

What is CI?

An introduction to continuous improvement

Dr. Mike Bell

Simple Improvement



Building a CI Culture in One Hour per Month

It may seem a bold claim that a continuous improvement culture can be built and managed in only one hour per month, but it can be done. It does rely on involving everyone within the organisation. And it does rely on applying a simple method. But the benefits are significant - for the customers, the employees and the organisation. This is like finding gold nuggets that have been hidden all around the organisation...



The idea behind continuous improvement is very simple - people improving the work that they do, getting better and better, day by day. However, in practice, this is not as easy as it sounds. We seem to have lost our ability to make improvements, despite this being a key part of our success as a species. Yet the need for improvement is ever more compelling. Here are some of the drivers...

- ▶ Global financial conditions
- ▶ High customer expectations
- ▶ Organisation's goals and targets
- ▶ Low productivity
- ▶ Low employee engagement

This article will cover some of the tools and systems of continuous improvement, such as lean and six sigma, but the main focus is on why making improvements has become so hard. Why is it that we struggle to implement the smallest of changes? What are the barriers to change and how do we overcome them? The aim is to present some simple strategies and help everyone see why continuous improvement should be something that they apply every single day.

It is important to understand the three different types of change within organisations, Disruption, Transformation and Incremental. Continuous improvement is defined as the incremental, step by step changes that are carried out by the employees (not done to the employees)...

Every person, Every process, Every day

Designing an improvement programme depends on the business phase of the organisation; Commodity, Product, Service or Experience and it is important to select a method based on this. It is possible to apply a manufacturing improvement method (such as lean six sigma) to a service operation, but the results will be sub-optimal. Another key decision is whether the improvements will be lead by experts (consultants or internal staff) or by involving everyone.

Finally, we will look at how to sustain continuous improvement. What should we measure, how do we track progress and how is it possible to manage the entire improvement programme in only one hour per month?

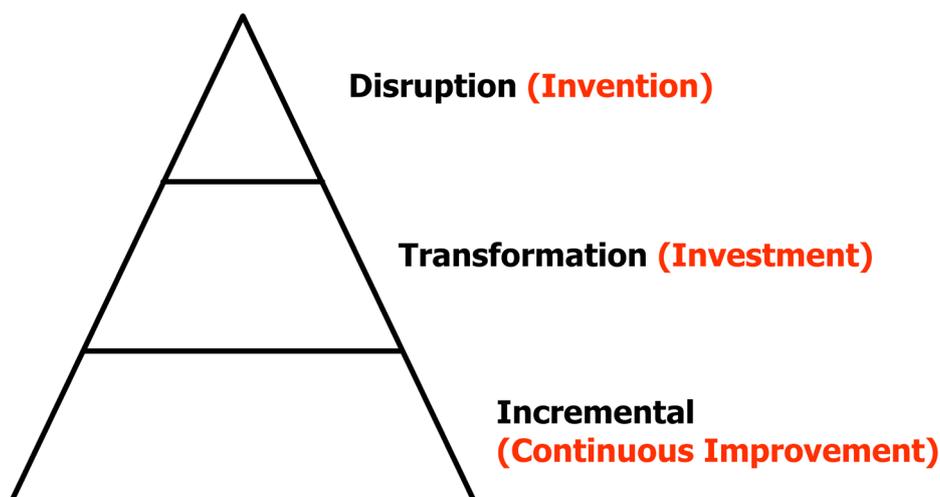
Top Tips for Building a Culture of Continuous Improvement

We need to recognise that it is often the culture of the organisation that impedes improvement. From our review of our past successes in making improvements, through the more recent difficulties, here are the top 5 things that would encourage more engagement from the entire workforce, ownership of problems and drive improvement...

- ▶ Drive out fear
- ▶ Aim for step by step improvements
- ▶ Give the people faced with the problem the autonomy to solve it
- ▶ Go and study the process, including collecting and analysing the data
- ▶ View all processes horizontally (break down barriers between departments)

3 Types of Change

There are three types or levels of change within organisations...



Disruption is really invention of a completely new product or service or entire new market. Examples include the motor car, which completely disrupted the horse and cart business, or iTunes, which changed the way that we buy and listen to music, or the interweb, which fundamentally changed the way that we work (and live). Such a change can bring overnight success. However, they tend to come along once in a generation, so should not be the entire basis for your improvement programme.

Next are Transformations. These are large projects that command lots of attention from the leadership team. There are significant resources allocated, budgets approved and the programme will be carefully monitored and managed. Examples include acquisition of a new business or construction of new premises or outsourcing the back-office functions etc. These are large initiatives and any organisation, regardless of size, should limit the number to one a year or one every two years, to avoid the risk of staff burn-out. Some organisations attempt to implement continuous improvement as a transformation initiative, undertaking huge training programmes, recruiting external experts and imposing new ways of working. This can feel as if continuous improvement is being done to the staff, forcing them to change. Engagement and on-going commitment tend to be low. As soon as the “experts” turn their attention elsewhere, the work and the workers revert back to the old ways.

The final type of change, incremental improvement can lead to really significant changes, simply by taking many, many small steps. This is true continuous improvement. The concept of amplification is critical and is the key to successfully building a culture of improvement.

Daily Problem Solving

Solving problems is the simplest way to think of continuous improvement. Problems confront us all the time and solving those problems is what drives improvement. Terms such as process improvement or quality improvement may have a slightly different emphasis but they are synonymous with continuous improvement.

Let's look at an example of the need for CI; I have recently opened a business bank account with one of the big clearing banks, a tortuous process that took 7 weeks. These banks make their money from businesses such as mine and attracting new customers must be a high priority. However, they do their best to push those potential customers away at the outset; the phone system takes forever to get through to speak to someone, the 25 page application form was repetitive and mostly redundant, but, worst of all, they consistently failed to contact me. Now I have been a private customer of that particular bank for over 30 years, but they had no record of my phone number and sent information to the wrong e-mail address on three occasions. I was so relieved to receive my new business cheque book after 7 weeks, only to be surprised to receive a second cheque book a few days later; they had opened two separate accounts, causing huge confusion, missed payments and made me an unhappy customer. Whether you call it continuous, process or quality improvement, that bank is in desperate need of some help.

Other examples of problems that need to be tackled within a variety of organisations...

