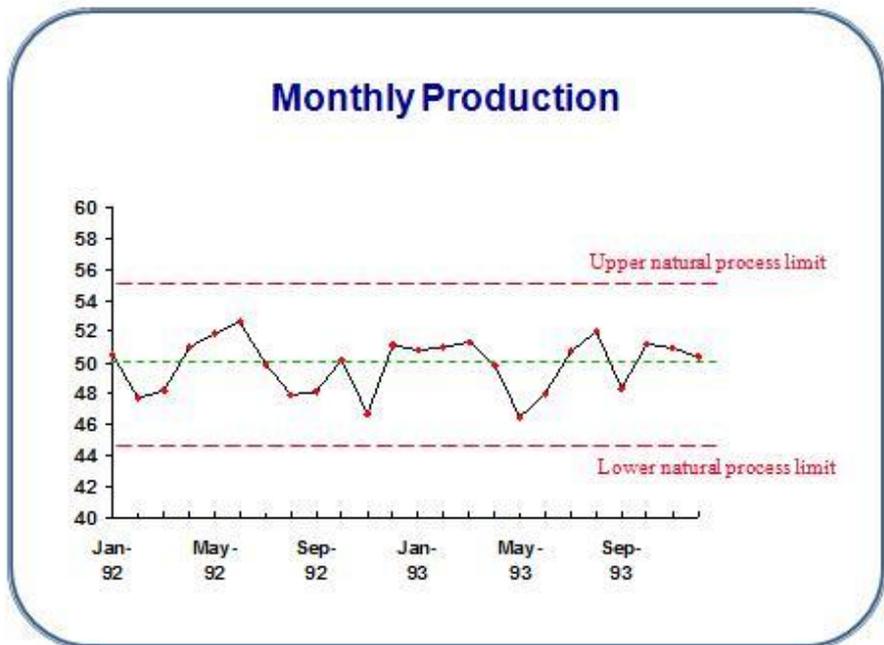


Fig 5

Taking the wider view, and plotting these figures on a PBC (Fig 5) give a completely different perspective. This demands taking a statistical view of numbers. We can see here that all the variation is common cause; we have a stable system.

When you have an understanding of variation, the questions you ask will be different, and aimed at improving a system. When considering a single point of data, your question will be "Is this within the usual range of variation we can expect from this system, or is it outside that range?" If it lies outside that range, you can legitimately ask the question "What happened differently?" The action to take is to seek the cause, eliminate the problem, or learn from the opportunity.

If it lies within the range, the best thing to do is to take the information about what happened and place it with all the other data you have collected about the system over a period of time. The question now is "What are the key sources of variation in this system over time, and can we redesign the system to reduce them?"

PBCs are also powerful forecasting tools. With a stable system, this means that the data you are looking at will continue to lie within the limits, unless the process changes. If your target lies outside this range then only a fundamental and systematic improvement of the process will consistently produce the result you seek.

The culture of understanding variation – a story of co-operation

Understanding variation will produce a significant culture change in organisations.

Here is a PBC from a division of a railway signalling installation company (Fig 6).

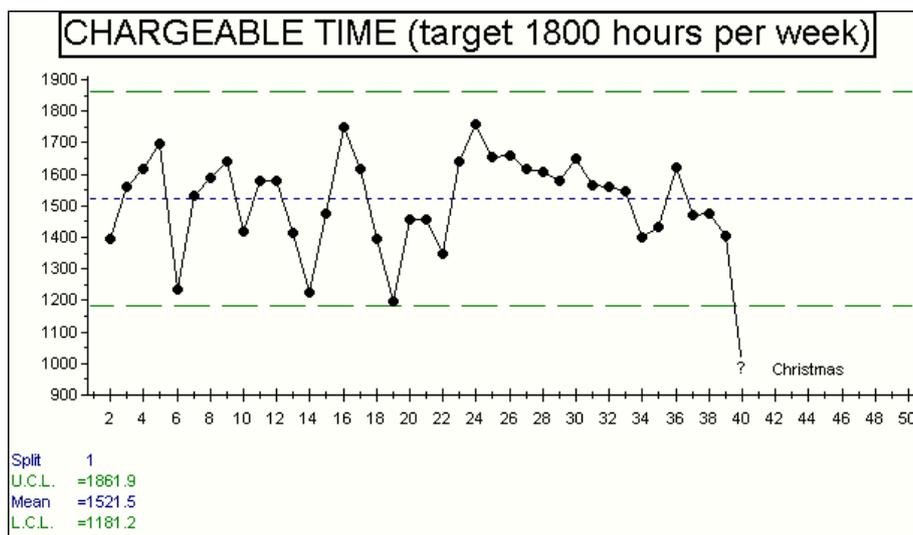


Fig 6

Their work is divided up into projects, and project managers strive to devote as much time each month as possible to chargeable items (as opposed to overheads which do not contribute directly to profits).

