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Some Thoughts on
OPERATIONALISING THE IMPROVEMENT PROCESS

ABSTRACT
There are many issues to navigate as a business attempts to operationalise the improvement process. At the request of several clients some of the "how to" with particular emphasis on the use of improvement teams will be addressed here.

OPERATING PHILOSOPHY

The first step should be the creation of an operating philosophy. Such a philosophy should be the way people know **what** to do, and **why**, rather than how to do it. A common error is to rush straight into the "how to". Action is important, as there is progress without it. However, an unguided albeit well meaning missile can be dangerous. A key role of leadership is to ensure that individuals and teams adhere to the operating philosophy. Eventually, it will become part of the culture. Until then, leaders are responsible to reinforce it at every opportunity. An example operating philosophy appears at Appendix 1.

TYPES OF IMPROVEMENT TEAMS

Many businesses can be found where the leaders have not given the improvement process any substantial structure. Many fail. The bulk of people work better when structure is present. This is particularly true of most middle managers. For these people, the structure is an essential part of the "how to". The most common forms of structures are the improvement teams and how they are incorporated into the organizational structure. Such teams can also be a forum for training. These teams provide a mechanism for undertaking the improvement process.

Essentially, there are two main types of improvement teams, local standing teams and project teams. A local standing team is one that routinely runs a distinct production or administrative area. Project teams take two forms. The first is one that is assembled to solve a specific problem after which time it disbands. In particular, such project teams are created when the problem being attacked runs through several departments or is technically very difficult. The second type of project team is a permanent part of the organizational structure. Its members may change and its objectives may change, but the team is a permanent part of the landscape.

ORGANISATIONAL STRUCTURE

Regardless of which type of team is being used, experience shows that any operation will benefit from a small group of full time troubleshooters/improvement experts. The six sigma movement calls such people Black Belts. Such people need statistical skills, a well developed ability to use quality and productivity improvement tools and the know-how to manage improvement projects. Also, they should be familiar with the business and the technology in use. Ideally, these people should have a roving brief. Their job is to work with managers to identify the most significant problems in need of resolution as well as the greatest opportunities for business improvement. A good rule of thumb is that a business should have two such experts for every 2-300 people. In corporations, these improvement leaders should be coordinated by a leader of statistical and improvement methods who reports to the CEO. Dr. Deming's book, Out of the Crisis, provides some additional guidance in the last chapter.

Local standing teams. This approach is well understood and widely used at Sola Optical Australia. Every manufacturing area has such a team. This team's job is to run the process on a daily basis and to conduct improvement projects within the operating philosophy. Generally, unless capital expenditure is sought, or a change involving high risk is being contemplated, the team may conduct trials and change the process as it sees fit. Providing the team remains mindful that the aim is to improve the entire process rather than one area, this should not present many difficulties. For example, there's no point improving yield in one area in such a way that even bigger problems are created downstream. Usually, the team leader will be the supervisor in a standing team, unless a leading hand or other responsible person is being trained to conduct these duties.

Project teams. Some guidelines for project teams are:

- Ensure that the team is process based, or drawn from all areas of the process being studied.
- Wherever possible, the level of authority needed to make changes to the process being studied should be on the team. When this is not possible, the team should report directly to the person who has the necessary authority. This is vital if the team is to feel empowered.
- In most cases you will need a balance of front line people, technical folk and supervisors/managers. All have unique skills, experience and abilities.
- It is not necessary for the most senior team member to be the team leader. For temporary teams, the most senior person may not have the most intimate knowledge of the process involved. Also, for a temporary team, the more senior someone is, usually, the less time he or she is likely to have available to dedicate to the project. One of the full time project leaders can led the team, or can act as an internal consultant.
- Not all members need to be full-time members. For example, people from Human Resources, Research and Development and from customers and/or suppliers (internal or external) can all be "visiting" members who attend meetings as they are needed. Avoid dragging people to every meeting if they can seldom contribute. Sometimes senior technical people are visiting members, but in technically difficult projects, they may be full-time.

Especially for temporary teams, don't hesitate to change the structure of your team. If you need to add members, do so. If you need to change someone's status from full-time to visiting, or vice versa, do it.

More clients have used project teams rather than the standing team approach. I don't believe there is a "right way". It seems technology plays a part here. In those businesses where large-scale machinery and/or high degrees of automation are found in conjunction with relatively small work forces, one of the project team approaches seems almost universal. Large petrochemical, cement, pharmaceutical and metallurgical plants are examples. When the business has smaller elements of differing technology linked together to form product processes, and where the processes are very labour intensive, the standing team approach is more common. It is possible to combine the two approaches, especially where several products using differing technology are produced. A step-by step checklist for projects appears at Appendix 1.