- ▶ long waiting times for hospital operations
- ▶ it takes several trips to the dentist to get your teeth sorted
- ▶ too much time spent on admin paperwork
- ▶ customer complaints too high
- ▶ too many customer invoices overdue
- ▶ new product development cycle too long
- ▶ inventory level too high
- ▶ demand outstrips capacity
- ▶ costs are too high
- ▶ many approval signatures required for recruitment
- ▶ many approval signatures required to spend money
- ▶ too many defects from a manufacturing process
- ▶ inspection steps

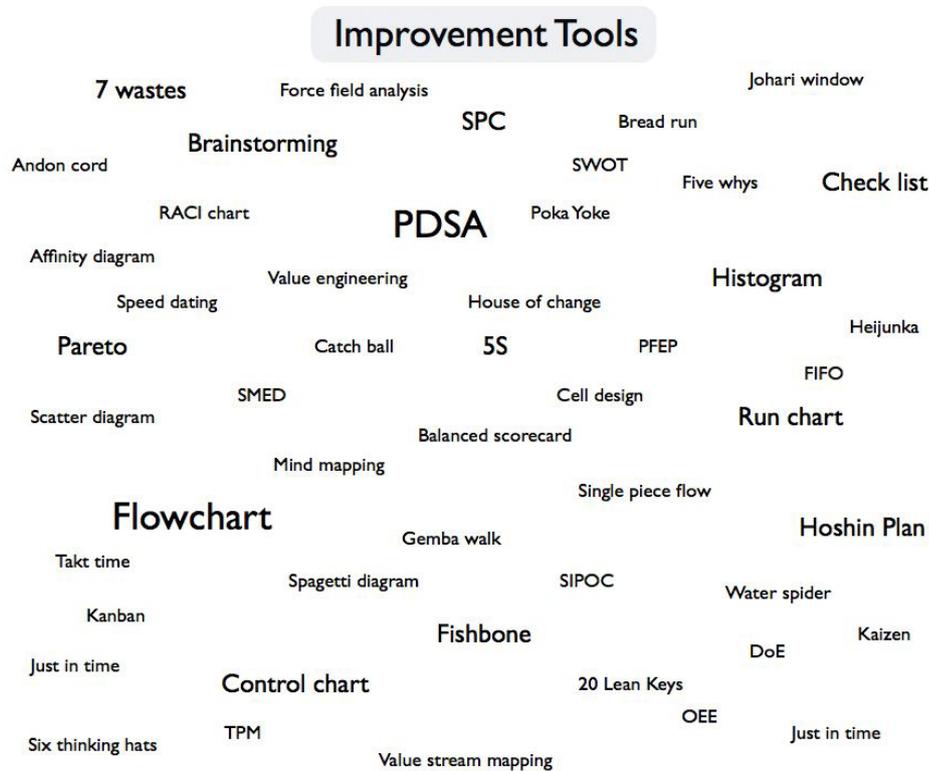
These are all process issues (not people problems) and continuous improvement can and should be applied.

It is interesting to note that many if not all wasteful process are the result of a lack of trust. For example a site manager has the responsibility for authorising thousands of pounds of overtime each week but needs head office approval to run a continuous improvement training course that has the potential to substantially reduce this overtime - lack of trust. A long check-out queue forms because the check out assistant needs supervisor approval to apply a senior citizen's discount - lack of trust. Companies send each other invoices - lack of trust. Documents need a manager's signature - lack of trust.

We will return to the issue of lack of trust when we look at Taylor's Scientific Management.

Beware the Tool-Heads

Many organisations employ continuous improvement; in fact the leading companies in any market sector always have an improvement methodology. However, for the vast majority, CI is just a collection of tools. These may be stored in a manual or electronically on the intra/internet and may have a helpful piece of text explaining how to use them; they may be useful but are seldom used. Why is this? Firstly, it is often difficult to see how a particular tool might apply to your situation and, secondly, there are often huge lists to choose from. Here is a diagram containing some of the improvement tools available; see how many you recognise.



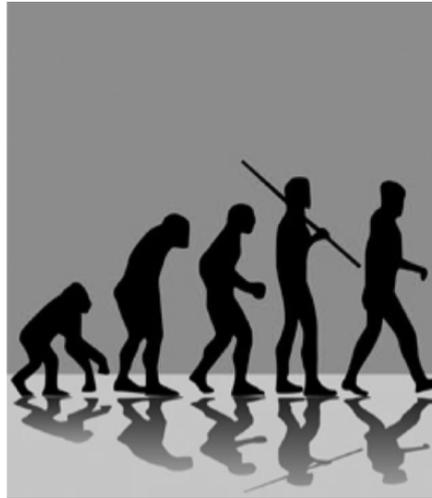
Conversely, some people become enamoured with a particular tool and want to see it applied everywhere. A common example of this is 5S (Sort, Set in Order, Shine, Standardise, Sustain); a tool for organising a workplace. A 5S workshop can have dramatic impact visually but leave the underlying processes untouched. A word of caution - when all you have is a hammer, just about everything looks like a nail.

Tools without a process will seldom be effective.

What we can Learn from our Ancestors

In the beginning there was no continuous improvement; however, we can trace the first sparks of CI to a period around 2 million years ago. Earlier than that, about 7 million years ago, our early ancestors moved out of the forest onto the open savannah of east Africa (more correctly, the forests moved away from them due to climate change). This was australopithicus, who walked upright for the first time and was the world's dominant hominid species for the next 5 million years. Little changed for these small ape-like creatures over that time period; then, quite quickly, evolution produced homo erectus, the first early humans to hunt and fashion complex tools. This species spread rapidly out of Africa to all parts of the globe. Anthropologists argue about what caused the change that created this highly successful, world dominating early human, but a clue may be that this evolutionary event coincided

with the first use of fire. The knowledge of how to build fires and ward off predators, particularly at night, would have removed the constant fear of attack for these little apes. How creative would you be faced with the threat of a sabre toothed tiger lurking in the shadows ready to eat you? (Never let historical accuracy get in the way of a good story!) Now able to relax under the stars beside a glowing fire, our ancestors were able to learn and communicate and improve their situation.



The taming of fire may have been the trigger that caused the hominid brain to grow larger and this key period of 2 million years ago is also linked with the development of the frontal lobe, possibly indicating the earliest signs of speech. I like the idea that this was the beginnings of continuous improvement; people were, for the first time, able to work together and solve the problems that confronted them, such as how to hunt more effectively, store water or travel long distances in groups. Make a note that this is the first requirement for successful improvement, removal of fear, and we will come back to that theme later.

This co-operative approach to improvement endured almost until modern day, but before we look at where this broke down, we need to make the distinction between CI and invention. Initially, our ancestors were involved in what we would class today as continuous improvement; working together, making use of materials they had to hand and testing alternatives to see what worked best. Conversely, the production of metal, such as bronze, required new resources, completely new methods and afforded a new range of possibilities, like tools and weapons; a disruptive change. This is not the aim of continuous improvement. The aim is incremental improvement, step by step. Occasionally, a breakthrough will occur and should be capitalised upon, but to set high expectations at the outset alters people's expectations; i.e. this will cost a lot of money, it is only for the research folk, it will be difficult, it will take a long time etc. This step by step idea is the second requirement for improvement; we will come back to this again later.

As man evolved from australopithicus to homo erectus to the homo sapiens that we are today, continuous improvement became a natural way of life. The simple problem solving was applied during the hunter gathering phase (better tools and tactics), the formation of settlements (better buildings,

sanitation), growing crops and keeping livestock (breeding to improve yields, fertilising the land) through to populating the great cities (planning the supply of food, government). However, in more recent times, improvement has become a service that is provided by others; we seem to have lost the link between facing a problem and owning that problem. We expect someone else to come in and solve it for us. The roots of this change could be traced back to the feudal system introduced by European monarchies and there are certainly signs that thinking was different during the industrial revolution but the transition was complete by the early 20th century. Next we will look at the ideas of Frederick Taylor, that workers were not paid to think. This highlights the third requirement for improvement; direct ownership of the problem and the autonomy to solve it.