Each week this division has a combined target to achieve 1800 chargeable hours. Each week the project managers meet with the finance director to review the previous week's performance, and if appropriate to explain why the target hasn't been met.

You will see from the chart that the upper control limit is at 1861 hours, so just occasionally the target will be met with luck. But the questioning each week was based on the premise, "If only project managers would work harder and take this chargeable time issue seriously, things would be a lot better".

In fact the chart shows that the system as it stands is not **capable** of reaching the desired target over a long period. People would dread the weekly meetings, and each time come prepared with better and better excuses, or better and better arguments for blaming somebody else.

However, once the managers concerned understood variation, and the concept of process capability, they suddenly breathed a great sigh of relief. "You mean, the only thing to do with this system is to redesign it fundamentally if we want it to reach the desired level!" It was no *individual's* fault that targets weren't being achieved; it was the system by which they were trying to achieve it.

Redesigning the system is a cross-functional issue that everyone must address together and in co-operation. Thus the study moves from the short-term "How I can avoid blame this week?" and meeting-dread, to the long-term "What have we got to do together to take control of our future?" and meeting-excitement. Now these managers are truly managing their business.

3. Theory of Knowledge

Deming said that management's job is prediction. Rational prediction requires theory, and builds knowledge through systematic revision of theory based on comparison of prediction with observation.

Improving your organisation requires prediction. You predict that the changes you plan to make will produce a benefit. A sensible way to carry out the change is to do it on a small-scale first, to see how close the actual outcome is to your prediction, and thus to make any necessary adjustments before implementing the change on a wider scale.

Introducing a new product or service requires prediction. Which customers will buy the product? How will they use it? What needs will it fulfil? Will it delight them? Will they boast to others about how good it is? How long will it continue to meet their needs?

Even the simplest plan – how I may go home tonight – requires prediction that my car will start and run, or that the bus will come, or the train.

Prediction is based on theory. On what basis is your prediction being made? The theory behind your train for your journey home is the existence of a timetable, modified by your experience of how reliable the actual delivery of the train service. The theory behind new products will be the research and testing that you have carried out amongst potential customers.

Without theory there is nothing to revise. Without theory, experience has no meaning. Without theory, one has no questions to ask. Hence without theory, there is no learning. Without a train timetable, the fact that a train appeared at 3pm yesterday tells you nothing about tomorrow. Without a timetable, one cannot ask the question “At what time is the train due?” Without a timetable, one cannot form a judgment about the reliability of the service.

Deming wrote of Chanticleer, the barnyard rooster who had a theory. He crowed every morning, putting forth all his energy, flapped his wings. The sun came up. The connection was clear: His crowing caused the sun to come up. There was no question about his importance. There came a snag. He forgot one morning to crow. The sun came up anyhow. Crestfallen, he saw his theory in need of revision. Just like Chanticleer, people often continue to do things in the way that they have learned from their predecessors - “I've got 20 years of experience”. Deming often referred to this as *'superstitious learning'*. How can we know whether we are operating according to best practice or just by tradition? Real knowledge needs to be continually developed and increased as customer expectations and circumstances change - in other words a systematic approach to improvement must be adopted. If it is not, organisations can only rely on management by trial-and-error or organisation-and-reorganisation. Both result in the typical peaks and troughs of performance we see - the boom and bust that we struggle to escape.

Improvement requires change. Change requires a plan. Such a plan is a prediction – if we follow this plan, we believe that certain benefits will accrue. Learning comes from observing the implementation, and modifying further iterations of the plan accordingly.

Managers in an improving organisation will see themselves as experimenters and as leader of the learning cycle. There is a way of thinking and a way of acting that serves to underscore this role; the PDSA cycle. It is sometimes called “The Deming Cycle”. Deming calls this the “Shewhart Cycle”.

