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Contents

Front Cover: Graphic of "The Eight Wastes of Lean Management" from Paul Simmenauer's paper **"Value Stream Mapping - a personal journey"** starting on page 9 of this edition of ***New Engineer Journal.***

FORMAL PAPER REVIEWS
Leading papers published in this Journal are fully refereed. This service is available through the **New Engineer JOURNAL**. Papers which are to be fully refereed for formal publication may be submitted at any time.

The 'Practical Experiences' Edition:
From project procurement through value stream mapping to performance management, to FIFO (the Fly-In, Fly-Out variety)

This edition of the ***New Engineer Journal*** is the first time (under this editor) the journal features a wide variety of articles covering the real world experiences of ***practicing industrial engineers***. Without exception, the stories told and lessons learned and relayed by the 'authors of practice' in their articles are both interesting, AND telling.

But first things first: Federal President Lex Clark presents his most recent report to the IIEA Federal Council and Institute members at the September 2014 AGM, held in Melbourne. The report is comprehensive in its coverage of both time events and the significance of each in the on-going development of our Institute. Significant current developments in IIEA's continuing evolution and integration back into Engineers Australia are both timely and informative. (Note: a special edition of the ***New Engineer Journal*** is planned to further facilitate these on-going changes in the new year). Following Lex's report, is an up-to-date listing of current Federal Council Directors and their responsibilities, contact details and State affiliations.

This edition includes an **'open letter to the editor'.** Robert Murphy writes that a conversation needs to be started amongst members of the IIEA about the need to train engineers to be both technically and commercially ready to play leadership roles in the era of today's rapid-pace and ubiquitous on-line businesses. Robert concludes that the old "Tayloristic" approach to strategic planning and 'innovation' is no longer valid.

The first feature article of this edition is from Michael Patterson – a 20 year graduate of the IE program of Monash University and an expert in project management – *"Introducing Project Procurement"* explains how the procurement function in project management now overshadows what was historically called 'purchasing'. Michael argues that the scope and professionalism of securing goods and services to meet project goals has evolved into a discipline far more comprehensive than ever before, and subsequently needs to be better understood. The article features a handy listing of the roles and responsibilities of today's project manager, authoring agent/ agency and project team members.

Paul Simmenauer (also a graduate of the Monash IE program, 2004) is the author of the feature article titled: *"Value Stream Mapping – a personal journey"*. Here Paul provides a brief on his experiences with using the VSM methodology to date and well illustrates 'his story' with clear descriptions and diagrams. The case study presented is illustrative of Paul's approach to VSM and demonstrates his successes to date on his continuing VSM journey.

'Radha' Radhakrishnan returns with an article based on his comprehensive experience as a leading project/ performance management consultant: *"Introduction to Performance Management – an effective productivity reporting tool"*, summarises Radha's 12-step practice approach to the design of an effective Performance Management System.

The final practice article in this edition is titled: *"Cycle Work – My FIFO Experience"*. The author is Jonathan Hickey – a member of the last graduation class of the Monash IE program, 2010, and consequently, a 'new engineer'. His story is both fascinating and informative. It provides insight into what a young industrial engineer has experienced flying in and out of major coal-seam gas projects in and around regional Queensland. He relates how the FIFO experience has impacted his professional development to date.

This edition concludes with a notice on the up-coming 30-year IE reunion, to be held at Monash University, Clayton campus, November 26th 2014. All members of the IIEA are most welcome to attend. I hope to see you there!

Dr. Damian Kennedy,
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IIEA and IES AGM Federal President's Report: 13 September 2014

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Thanks

I must first start by thanking members of the IIEA Board who have weathered through a year where there has seemed sometimes to be a lack of progress while we worked to ensure that our members, present and future, were both protected and placed in a position to benefit from the number of changes that are being developed.

Bob Watson in particular had something of a sea change during the year which didn't seem to prevent him from coming up with new ideas. Damian Kennedy managed to find authors for our New Engineer Journal while continuing to provide insight into how IE academics think. Scott Fairburn had to put up with my delays in sending through membership certificates and letters while we work towards a better system. Sam Ghaith organised our new IIEA name change while trying to get everyone together for teleconferences and Radha still confuses us as to how we use his name while he makes sure we have money in the bank. Mo Barghash has developed the means to produce our new IIEA website which should be one of our most valuable resources. David Beale waits patiently for us to provide him with the new IIEA promotion tools while Chin Hak Wong also waits patiently in Singapore while he must wonder what is actually going on in Australia.