A CASE STUDY USING STANDING TEAMS

One approach is to create an operating philosophy couched as a clearly stated aim and some limiting conditions. Essentially, this is what Geoff Ward did at Sola Optical Australia. Once the Sola managers knew what they wanted to do, they faced the need for a how. They first outlined their operating philosophy. Then they isolated what would normally be termed natural work groups and created standing teams. Sola established 24 hour ownership of these groups by the day shift supervisor. In those organisations that work more than one shift, it may be necessary to create such accountability where it does not already exist. If ownership changes as shifts change, perhaps nobody owns it.

These teams were linked together to form product processes overseen by production managers. The teams and managers were then given a single aim, to reduce variation. To the best of my knowledge, it is the only superordinate aim Geoff Ward ever gave his team or process leaders. He gave them also some conditions, they included:

- **A process approach.** All work done and any improvements made must be conducted on a process base. Total costs and overall product or service performance was superordinate. The costs or performance of a cell or a department were subordinate. Customer focus was intrinsic in this condition, and was explicitly stated in policy.
- **Fact and data.** Whilst Sola encourages innovation and new ideas from everyone, they insist also on a scientific approach that demonstrates the validity or otherwise of an approach in data. Not only has this scientific approach exposed and disposed of much superstitious knowledge, but also it has been the anvil against which new ideas are tested.
- **Multi-disciplinary.** Each manufacturing cell has a team or work group, led by the day shift supervisor, that manages the cell. It will include operators, someone from maintenance, perhaps an industrial engineer and support from any other area that might be necessary at the moment. Teams can call for support from purchasing, production, planning and scheduling, accounting or human resources, to name some. It is this aspect that integrates the functional approach into the process approach. However, no one is in much doubt that when a clash of functional and process priorities exists, the process approach will prevail in most cases.
- **People and Ideas.** Sola recognises that it makes good business sense to utilise the intellect and ideas of its people. Rather than create yet another suggestion scheme that consumed hours of management time and which was overly subjective, they gave the cell and process leaders the power to investigate and trial new ideas as they saw fit. Only changes that are defined as having very high-risk potential or requiring capital outlay require senior management approval.

Even then for some projects small scale plant trials are undertaken before the executive team are made aware that the idea is under consideration. Other value statements relating to safety and how people interact with each other are implicit in this condition. They are explicit in policy.

Provided cell and process leaders adhered to the aim and the limiting conditions, they were free to act pretty much as they saw fit. Sola's senior people moved away from managing the work in detail to managing a set of aims and conditions and looking to the future. After a while, the cells became self-organising. The cell and process leaders now change the membership of the teams as the need rises. Sometimes they seek guidance on priorities, but largely they are left to themselves.

A CASE STUDY USING PROJECT TEAMS

The plants at ICI Botany's petrochemical site took a temporary project team rather than a standing team approach. In addition, individuals and informal teams did much ad hoc work. At the various plants, a project would be selected, a team assembled and the analysis commenced. Something the ICI folk generally did well was to avoid rushing into finding "instant solutions" and to spend the necessary time conducting sound analysis to ensure they understood the process and the nature of the attendant problems. A strong emphasis was placed on understanding and reducing variation. An early project led by Peter McDonald produced some spectacular results that provided impetus for follow up projects.

Also noteworthy was the co-operation that developed between plants. At ICI, it was common to have several plants linked in customer/supplier relationships. The improvement in their ability to see each other as customers and suppliers, and to work together to solve common problems was as outstanding as it was important to their improvement efforts.

Although the ICI Botany operations lacked some of the formal structure found at Sola Optical Australia, it was nevertheless present and leaders such as Jesse Moore, Peter Skellern and Ross Howie did a good job of keeping their people focused on a systems or process approach, understanding and reducing variation, replacing opinion with solid data and the development of good diagnostic skills.

A SECOND PROJECT BASED CASE STUDY

At WMC's Leinster Nickel Operations, even less formal structure was present than was used at ICI Botany. For the most part the teams were relatively informal. Because the metallurgical plant was large in scale and more automated, a few critical changes produced some remarkable results. Importantly, the Resident Manager, Peter Smith, personally led the analysis and subsequent changes.

Unlike Sola, where the labour intensive nature of the work required the leaders to gain the emotional commitment and co-operation of hundreds of people, Leinster was a more technology-based operation. At Leinster it made more sense to use a project based approach rather than one based on standing teams.