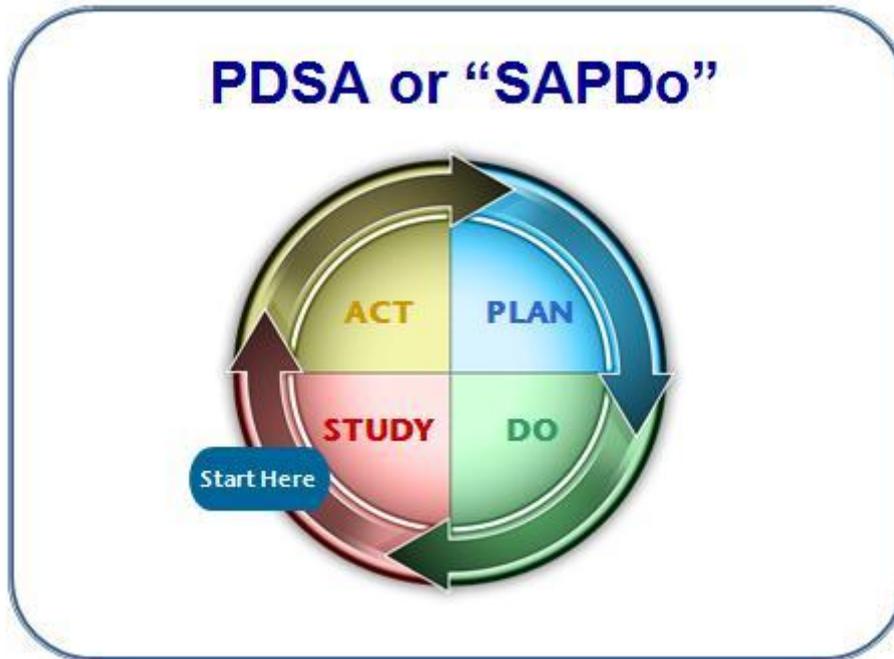


Fig 7

The Plan - Do – Study – Act (PDSA – Fig 7) cycle is a never-ending cycle of learning and improvement:

Plan – We identify our purpose and goal. We formulate our theory. We define our predictions. We define how we will measure success. We plan our activities.

Do – We execute our plan on a small scale, undertaking the activities, introducing the interventions, applying our best knowledge to the pursuit of our desired purpose and goals.

Study – We monitor the outcomes, testing the validity of our theory and plan against our predictions. We study the results for signs of progress or unexpected outcomes. We look for new lessons to learn and problems to solve.

Act – We integrate the lessons learned from our study. We reformulate our theory. We adjust our methods. We identify what more we need to learn.

People working with the PDSA cycle will no longer make simple assertions about what changes are required. They will use phrases like “My theory is” “Lets’ design a small-scale trial of....”

Testing theories requires you to understand the system that is being worked upon; to understand its aim; to design a test and a means of judging the outcome of the test; to understand variation and so be able to interpret the data from the test.

4. Psychology

The fourth element of Deming's System of Profound Knowledge is those aspects of Psychology relating to what motivates people. In particular understanding the respective roles of intrinsic and extrinsic motivation, and respecting the rights of people to obtain joy in work and joy in learning.

Deming said:

“People are born with a need for relationships with other people, and need for love and esteem by others. One is born with a natural inclination to learn. Learning is a source of innovation. One inherits a right to enjoy his work. Good management helps us to nurture and preserve these positive innate attributes of people.”

Extrinsic motivation may indirectly bring positive results. For example, a man takes a job and earns money. Money is extrinsic reward. Some extrinsic motivation helps to build self-esteem, but total submission to extrinsic motivation leads to destruction of the individual.

“People are our most important asset” is the boast of many organisations. This rhetoric is humanitarian, but the behaviour of some managers does not always follow the same path. People spend a large proportion of their lives at work. If the aim of any system is that everybody gains, then part of that gain for people is to actually enjoy the work that they do.