Management and Workers

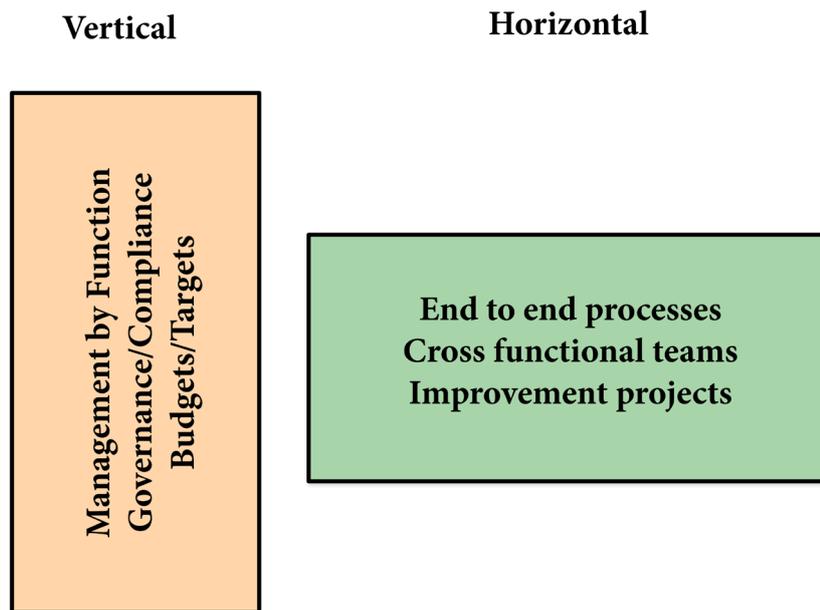
Frederick Taylor's book, *The Principles of Scientific Management*, was published over a century ago and was a landmark in the history of improvement. He studied processes, analysed data and made recommendations that dramatically improved productivity and output for clients such as Henry Ford and Thomas Edison. This is the fourth requirement for continuous improvement - study the process and analyse the data. For his time, he made very sensible suggestions but, unfortunately, these were at odds with the long established method of continuous improvement, where the people faced with the problem, faced up to that problem and solved it. Taylor believed that workers were "lazy and stupid" and that the only way to get them to work harder was to incentivise them with money, herein cementing the gap between management and workers that still exists today. It is a sad indictment on our ability to learn and improve that Taylor's ideas are still very prevalent in the current workplace.

The philosophy in Taylor's time was that there always had to be someone to blame and the workers were an easy target. Many of the factory and manual workers were new immigrants to the US and had little formal education. Unfortunately, Taylor and others equated illiteracy with stupidity and established the role of the manager as policemen to check up on and control them. We remain saddled with this view of management to this day and the lack of trust is a huge impediment to improvement.

The Time Study came from Taylor and he emphasised the use of piecework, where workers were paid for each task completed or part produced. His approach was focussed on preventing the workers from "soldiering" or slowing the pace of their work deliberately to maximise their pay, but this resulted in dehumanising the workplace. According to Taylor, the people were to blame and needed to be forced to work in a better way. Although *Scientific Management* fell out of favour in the literature, the spirit of mistrust between management and workers lives on. Even in more open organisations, where work has been done to bridge the gap and build more trust, workers still believe that management's role is to resolve their problems. In my view, the worst legacy from Taylor is the disconnect between the person facing the problem and the one expected to come in and solve it. This hierarchical view is further reinforced by the way that organisations are structured, by department rather than by the way that the work flows.

The Vertical World

Most organisations are separated into functional departments; i.e. finance sit with, talk to and report to other finance people. The idea is functional excellence, to become really good at finance or marketing or production. However, the real world operates horizontally, requiring many departments to work together to provide the organisation's service or products. However easy it may be to run a project within a functional department, this will have little impact on the overall system as this is usually dependant on cross-functional interaction.



In the beginning, problem solving was simple, but barriers have emerged meaning that improvement no longer occurs naturally. Therefore, if continuous improvement is to be successful and to become a way of life, we need an improvement system.

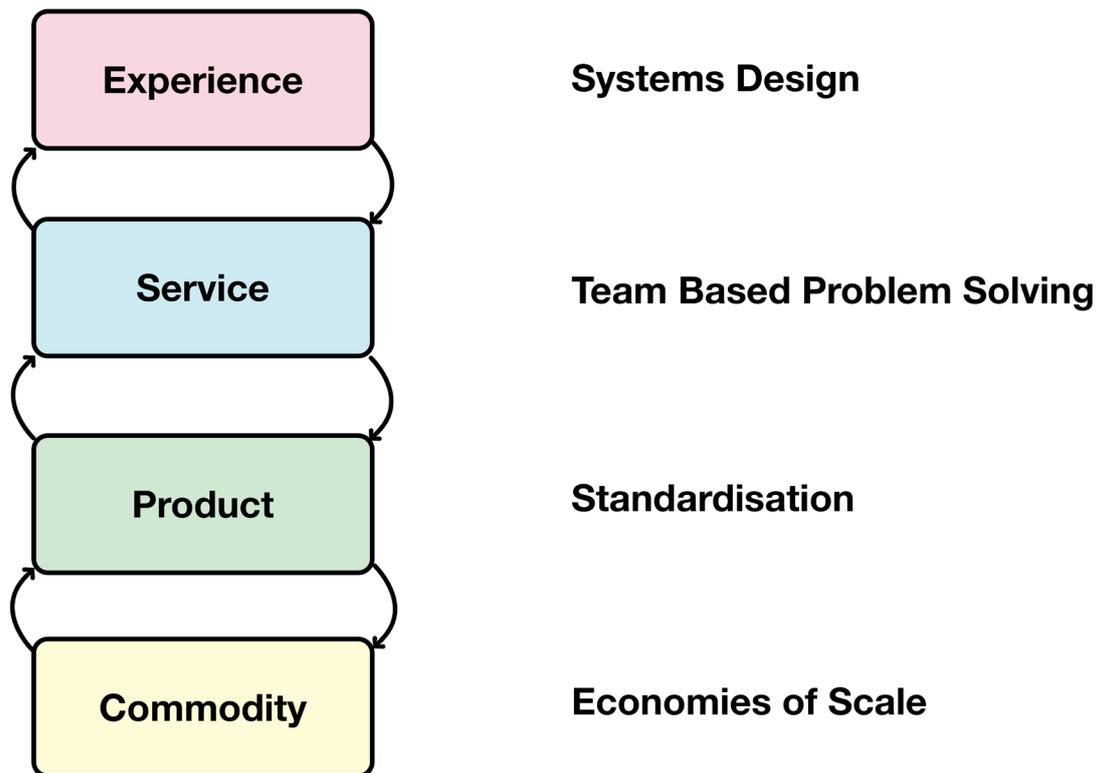
The Need for Improvement Systems

Our ancestors made rapid evolutionary progress by working together, solving the problems that they faced and learning from each other. This is the basis of continuous improvement. However, in our attempts to add structure, particularly post-industrial revolution, we have added complexity and broken the link between the person facing the problem and the one expected to solve it. We also structure our organisations in a way that encourages sub-optimisation. Finally, the atmosphere of mistrust that pervades the workplace creates a fear of trying anything new as failures and problems are usually blamed on people rather than the process. This is not quite the same fear as our early hominid ancestors felt when faced with the probability of being eaten, but the effects are just the same; stifling learning and shutting down improvement.