SOME PROS AND CONS

The standing team approach is generally more difficult and time consuming to establish. Given that it is mostly used when it is necessary to get many people singing off a single sheet of music, this is no surprise. However, one advantage of

this approach is that once the improvement process and the team approach becomes largely cultural, it is more self sustaining than is the temporary project team approach.

The project approach is more dependent on leaders maintaining focus and impetus, but only if the project team approach is not built into the organizational structure. When the project approach is not built into the physical structures of the organisation to the same degree as is the standing team method, it is more susceptible to being upset by changes in leadership. This is not to state a preference of one approach over another. The nature of the business will dictate, at least to some degree, the type of approach used.

Nonetheless, there is strong evidence to support the idea of building the project team approach into the organizational structure. Several clients have discovered the power of having a small group of people permanently assigned to mid to long-term projects. Because the day-to-day issues do not distract them, such teams have, in my experience, always achieved breakthroughs in performance. It is remarkable how many companies use full-time project teams to solve a pressing problem, and once this has been achieved return to the organizational structure and operating philosophy that led to the crisis in the first instance.

When the project team approach is built into the organizational structure, it is common for its members to change as the type of problem faced changes. For instance, at one company the full time project team initially comprised seven members whose focus was to stabilize and improve operations. The big problem was stoppages. Once operational stoppages were all but eliminated, the focus shifted to mechanical and electrical breakdowns. Five of the team members returned to operational jobs and four new members with a strong maintenance/engineering (electrical and mechanical) background joined the team…and so on. Whilst this team is a permanent part of the organisational structure, its membership is not.

Another company created two such permanent project teams. One focused on finding and eliminating the "special" cause upsets and operated to a time horizon out to about a week or so. Another permanent project team focused on the mid to long-term issues, often involving re-engineering.

EMPOWERMENT?

This is a much over-used term, but it is used here because I can't think of a better word. **A team is not empowered if it does not hold the power to change the process as indicated by its analysis.** Clearly, teams cannot spend money on capital equipment, and high-risk trials should be brought to the attention of an executive. Nonetheless, if we want high levels of ownership and commitment, and if we want the improvement process to become part of the culture, a shift in power so the teams can make most of the necessary decisions will be necessary.

There are a few hallmarks of successfully empowered teams. One is an environment of mutual trust between the team members and managers. Another is a shared vision, from which springs the operating philosophy. In addition, the teams must be provided with the skills they require. At Sola, the Manufacturing Manager or one of the Production Managers personally guided every team until the teams had found their feet. This was an enormous time commitment, but it paid huge dividends. Finally, the teams will need systems that support their activities. For example:

1. Do the pay, reporting and other management systems encourage a process or systems approach; or do they drive people into their own "pigeon holes"?
2. Do the purchasing systems help people do a good job by providing uniform raw materials, or are they purchased on price?
3. Do we have maintenance systems that provide reliable equipment?
4. Does new product development include the manufacturing people, so initial design of product and process is done in such a way as to optimise the chances of producing good quality products at low costs from the outset (design for manufacturability)?

As Rob Guttentag of Australian Vinyls stated, the crux of the matter is that teams will struggle unless managers get their behaviours right.

PROJECT MANAGEMENT

Project selection. Many texts suggest you choose something relatively simple to start with, but this approach seldom works well. Even if you are successful with, say, a full-blown attack on photocopier waste, the project will not enjoy high visibility and the team seldom draws a lot of satisfaction from the result. Such projects are rarely a good starting point. At the other end of the spectrum, choosing a difficult project with inexperienced team members may not be a good idea either. You may be setting yourself up to fail. With a new team, choose something that looks like it can be solved in a reasonable time and which will produce a notable victory.

Setting the project aim. The aim should always be expressed in outcomes, and at as high a level as possible. For instance, a poor aim would be to "reduce labour costs". Such an aim, at least in part, states a solution rather than a desirable process outcome. A better aim would be "reduce unit costs". This aim allows the team to examine cost structures, gather some data and decide where they can best impact on costs. For instance, if a ten percent reduction in labour costs was roughly equivalent to a one percent improvement in yield it might be profitable to increase both labour costs and yield. Armed with this type of knowledge, and with an understanding of other business priorities, the team then decides which areas of the process to focus on. Some common traps are:

- Selecting a solution rather than a problem or a desirable outcome. We think we already know what the problem and its solution is, but often, we are wrong.
- Selecting an aim that is at too low a level. "Fix the mould washing machine" is an example of an aim that is probably at too low a level. The machine is not the problem, damaged moulds are the problem. In this case the team should aim at "reducing mould damage". **If** the data indicate that the biggest problem area is the washing machine, by all means focus on it, but prove this in data first.
- For new and inexperienced teams, choosing a project that is overly complex or difficult.
- When starting in a new area, choosing a project that is unlikely to enjoy high visibility or to give team members a sense of satisfaction.