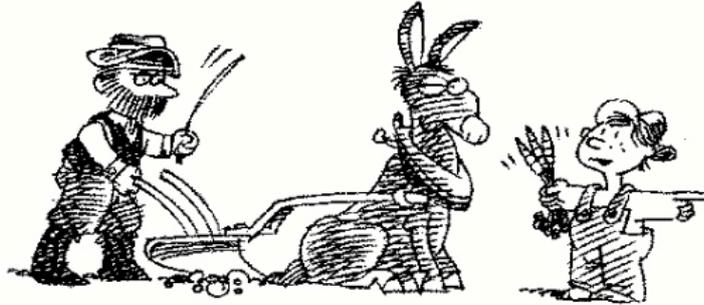
“But our people aren't motivated!” is a cry from managers I often hear. “They just come to work for the money”.

There are two important undercurrents to this observation of life. One is a self-fulfilling prophecy where, to a great extent, people behave in a way consistent to how we expect them to behave; Eliza Doolittle in Shaw's Pygmalion explains that “the difference between a lady and a flower girl is not how she behaves, but in how she is treated.”

If you want to know why people do what they do, a good starting point is to examine your own expectations. There is a good likelihood that self-fulfilling prophecies are at work.

The second undercurrent is more deeply embedded in society. Deming called this the “Forces of Destruction”. We are born with intrinsic motivation, self-esteem, dignity, cooperation, curiosity, and joy in learning. Slowly through life, these are squeezed out of us by the need to pass tests and get good grades at school and college. Then further damage occurs at work by performance rating and ranking, and the need to achieve arbitrary targets without a method.

In the UK we have seen this debate rage over Standard Assessment Tests (SATs) in schools. Newspapers have reported children as young as seven simply cramming for exams and missing out on the joys of other aspects of school such as music, drama, and even play.



CARROTS AND STICKS

Fig 8

Managing by extrinsic motivation alone is like managing with carrots and sticks (Fig 8). But does this work?

Consider the implications of someone being able to motivate you to a higher level of performance through some kind of reward. Have you been waiting for some reservoir of effort to be bribed out of you? We would not say this about ourselves. However, with merit pay and incentive bonuses, we *act* as though it were true.

Alfie Kohn (*Punished by Rewards*. 1993) reminds us of the observation that between a carrot and stick stands an ass. The usefulness of the carrot and stick motivational approach may be limited to that species alone! Yet managers commonly accept that people must be motivated through a combination of promises of reward (carrots) and threats of punishment (sticks).

Carrots and sticks do not work, except for the short-term. They are detrimental to the relationships between the motivator and the *one* to be motivated, and the *one* to be motivated and his or her peers

5. Deming's 14 Points for Management

Prior to articulating his System of Profound Knowledge Deming summarised his views in his "14 Points" or "14 Obligations" for management, as an attempt to help people understand and implement his way of thinking. Actually, the 14 Points are important corollaries of his System of Profound Knowledge. They are not a straightforward list of instructions; not a technique; not a checklist

Here they are in summary. This 1989 version is taken from "Deming's 14 Points for Management", prepared by Henry Neave. *The words in italics are my own and indicate my view of the links between Deming's 14 points & his System of Profound Knowledge.*

1. Constancy of Purpose

Create constancy of purpose for continual improvement of product and service, allocating resources to provide for long-range needs rather than short-term profitability, with a plan to become competitive, to stay in business, and to provide jobs.

Constancy of purpose demands a well articulated aim for the organization - one which is widely agreed and understood through the system, thus promoting co-operation.

2. The New Philosophy

Adopt the new philosophy. We are in a new economic age, created in Japan. We can no longer live with commonly-accepted levels of delays, mistakes, defective materials, and defective workmanship. Transformation of Western management style is necessary to halt the continued decline of industry .

Even if the performance of your system today is in some way acceptable, this will not be so forever. Customer needs continually advance and develop. Neither will your competitors stand still. They will offer better or substitute products that delight customers needs, and address needs that hitherto have not been known or articulated. The new philosophy will give you a fighting chance of long-term survival.

3. Cease dependence on inspection

Eliminate the need for mass inspection as a way to achieve quality by building quality into the product in the first place. Require statistical evidence of built-in quality in both manufacturing and purchasing functions.

Dependence on inspection means there are two systems at work. One that makes defective product and another that tries to protect your customers from the inadequacies of the first. The inspection process falls down whichever way you

look at it. On the one hand, defective product might easily evade the inspectors and get through to your customers. On the other hand, even if it is entirely successful in picking out defects, why should customers have to pay for this additional system, when you should be striving to eliminate the problems at source?