In summary, continuous improvement does not happen naturally in our modern organisations. We need a continuous improvement system. The next section will give an overview of the most common systems, six sigma, lean and systems thinking, highlighting the positive and less positive aspects of each. Each is very good in certain situations, but less effective when applied outside of that situation. Before selecting an improvement method, we must understand the different phases of business.

The Improvement Experience

I like the simple explanation of the Experience Economy by Joseph Pine and James Gilmore¹ - four phases of business and the approach to improvement is different for each phase...



A good example is coffee. The farmer earns about 2-3p for the coffee beans he grows to make a single cup of coffee (Commodity). The supermarket that sells these beans, ground and roasted, gets about 15-25p (Product). You can buy a cup of coffee from a vending machine for £1 (Service), but you are willing to pay Costas or Starbucks £2.50 for the Experience of having a coffee served in a nice environment, with background music, maybe free WiFi.

Each of these stages is valid and necessary for the coffee business to work. However, I am interested in the different approaches to improvement and why applying the wrong method a stage will produce ineffectual results.

¹ The Experience Economy by Joseph Pine and James Gilmore

Commodity

If you are at the commodity end of any business, then margins are tight. The best way of improving your return is to get bigger and squeeze your assets; i.e. benefit from economies of scale. Depending on the type of commodity business that you are in, this could be increasing the acreage of coffee trees, or buying larger equipment to dig out the iron ore or building huge container ships to reduce logistics costs.

Product

If you are manufacturing or assembling a product, e.g. roasting and grinding coffee beans, then applying lean manufacturing techniques from the Toyota Production System makes a lot of sense. You are dealing with visible processes, which lend themselves to a focus on cell design, kanban signals and the elimination of waste. Or you may apply the statistical methods of Six Sigma in very large volume production. An external expert can quickly understand the product flow and make good suggestions for improvement. By running your organisation like a machine, you achieve the goal of standardisation, efficiency and reducing variation - producing the same every time at the lowest cost.

It would be a mistake to apply the improvement methods suited to commodities; i.e. just to get bigger. It is a fallacy to think that bigger factories and bigger equipment will automatically translate into lower costs. A small, local and lean facility can easily produce better quality and delivery at lower costs than the enormous factory in some other country. And this is true even when lower labour costs are available overseas.

Service

If you are involved in service, this is complex work that involves relationships between people and is usually hidden; i.e. is carried out in conversations, in computers and, increasingly, over the cloud. The best way of driving improvements in service is to involve the people doing the work in making the work better. Training everyone on simple problem solving allows them to make many, step by step, incremental improvements that can provide huge benefits for the customer, the employees and the organisation. A programme such as Practical Process Improvement works especially well in these hidden work environments.

It would be a mistake to apply the improvement methods for commodities or products to service processes. Just getting bigger is no guarantee of success for services. This is seen in the poor results obtained by centralising back-office functions in huge service centres, where the communication with the customers becomes more distant and convoluted. This makes the service worse and, usually, the costs go up, not down. Flawed thinking. Equally, trying to run a service organisation like a machine by applying lean manufacturing techniques affords sub-optimal results. The key here is that customers are people and rail against being “standardised”, by standard call centre scripts or rigorously timed appointment slots or being forced to be the same as the last person. Customers are not products and each may well have different needs and wants than the next customer. It can be de-humanising to force

conformity on them. Most of the stories in the press about poor experience with improvement methods are related to this mistake - running service organisations like machines, rather than focussing on the end to end customer journey.

Experience

If you are involved in providing experiences for customers, then this should be designed with the customers. Not with the customers in mind, but actually involving the customers and incorporating their ideas and feedback in the design. The application of Systems Thinking would be appropriate here. Once you get your operation up and running, you need to involve your customers in continually improving the experience. Social media is particularly helpful here, but you should go one step further and involve your customers in defining and implementing improvements. Again, a simple problem solving method, such as Practical Process Improvement, can be very helpful.

Blending Methods

If your business is vertically integrated and you have several phases in your business, for example product manufacturing and service provision, then a blend of methods might be appropriate. The most common is to find lean manufacturing within product operations and problem solving (PPI) in the service side of the business.

Continuous Improvement Systems

The application of improvement tools on their own have little impact on an organisation; the tools need to be organised into a system. However, a system is more than a collection of tools and advice on when to use them, a system is a way of thinking, a methodology. Here are the main themes of the systems that we will examine...

- ▶ Lean - waste elimination
- ▶ Six Sigma - variation reduction
- ▶ Systems Thinking - system redesign
- ▶ Practical Process Improvement (PPI)

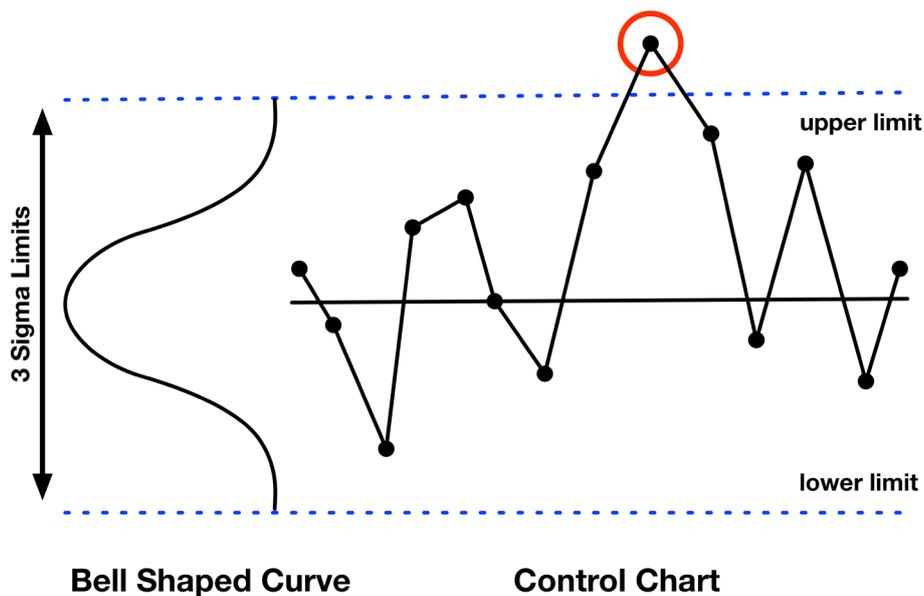
In order to understand the basis of these systems, we need to start at the beginning, meaning the work of Walter Shewhart in the 1920's and 30's and W. Edwards Deming after World War II.