It all seems to come together eventually.

Introduction.

I have had a long time association with the Institute of Industrial Engineers Australia (IIE), starting back in 1971 when I became the Director of Value and Industrial Engineering in the then Department of the Navy. Before this I had been training and practicing Industrial Engineering in the aerospace and marine industry since 1954. As the original Australian Methods Engineer Association was founded in 1953 and then became the Institute of Industrial Engineers in 1958, I have been around and been involved with practicing Industrial Engineering in Australia since it was formally recognised. However, it should not be forgotten that its earlier forms of Work Study, Methods Engineering and Time Study (or Time and Motion as it was more commonly known) has been around for a lot longer.

Over my 60 years or so of personal involvement, I have seen Work Study Practitioners and Industrial Engineers and many others evolving and applying a wide range of management engineering principles and practices. They were some of the first and some of the best Management Consultants. They were among the first to introduce computer systems into manufacturing and management. And they had to continually adapt to the ever changing demands of the industries in which they worked. There have been boom and bust times, and at present we seem to be in a bust time with the decline of Australian manufacturing and the fragmentation of the application of management consulting.

Starting in 1993, the IIE started its first moves to also become the Industrial Engineering Society (IES) of the Institution of Engineers Australia (IEAust, now more commonly known as Engineers Australia EA). At times, more than half the members of IIE have also been members, or were eligible to be members, of EA so there was some logic in this evolution. However, the recognition and limited acceptance by EA of our non-EA members became an issue with IIE, and the role of IES was not fully implemented.

While still remaining an independent Incorporated body as the Institute of Industrial Engineers (IIE), also becoming a Technical Society of Engineers Australia as the Industrial Engineering Society (IES), has a number of advantages. These include:

- Access to the EA administration system of membership applications and renewals which overcomes the continually changing support required of IIE volunteers.
- Access to the roughly 120,000 EA membership.
- Enhanced recognition of Industrial Engineering in Australia through EA, both locally and overseas.

However, these advantages come at the cost of needing to meet EA regulations and code of ethics amongst other requirements, not the least of which is Continuing Professional Development (CPD) of its members.

Yesterday.

When I became President of IIE in September 2012, our membership, while reduced, had stabilised under your previous President Daniel Kulawiec, who was also starting to participate the Engineering Practice Advisory Committee (EPAC) conferences in EA.

As I started to attend these twice a year EPAC meetings I began to better understand the problems, as did the other 27 Technical Societies with their own members, that IIE had with the lack of understanding and acceptance of the valuable roles that the Technical Societies could play if allowed.

At the following AGM on 5 October 2013, I reported that EA was reviewing its General Regulations, in conjunction with the Technical Societies, on the roles and requirements as the key Learned Society for Engineering in Australia.

Today.

During the Year 2013/14, the new General Regulations 2013 were finalised and are now much more acceptable to the Technical Societies. IIE members can now have confidence that most of the previous issues have been resolved, although there are still some to be worked on. As one of the only 10 Incorporated Technical Societies in EA, IIE is in a much better position to move ahead with the renewal of its IIE/IES role.

During the Year 2013/14, while the new General Regulations were being finalised, the Board of IIE has been initiating this renewal. These have included:

- A review of the existing IIE membership database prior to it being moved across into the EA database. This is a crucial development as without this link no IIE members can access any of the many EA services such as membership applications and renewals, training courses, CPD requirements etc.
- A review and renewal of our IIE website which has become out of date as well as looking dated. This will be linked to an IES page on the Engineers Australia website which will incorporate the new online membership renewal and application process. IES members can also join other Technical Societies through this system such as the Australian Cost Engineering Society, the Risk Engineering Society and the Systems Engineering Society of Australia.
- Discussions have been held with Engineering Education Australia (EEA, part of EA) as to the future development of Industrial Engineering courses and training opportunities.
- Discussions with some IE technique organisations (such as the now defunct ANZMA Modapts group) to obtain access to IE training material, videos etc which may be utilised in future EEA and Engineering On Line (EOL) developments.
- On 2 June 2014, "Australia" was officially added to our name as the Institute of Industrial Engineers Australia (IIEA). This was done to resolve a confusion with some other overseas IE organisations (particularly the US) that also use the name IIE. This also helps to confirm our partnership with Engineers Australia. All existing IIE documentation, our ACN/ABN code, post nominals etc are still applicable however.