Deming once told the apocryphal story of two Western industrialists holding a breakfast meeting. One said, "Let's make toast. You burn and I'll scrape". And we all know that burnt toast never tastes as good as toast made properly in the first place.

4. End "lowest tender" contracts

End the practice of awarding business solely on the basis of price tag. Instead, require meaningful measures of quality along with price. Reduce the number of suppliers for the same item by eliminating those that do not qualify with statistical evidence of quality. Move towards a single supplier for any one item, on a long-term relationship of loyalty and trust. The aim is to minimise *total* cost, not merely initial cost. Purchasing managers have a new job, and must learn it.

This is often one of the more controversial of the 14 points in advocating moving towards a single supplier. I often hear comments like "We need to keep our suppliers on their toes by having alternative sources. They would take us to the cleaners, price wise, if there wasn't the threat of us taking our business elsewhere".

*Deming's words of "**move towards** a single supplier" are key here. Having more than one source for raw materials increases variation. In the railway industry one manager showed me two blank travel tickets prior to going into the computerised ticket machine. They both met specification in terms of size, but came from different suppliers. One ticket went through the machine like a dream – the other got stuck in the hopper. He said this happened far too often, and the jamming ticket blanks always came from the same supplier.*

Suppliers are an integral part of your system, and should therefore have the same aim for delighting the end user. Achieving this most effectively means building co-operation, and seeking together to constantly improve processes. This requires a belief on both sides that the relationship is going to be mutually beneficial and holds the promise of ongoing business.

5. Improve every process

Improve constantly and forever every process for planning, production, and service. Search continually for problems in order to improve every activity in the company, to improve quality and productivity and thus to constantly decrease costs. It is management's job to work continually on the system (design, in-coming materials, maintenance, improvement of machines, training, supervision, retraining, etc.)

Not only will constantly improving every process mean reducing variation, and meeting customer needs ever more closely – but people working IN the system will be encouraged to engage in the improvement process. Everyone will benefit from the input of their knowledge, as people are likely to enjoy their work more, and the company likely to survive and prosper for longer. Processes will become more predictable, and further improvement easier to see as the background noise of common cause variation is reduced. Operational definitions will be made more useful and consistent, meaning greater understanding and cooperation between everyone in the system.

6. Institute training on the job

Institute modern methods of training on the job for all, including management, to make better use of every employee. New skills are required to keep up with changes in materials, methods, product design, machinery, techniques, and service.

Every system includes preparing the future of the system. Keeping up with advancing customer needs will require skills and knowledge to be able to capitalise on new ideas for product and service, and on improved processes.

7. Institute Leadership-

Adopt and institute leadership aimed at helping people to do a better job. The responsibility of managers and supervisors must be changed from sheer numbers to quality. Improvement of quality will automatically improve productivity. Management must ensure that immediate action is taken on reports of inherent defects, maintenance requirements, poor tools, fuzzy operational definitions, and other conditions detrimental to quality.

Leaders and managers who appreciate systems and who understand variation will manage very differently from those who do not. Those who strive to engage the intrinsic motivation of the people around them, and who are constantly looking for sustainable learning and improvement will be much more exciting and pleasant to work for.

8. Drive out fear

Encourage effective two-way communication and other means to drive out fear throughout the organization so that everybody may work effectively and more productively for the company.

The giftware company I mentioned on page 5 was riven with fear. Salespeople were almost bullying customers into buying for fear of not reaching their sales targets. Sickness and turnover amongst sales staff were at astonishingly high levels. The company almost does not deserve to survive, and probably won't if they continue to treat their customers in such a manner.

9. Break down barriers

Break down barriers between departments and staff areas. People in different areas such as research, design, sales, administration, and production must work in teams to tackle problems that may be encountered with products or service.

The UK railway industry again is a case in point. Much managerial effort and time is spent in identifying the cause of delays and attributing these to responsible companies and departments. Equally far too much time is then spent in arguing about the attribution and not nearly enough working together in teams to benefit the actual user of the railway – the passenger and the freight customer.

10. Eliminate exhortations

Eliminate the use of slogans, posters, and exhortations for the workforce, demanding zero defects and new levels of productivity, without providing methods. Such exhortations only create adversarial relationships; the bulk of the causes of low quality and low productivity belong to the system, and thus lie beyond the power of the workforce.