Last year, Rob Guttentag of Australian Vinyls gave his operations the aim of reducing variation. Since February of this year one of his plants has produced 243 tonnes per day, plus or minus five tonnes per day, an outstanding result indeed. Clearly Rob and his staff did much work to achieve this result, but do you believe that it would have been achieved if a different aim had been set?

Conduct of the project. In many companies, temporary project teams fail or sub-optimize because the team's work is not given a high enough priority. If we are too busy to attend improvement team meetings, we are too busy to improve. As absurd as it sounds, this situation is quite commonplace. Consider this discussion:

Question	"Why were you not at this morning's improvement team meeting?"
Answer	"I was too busy doing **********"
Question	"What is your job?"
Answer	"To make better product at lower cost?"
Question	"The method we have chosen to do that is through the improvement teams. They are our priority"
Answer	"But you don't understand, I was **busy**"

Can you see the trap? Too often we confuse urgent with important. Many things are urgent, but in many cases the business will do just fine if they are not done at all. How will the business fare if we fail to do those things that bring about improvement? **Busy** won't necessarily pay the bills, improve quality or improve service levels. For temporary teams, regular meetings are essential. Sometimes, in the middle of a data-gathering phase of the project, meetings will last for only a few minutes, but all regular members should attend them.

Training. Much training can be done during team meetings. For some clients, this is the way most of the training in tools such as Cause and Effect Diagrams and Pareto Charts has been done. However, most, if not all team members should have a basic grasp of the key principles and tools. Understanding variation (common and special causes), being able to gather data, an ability to plot points or construct a Pareto Chart, knowing why every idea or opinion must be tested in data and a basic grasp of systems thinking are all necessary if we are to get the most from team members.

Documentation. Apart from check sheets (and other data gathering devices) and charts, the only routine documents generally used by temporary teams are logs, agendas and minutes. Don't get bogged in paperwork. However, an outline agenda can help the team to stay focused on what will be discussed, and by default, what will not. General discussions can take place elsewhere. The team meetings should stick to the job at hand. Minutes are a good idea to make sure we all know what our job is. Avoid having them typed. Use a standard form (see example below), write it out by hand as the meeting progresses, and photocopy and distribute it to all team members before they leave the meeting. Do keep a file that contains copies of all relevant data, charts and other records including a log. Some projects can last for months (it took 18 months to stabilise the E-Lines process at Sola, let alone start any improvement). These records are valuable for briefing new team members and provide the basis needed for requests for funds or other resources. Most teams will be called on to conduct presentations; these records are invaluable during preparations for these presentations. Again, don't get bogged in paperwork, but do keep these records.

EXAMPLE TEAM MEETING MINUTES

Minutes of ……...improvement team meeting held on……

ITEM	DISCUSSION	ACTION	BY WHOM	BY WHEN

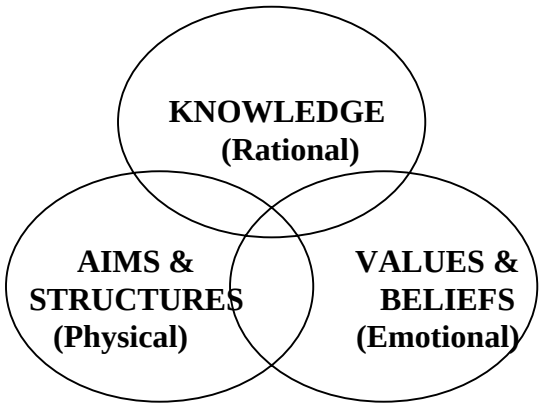
APPENDIX 1
To Wysowl Newsletter No. 6

EXCERPTS FROM COURSE NOTES

TOOLS AND TECHNIQUES FOR IMPROVING QUALITY AND PRODUCTIVITY

NEITHER RIGHT NOR WRONG
No method, policy, plan or approach is intrinsically right or wrong. We decide that something is either good or bad based on our Aims and Structures, our Values and Beliefs, and on our Knowledge

THREE HUMAN EXISTENCES



We start with the development of an Operating Philosophy, or if you prefer, some key guiding principles, that are broad enough to apply to everything we do and yet specific enough to guide our actions.

EXAMPLE OPERATING PHILOSOPHY
or
KEY PRINCIPLES

1. **A "process" approach to everything we do:**

- Customer focused, whether internal or external.
- Work upstream, even if you must cross departmental boundaries. Usually, working where the problems manifest themselves is too late.
- Use process rather than department based project teams.
- The flow chart **is** the organisation chart for a process.
- Measurements must be couched in terms of the customer and the process rather than departments.
- Use customer models to determine measurement points.