Shewhart - Father of Modern Quality Control

Dr. Shewhart developed a simple way of looking at data as a way of understanding variation, his Control Chart. This allows us to distinguish between Special (or Assignable) Cause from Common (or Natural) Causes, which is crucial because the actions taken will be very different...

- ▶ Special Cause Find it and fix it
- ▶ Common Cause Study the process via the 4 M's and an E (Machine, Material, Manpower, Methods and Environment) to find the root cause

He developed his ideas² while working for Western Electric, a company that supplied telephone equipment. The expense of digging up buried equipment was significant and Shewhart wanted to reduce the variation in the production process. On 16May1924 he wrote a one page memo to his superiors outlining the Control Chart, a third of which was taken up by a simple diagram...



Shewhart's insight was profound and simple but, nearly 90 years later, many managers in organisations fail to appreciate the importance of the difference between Special (Exceptional) and Common (Routine) Cause variation and are doomed to making bad decisions accordingly. This is probably because most people shy away from statistics (probably due to the way that it is often taught). Thankfully, the work of Dr. Donald Wheeler has given us very simple means of plotting and analysing control charts that are accessible to everyone, even those with little or no knowledge of statistics. Understanding variation is fundamental to continuous improvement and everyone should be able to analyse data.

Deming - Systems Thinking and Profound Knowledge

The ideas of Shewhart were taken up and developed by W. Edwards Deming³, who had a profound effect on the world of quality improvement, particularly in Japan.

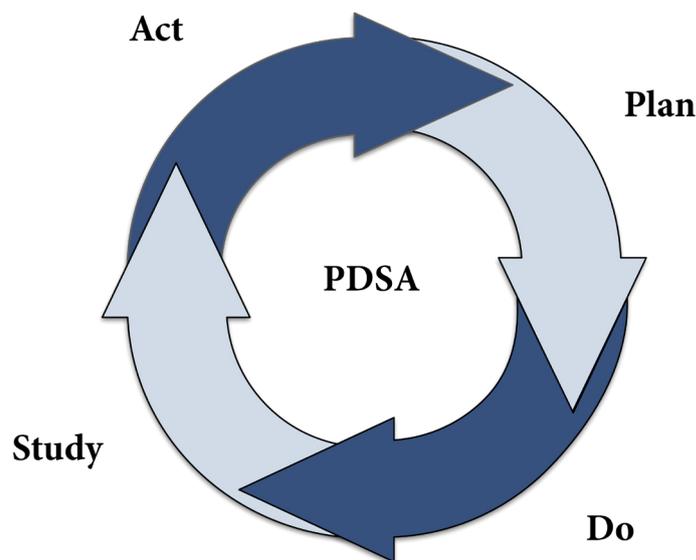
Deming taught statistics as a means of controlling quality but he expanded Shewhart's thinking, focussing on the crucial role that management plays in designing and operating the system. His

2 Economic Control of Quality of Manufactured Product (1931) by Walter Shewhart

3 The New Economics by W. Edwards Deming

famous Red Bead Experiment demonstrates how willing workers are often punished or praised for things that are out with their control; a lack of understanding of variation and the difference between Special and Common Cause.

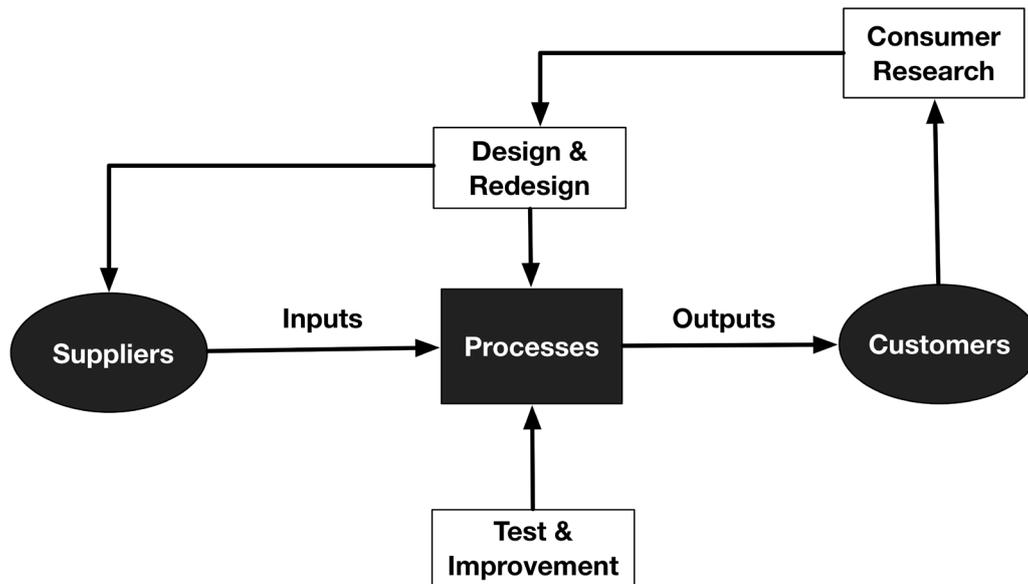
It was Deming who popularised the use of the Scientific Method of Plan Do Study Act (PDSA), although he always referred to it as the Shewhart Cycle.



This model, PDSA, is probably the most significant in scientific advancement as it is the basis of all experimentation. The idea of planning a change, carrying it out, studying the results and acting on what you have learned is simple and powerful, but often overlooked as people reach for a more complicated tool in the mistaken belief that it is more sophisticated. Another key point that is often missed is that the method is cyclical and it often requires several cycles to refine a change before full implementation.

Deming had his greatest impact on Japanese industry, where he taught a number of seminars after World War II focussing on understanding how the system determines quality. He emphasised that to improving quality you need to get things right the first time, as opposed to inspecting out mistakes, and viewing everything as an interconnected system. He used his famous model, where production is viewed as a system, for his lectures in Japan in 1950; here is that model...

This has been developed into the SIPOC Model, although Deming himself never used that term. SIPOC stands for Suppliers, Inputs, Processes, Outputs, Customers; this is the basis of process mapping and value stream mapping that are so popular today.



Deming's ideas of viewing everything as a system led him to develop his System of Profound Knowledge, consisting of four parts:

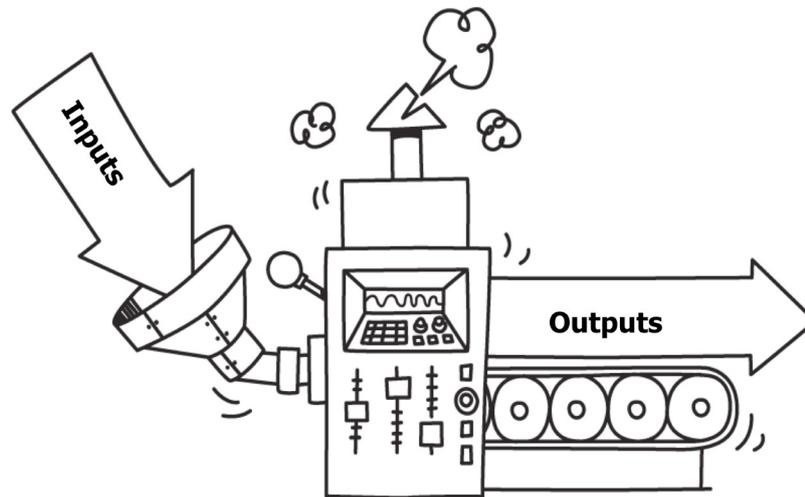
1. Appreciation of a system: understanding the overall processes involving suppliers, producers, and customers (or recipients) of goods and services
2. Knowledge of variation: the range and causes of variation in quality, and use of statistical sampling in measurements (based on the work of Shewhart)
3. Theory of knowledge: the concepts explaining knowledge, the overlap between truths and beliefs, and the limits of what can be known
4. Knowledge of psychology: concepts of human nature and change management

He also devised his 14 key principles for management to drive quality improvement. These are given elsewhere but I will pick out my favourites from his original list...