Posters such as "Quality depends on You" are facile and damaging. Improvement of the system is the responsibility of management. Most people at work want to do a good job, and typically it will be the system that is preventing them. Poor training, poor tools, inadequate information, defective raw material are all examples of how the system can defeat the best efforts of people.

11. Eliminate arbitrary numerical targets

Eliminate work standards that prescribe numerical quotas for the workforce and numerical goals for people in management. Substitute aids and helpful leadership; use statistical methods for continual improvement of quality and productivity.

Managers with understanding of variation will no longer set arbitrary goals. They will set about improving processes through considered use of the PDSA cycle. They will use Performance Behaviour Charts to understand the capability of

processes, and to monitor the success of the improvement effort. This is the only way to move performance towards where you wish it to be.

12. Permit pride of workmanship

Remove the barriers that rob hourly workers, and people in management, of their rite to pride of workmanship. This implies, *inter alia*, abolition of the annual merit rating (appraisal of performance) and of management by objective. Again, the responsibility of managers, supervisors, foremen, must be changed from sheer numbers to quality.

Improved performance comes from addressing the design of the system. This requires the knowledge, skills and the sheer enthusiasm of people if it is to be achieved most effectively. Deming regarded joy in work as more than just a basic human right. He also regarded it as a prerequisite for long-term survival. He used a phrase that indicated his view of companies that treated their employees badly; "Survival is not compulsory!"

13. Encourage education

Institute a vigorous programme of education, and encourage self-improvement for everyone. What an organisation needs is not just good people; it needs people that are improving with education. Advances in competitive position will have their roots in knowledge.

This point is all about joy in learning, and in developing people's ability to take on new knowledge and skills, to "learn to learn".

14. Top Management's commitment

Clearly define Top Management's commitment to ever improving quality and productivity, and their obligations to implement all of the principles laid out in the 14 Points. Indeed, it is not enough that top management commit themselves for life to quality and productivity. They must know what it is they are committed to, that is, what they must do. Create a structure in top management that will push every day on the preceding 13 Points, and take action in order to accomplish the transformation. Support is not enough, action is required.

Top Management need a theory of improvement, a systematic approach that builds learning and development through the whole company. To achieve improved process performance requires a method. How do we analyse current performance? How do we experiment with new ways to enhance performance?

The same is true for the whole company - its customers, suppliers, and stakeholders - but on the grand scale.

APPENDIX

Dr W Edwards Deming

Dr Deming is perhaps best known for his work in Japan, where from 1950 onwards he taught top management and engineers his methods for management of quality. This teaching dramatically altered the economy of Japan. In recognition of his contributions, the Union of Japanese Science and Engineering (JUSE) instituted the annual Deming Prize for achievements in quality and dependability of product. The Emperor of Japan awarded Dr Deming the Second Order Medal of the Sacred Treasure in 1960.

Myriad books, films, and videotapes profile his life, his philosophy, and the successful application of his teaching worldwide. In his later life, Dr Deming's four-day seminars reached 10,000 people per year over ten years.

For a very readable and comprehensive view of Deming's life and work, try "The Deming Dimension" by Henry R Neave

Some landmark dates

1900 Born 14 October – Sioux City, Iowa
1927 First Meetings with Walter Shewhart
1939 US National Bureau of the Census as Head Mathematician
1942 Consultant to Defense Department
1947 First visit to Japan
1950 The "Vital" visit to Japan
1960 Decorated in Japan – the Second Order of the Sacred Treasure
1979 First meeting with Conway of Nashua
1980 First four-day seminar: NBC Documentary "If Japan can – why can't we?"
1986 "Out of the Crisis" published
1987 Deming movement in UK began
1990 First documents on "A System of Profound Knowledge"
1993 20 December. Died in Washington DC
1994 "The New Economics" published

Some useful reading:

<http://www.deming.org/theman/biography.html>
W Edwards Deming – Quality, Productivity and Competitive Position 1982
W Edwards Deming – Out of the Crisis - 1986
W Edwards Deming – The New Economics - 1994
Mary Walton – The Deming Management Method –1989
Henry R Neave – The Deming Dimension – 1990
Peter R Scholtes – The Leader's Handbook – 1998
Donald J Wheeler – Understanding Variation – 1993
Brian L Joiner – Fourth Generation Management - 1994