2. **Understand and reduce variation:**

- What is it that great men and women do?
- Step one is always to stabilise the process (unless you intend to replace it).
- Don't over react or over control. Wait until the chart sends a signal to take action
- Work upstream, variation at input is difficult to control downstream.
- Don't manage variation, minimise it.
- Whenever possible, work on one variable at a time, whilst holding the others as steady as possible (unless you have the services of a competent statistician).

3. **Eliminate waste:**

- Know the cost of poor quality and advertise it widely.
- Measure "things gone wrong" and attack them. Initially, look for and eliminate red beads rather than trying to increase or speed up output.
- Work upstream.

4. **In God we trust:**

- All others must have data.
- Value experience and judgment, but do not rely on it
- All ideas and assumptions must be tested in data.

5. **There is always a better way:**

- So let's find it.
- Be prepared for emotional responses from those who have high ownership of an idea or practice you wish to change. Remember, at some stage this comment will apply to you.

6. **The inventory goes home at night:**

- A Hollywood mogul coined this phrase. He knew that the most important form of capital was neither financial nor asset based, but was in the form of intellectual capital.
- How well do we utilise the ability of our people? Can we do better?
- Every member of your team is your better in some way, do you know where?

A PROCESS FOR IMPROVING PROCESSES

1. Identify a problem or opportunity. The subject of your study should always be couched in terms of the work done and or the customer, and never in terms of a department, section or branch.

2. Identify the work process or processes involved. A preliminary study may be conducted to sketch out the scope and scale of the project.

3. Assemble a process-based team to address the problem or opportunity. It is vital that all the key areas of the process be represented, even if not all members are full-time members of the team.

4. Conduct the initial analysis. Usually this includes a flow chart of the process and control charts for key parameters. It is important to establish the state of the process before any changes are made so improvements can be quantified. Often it is possible to make some improvements based on a flow chart alone.

5. Stabilise the process. If your plots indicate that the process is not stable, it is imperative that unless a glaring problem/opportunity is patently obvious the first action you take is to stabilise it. An unstable process has no known capability. Cause and effect relationships are either difficult or impossible to establish in an unstable process.

6. Brainstorm and construct a Cause and Effect Diagram. No ideas are discarded initially. This is a divergent or creative tool. Don't allow discussion during brainstorming. This is a commonly "skipped" step in the process, perhaps because many people are more comfortable with a logical rather than creative approach. Don't skip it.

7. Collect data and build a Pareto Chart. In many cases, the necessary data do not exist. It will be necessary to devise a data collection plan to gather the data.

8. Repeat steps 6 & 7 until root causes have been located. A good rule of thumb is that between three and five Pareto Charts will be needed to reach root causes.

9. Plan an improvement to the process. In most cases potential solutions will become obvious during the data collection/Pareto phase. Where they do not, recruit people onto the team who may be able to help. Imagineer the perfect process.

10. Implement the improvement. If possible, do this on a trial basis, or on a small scale. Ensure the process is maintained in a stable state during implementation, or false results can be recorded.

11. Study data from the initial implementation/trial. What was learned? Did the trial work? If not, is a new trial under different conditions warranted? (Return to step 9.)

12. Act to standardize. If successful, standardize around the new method. As far as possible, error-proof the process by designing the controls into the process.

13. Return to step one and repeat, *ad infinitum.*

DEMING'S PDSA CYCLE

Dr. Deming spoke often of the Shewhart Cycle of Plan, Do, Study, Act. It is now widely called the Deming Cycle. The above "process for improving processes" is an expansion of Deming's approach.

Plan. Plan the improvement. What are you trying to do? Why? What will you do if the results are positive: If they are negative: If they are inconclusive? What variables or conditions could possibly mask the effects of the trial? Are all other variables being held constant for the period of the trial?

Do. Carry out the trial. Be careful that no other variables are changing during the trial, unless you deliberately want to make changes part way through the trial (for example, for half the trial period caustic soda will be added at 0.2%, and for the other half of the trial caustic soda will be added at 0.4%). If possible, conduct the trial on a small scale or in a reversible way.

Study. Study the results. Did the change have the anticipated effect? How do you know? By what data? Were there any side effects not anticipated at the outset?

Act. If the trial was a success, standardise around the new methods. Think about ways of making the process as error-proof as possible. If the trial failed or sub-optimised, find out why. Perhaps the trial needs to be done again under different conditions.

PDSA CYCLE