- ▶ Drive out fear so that everyone may work effectively
- ▶ Break down barriers between departments
- ▶ Institute a vigorous program of education and self-improvement

It took many years before Deming received recognition outside of Japan, but many people now talk of systems thinking and the roots of most thinking in quality improvement can be traced back to his teachings. However, his ideas are not part of an improvement system that organisations can pick up and implement; it usually takes some detailed study and effort. Therefore, let's look some of the most common continuous improvement systems.

Lean Manufacturing



Lean is derived from the Toyota Production System (TPS), although the term lean was coined by Jim Womack and Dan Jones. The publication of their study into Toyota's methods in 1990, "The Machine that Changed the World", was the first time that this new way of thinking was brought to a wide audience, but Toyota had been quietly working on their system for decades by that stage. The birth of the Toyota Motor Works in 1930 came out of the Sakichi Toyoda's early work on mistake proofing textile looms, which stopped automatically whenever a thread broke. The money gained from the sale of patent rights to that loom provided the capital to start the car division. Deriving ideas from Henry Ford, Deming and the simple restocking of American supermarket shelves, the architect of TPS, Taiichi Ohno, changed the rules of the game. He rejected the concept of economies of scale (quantity) and set about devising a system that would build-in quality and supply material just in time (JIT).

The surprising thing is that Toyota were very open and let anyone visit and learn the TPS, even their closest competitors in the car industry, because they believed that western companies did not have the culture to adopt the system. This has proven correct as most organisations that have implemented lean have only a collection of improvement tools, not a new way of thinking.

The Toyota Production System is the embodiment of continuous improvement and is the best example that we have currently for manufacturing or assembly. However, despite the potential benefits, it remains hard to implement and organisations with little history of continuous improvement will struggle to adopt lean, ending up with fake lean. The core ideas within TPS are very different from the way that western organisations work...

- ▶ leadership comes from the trainers and coaches of the system
- ▶ problems are opportunities for improvement, so should be highlighted
- ▶ if a problem occurs, stop and fix it
- ▶ build in quality, even if this impacts short-term financial results
- ▶ organise the work horizontally

How many western organisations have their senior management leading improvement events and coaching their employees on how to solve problems? This is impossible in most cases because these senior people are too focussed on meeting short-term targets and delegate the key task of building quality into the system. The tendency to blame individuals (exacerbated by our current culture as lead by the media) means that problems are often hidden, not resolved.

It is interesting that Toyota have had very significant quality issues in recent years, leading to the recall of millions of vehicles. Does this undermine the Toyota production System and Lean in general? I do not think so. Toyota's problems probably stem from a change in direction, chasing quantity and profit ahead of their long-standing commitment to quality and the customer. As a company they have now surpassed Ford and General Motors and are the biggest motor vehicle manufacturer in the world, but at what cost? Should this shake our belief in the Toyota model? No, but it does provide a salutary lesson that even the best can falter if they deviate from their principles.

In spite of recent problems at Toyota, all manufacturing managers should study and learn from the Toyota Production System (TPS). Womack and Jones distilled lean into 5 principles...

1. Define value from the customer's point of view
2. Organise the work into (horizontal) value streams
3. Make the work flow
4. Do everything at the pull of the customer
5. Strive for Perfection

Unfortunately, most organisations skip steps 1 and 2 and jump straight into step 3 and apply all the tools for eliminating waste. The definition of the 7 Wastes was one of the most useful parts of TPS but unless you have defined what the customer values, how can you decide what is waste from their point of view? However, here are the wastes that can be found in all types of organisation...

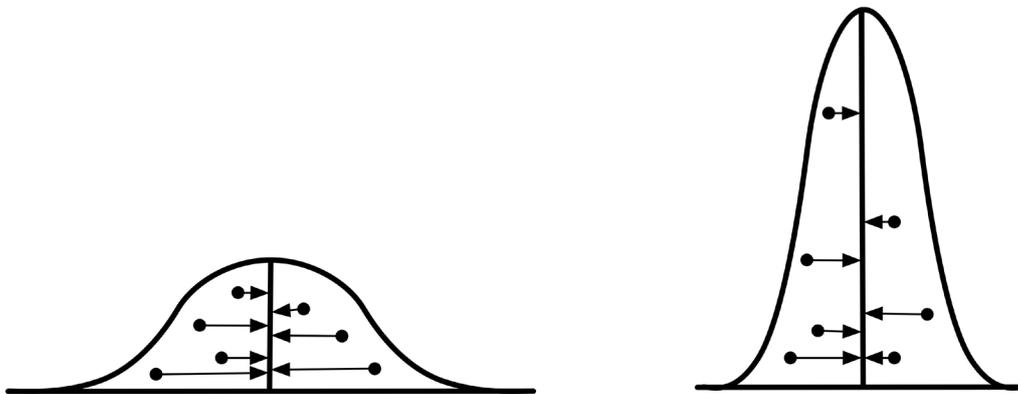
T	Transport	Moving materials & information
I	Inventory (Stock)	Stocks of materials, finished good,
M	Motion (People)	People moving, stretching, bending
W	Waiting	Materials, information, people waiting
O	Over-Processing	Doing more than necessary
O	Over-Production	Making too much or too soon
D	Defects	Errors that need to be corrected/ scrapped

Six Sigma (6σ)

Six sigma is based on statistical analysis that considerable time and study to understand. However, the key concept is variation reduction. In the words of Jack Welch who famously implemented six sigma at GE...

*“60% of six sigma is recognising that variation is evil;
the other 40% is about driving that evil out”*

All process have variation and results can typically be grouped under a bell-shaped curve. The statistical symbol σ , standard deviation, is simply a number that signifies how far away the points are from the centre of the curve; small σ means that the points are all close to the centre and the curve will be narrow and pointed, large σ means that the points are further away and the curve will be squat and fat.



For any bell-shaped curve, empirical evidence shows that more than 99% of the points will be within 3σ either side of the centre; if you take that out to 6σ either side of the centre, then you will capture 99.9997% of the points. The trick to six sigma is to improve your process so that the customer specification limits are 6σ away from the centre; this means that you will produce a defect (something outside of specification) only 3 times in a million.

Six sigma originates from Motorola in the 1980's and is structured under the acronym DMAIC...

- ▶ Define, Measure, Analyse, Improve and Control

Six Sigma can be a very powerful methodology and is particularly useful for very high volume manufacturing (a million made each week). There are different levels in the program, from Yellow to Green and Black Belts, and it can take many months of hard study to qualify. The advanced statistical analysis is beyond the average worker. For this reason, projects are lead by Black Belt qualified experts. Pure Six Sigma programmes have fallen out favour recently, with more and more companies choosing to employ the hybrid lean six sigma.

Systems Thinking

A system encompasses everything that you need to make your organisation successful (and this may be wider than the organisation alone). It is always better to start with a wider view and narrow that down as you learn more about your system, than risk taking too narrow a view. There are huge benefits to managing an organisation as (part of) a system; better alignment and direction, clearer roles and responsibilities, better overall results. The traditional (fragmented) approach assumes that each part can be managed individually, with the system taking care of itself. This creates the belief that it is important to keep people busy, keep them working, keep them productive. However, most organisations are busy working on the wrong things, busy fixing issues that they have created and busy serving targets not the customer. Everyone should take a step back and consider the system that they work in; is it managed as a system or as a collection of unrelated parts? The switch to systems thinking has the potential to transform the customer experience, make the organisation much more effective and make it a much better place to work.

There are three questions to ask of any system...

1. Who is the customer?
2. Who owns the system?
3. What is the purpose of the system?

The temptation is to fragment any system down into manageable, bite sized pieces. However, this raises the significant risk of sub-optimisation, where the parts of the system act individually to the detriment of the overall system and the customer. This is a natural consequence of people trying to manage their piece as best they can (it is not anyone's fault), blind to impact on other parts of the system. For example, a dental practice may schedule the dental and hygienist visits separately, in order to maximise productivity, but this results in patients (the customer) having to make two, separate trips.

The current exponent of systems thinking that is having most impact in the UK is Professor John Seddon of Vanguard⁴, who is lobbying service organisations and government to study systems and drive out the enormous waste of failure demand. John's mantra is that you must study your system. There is an excellent summary of the various system thinkers and their theories on the Vanguard website.

Things that get in the way of systems thinking...

- ▶ Functional departments
- ▶ Targets
- ▶ Outsourcing
- ▶ Productivity measurement

4 Freedom from Command and Control by John Seddon

-
- ▶ Poorly selected, analysed and reported metrics
 - ▶ Personal performance appraisals
 - ▶ Management by objectives
 - ▶ Global organisations set-up by function
 - ▶ The feeling that everyone should be kept busy, as busy equals productivity
 - ▶ Decisions made on intuition and experience (guessing)
 - ▶ The need to blame someone when things go wrong (scapegoats)

The problem with systems thinking is that it involves a complete system re-design, usually performed by outside experts. Leadership must accept and endorse the new ways of working, but existing employees can feel excluded from the changes.

Pitfalls of these Improvement Methodologies

We have established that we need an improvement system but the commonly available systems all seem to have drawbacks. I would recommend that these are considered and strategies developed to counter them. The drawbacks are...

- ▶ making things too complicated
- ▶ teaching complex tools that people struggle to understand and never use
- ▶ focussing on a chosen few people (experts) to run improvement projects
- ▶ applying a manufacturing improvement method and assuming that it will work in a service environment

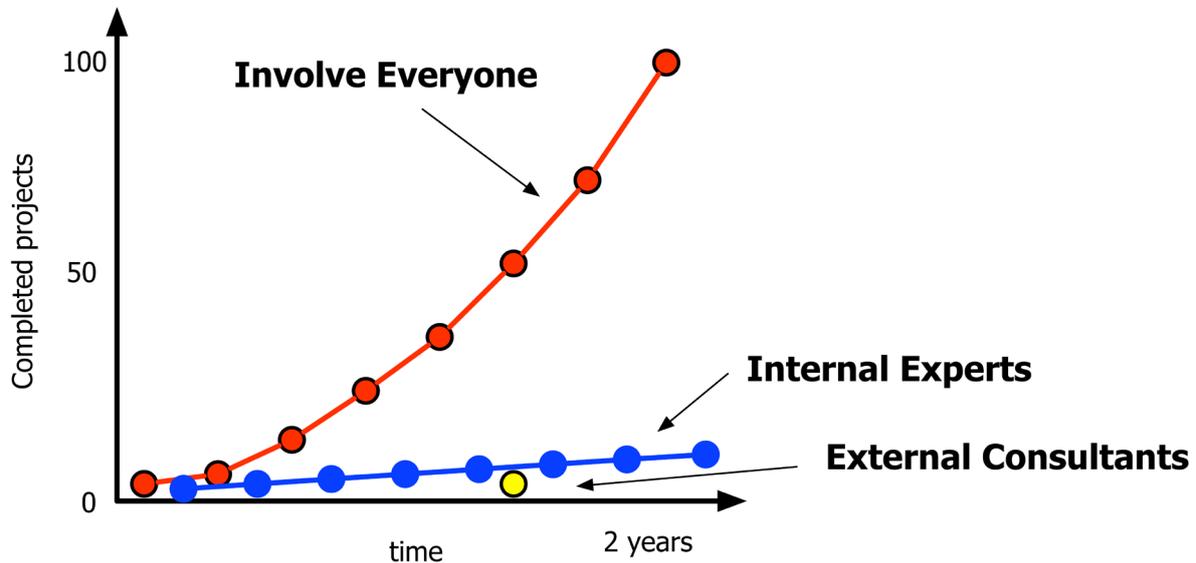
The final point relates back to the issue that we have come to expect someone else, a supervisor or manager, to come in and solve our problems; everyone should be identifying and solving the problems that confront them. Therefore, any organisation needs to choose an improvement methodology that they can teach/coach to everyone in that organisation. This probably means a program that can be adopted with little external guidance.

Amplify Your Improvement Efforts

The concept of amplification is critical in building a continuous improvement culture; it is the key to success. You do a little bit and this is repeated (amplified) many times over, throughout the organisation. Involving everyone dramatically improve results.

Compare the number of projects possible with the three approaches shown in this chart. Bringing in an expensive outside consultant may allow you to complete just one or two projects, then improvement stops. Setting up an internal team of experts, such as lean sensei or six sigma black belts, allows you to run a few more projects, but this is limited to about 10 projects over 2 years. Each of these projects

tend to be large, to justify the effort and expense, so failure of any one project can severely dent your overall programme. Contrast this with the amplification approach, involving everyone, and running dozens to hundreds of projects. Here, failure can be absorbed as a learning event, rather than being catastrophic.



Practical Process Improvement

We are fortunate to have an improvement programme that counters many of the pitfalls of other methods. It is PPI, Practical Process Improvement, developed by Ed Zunich and based on these principles...

1. Logical simplicity
2. Practical tools and methods
3. Involve everyone

PPI is a problem solving method where teams use the 8-Step Method© to operationally define the problem, study the current process and analyse the data to arrive at the solutions. Any solutions are then tested before being standardised, including updating the procedures and training, and the benefits calculated. The method is cyclical, based around the Scientific Method of PDSA, so ideas from the team that were outside their project boundary can be fed back to management as potential future projects.

The key advantages of PPI are that it is simple and that it works. I have seen hundreds of PPI projects and, as long as the team are given a good problem statement to work on, they will be successful. Having studied many continuous improvement programs over the years, this method is especially good for hidden processes, such as those found in service, transactional and administrative environments (the modern office).

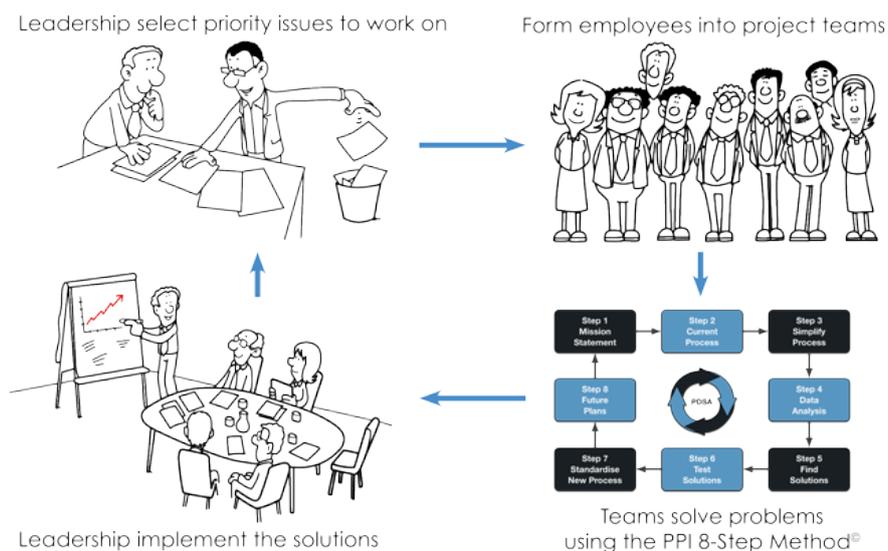
What is Continuous Improvement?

Some of the reasons that PPI is so effective are...

- ▶ it is simple and can be learned by everyone in the organisation
- ▶ there is well defined structure to work to
- ▶ there is a schedule, including a Report Out date
- ▶ the timescale is only 10-12 weeks and improvements are realised very quickly
- ▶ there are roles within the team and supporting the team
- ▶ this includes a Facilitator to keep the team moving through the 8-steps
- ▶ the project is started on Day 1, so there is a context for the training
- ▶ the tools are simple and practical but very effective when applied within the method
- ▶ the teams focus and prioritise, only solving the 20% of the problem that is causing 80% of the hassle
- ▶ this narrowing process leads to only one or two solutions to implement
- ▶ senior management commitment to implement the solutions is built in
- ▶ the teams generally work very hard but have fun

Here is how PPI works...

At the start, Leadership select the priority projects to work on. This is to ensure that important issues are selected and that there is a clear link back to the organisation's goals and targets. Employees are formed into teams of 5 to 8 people; these are people who work directly in the process being studied. They follow the PPI 8-step method to solve the problem and present this back to leadership for implementation of the solutions.



Conclusions

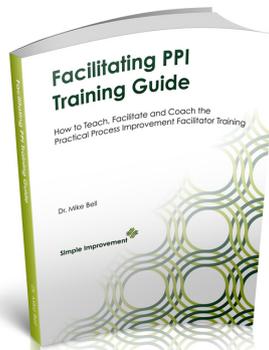
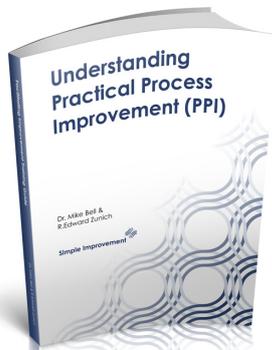
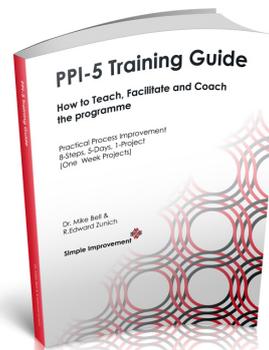
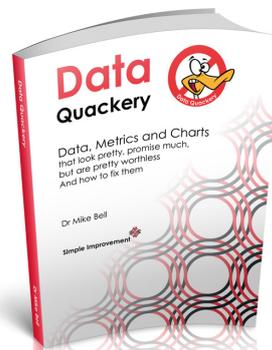
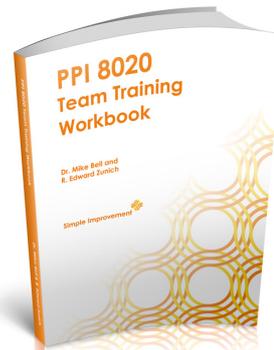
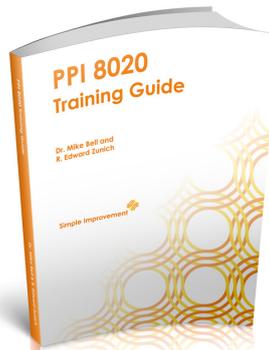
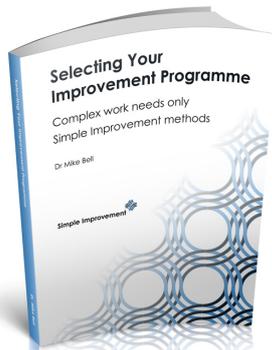
We must improve and to do that we have seen that we need an improvement system; anything else is just a collection of tools. There are many systems to choose from but an organisation just starting out on the improvement journey should be wary and answering these questions should help to avoid the common pitfalls...

- ▶ Which sectors does your organisation operate in?
 - ▶ Commodity, Product, Service, Experience
 - ▶ How will you ensure that your chosen improvement method suits your sector(s)?
- ▶ How many people do you want to make improvements?
 - ▶ will this be a few experts or the entire organisation (over time)?
- ▶ Who will conduct this training?
 - ▶ external consultants or in-house trainers?
- ▶ Do you want to realise benefits immediately or can you wait until everyone has been trained?
- ▶ How will you select projects to ensure that you are addressing the highest priority issues?
 - ▶ How will you ensure that these are step by step projects, not so big that they cannot be completed?
- ▶ How will you communicate about the improvement program?
 - ▶ What about the projects, the teams, the progress and the results/benefits?
- ▶ How will you drive out fear within your organisation?

The claim of building a continuous improvement culture in only one hour per month concerns leadership time. Any it is definitely possible. If you involve everyone in running hundreds of small, incremental projects, this spreads the improvement load. Many small steps, by many people adds up to very significant improvements.



Dr Mike Bell runs Simple Improvement Ltd, a continuous improvement training and coaching business based in Scotland. He uses Ed Zunic's Practical Process Improvement (PPI) programme to help organisations establish a simple improvement system where they can realise quick results and build an in-house capability to train and coach their own staff. He also campaigns against Data Quackery.



Some of the books by Dr Mike Bell
Order at www.simpleimprovement.co.uk
www.ppiex.co.uk
www.dataquackery.co.uk