Tomorrow.

In the short term, "Tomorrow" means the Year 2014/15. Over the next year, now that we are more secure in our IES relationship with Engineers Australia, IIEA will aim to put into operation those initiatives listed above, and more.

- Of particular importance of course is the transfer of the IIEA database across into the EA system which also becomes a record of a large number of those who have practiced Industrial Engineering in Australia over the years.
- The renewed ability of IIEA to offer new services, training and resources to its members and others should provide the opportunity to promote Industrial Engineering again in Australia and overseas. The role of our Journal, the New Engineer plays a valuable role in this. A Special edition is planned for May next year to detail how the above changes can be utilised by IIEA members and others who may be interested.
- As part of this promoting IE in Australia, the IIEA Board has also decided to develop and offer a Chris Heyde Award for Industrial Engineering innovation in Australia. This initiative has been floated to the MODAPTS people in Australia but will need to be developed further.
- With the strength of Engineers Australia behind us, and the resources such as EEA to work with, there is the opportunity to develop and negotiate with a number of influential and innovative overseas Industrial Engineering organisations for future collaborative activities.

Future.

The future as Industrial Engineers in and for Australia is in our own hands. This Report hopefully gives an indication that this could be an interesting and productive future, particularly for the present and future generations of young Industrial Engineers.

Industrial Engineering – a great career and a way of life.

Lex Clark
FIEAust CPEng FIIE, FIVMA
President
Institute of Industrial Engineers Australia

IIEA Directors for 2015

L to R: David BEALE, Dr.Damian Kennedy, Mo Barghash , Scott Fairburn, Alexander (Lex) Clark, Robert Watson, visitor, Sam Ghaith, Selvarajah (Radha) Radhakrishnan, Daniel Kulawiec

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- Dr. Damian Kennedy (QLD) (Journal Editor)
- Mo Barghash (VIC) (Webmaster),
- Selvarajah (Radha) Radhakrishnan (VIC) (Federal Treasurer),
- David Beale (NSW) (Promotion and Development Director);
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Open letter to the Editor of New Engineer journal: Re: Leadership: The End of the Taylorist Era!

To the Editor:

The business world is dramatically different today than it was even a few years ago; technology is driving a revolution within business modelling and this places high demands on business leaders. Today, competition is not just the domain of global scale-intensive industries because anyone with imagination can leverage a value proposition through the connections afforded by the world-wide web, and can do so at considerably less cost. Competitive rivalry increases as this new cohort of players enters the market with innovative business models. Recently the Business Council of Australia (BCA) made a submission to the Senate enquiry into Australia's innovation system rightly identifying the key role regulation has in setting macro environmental conditions that encourage it. The BCA offered three actions: a need to broadly define innovation and the system that underpins it, the need for competitive tax systems and a collaborative workplace relations system, assurance of skilled human capital with supporting knowledge systems. Innovation as the BCA suggest is not simply concerned with new products or research and development, but encompasses all business activity.

For business leaders innovation concerns the intent, purpose, direction, and destiny of their organisations; the strategic review process that today needs to be conducted every three years. Strategic reviews should aim at regeneration, but in practice they are often prescriptive transactional documents that provide corrections to previously held assumptions. Organisations move along predictable linear pathways where competitive rivalry, among other things, ensures uncertainty. But in dealing with uncertainty organisations simply open their tool kits and institute predictable linear improvements such as re-engineering, supply chain management, enhanced customer responsiveness, and of course cost controls. As a whole the industrial philosophy underpinning this is Taylorist: wealth creation by getting better at doing the same things. Strategic planning then, locks organisations into past practices and focuses continuous improvement towards resource allocations. The prescriptive calendar based budget process allocates resources to the strategy but in doing so diverts manager's attention away from the organisations purpose and towards departmental needs. This top-down approach forces reactive continuous business process improvement by concentrating on efficiency improvements such as better inventory management, order processing and purchasing.

The traditional strategic review process aim was to set unity of purpose, but in practice this has been internally focused and conservative. Resource allocations tie resources down to controlled predetermined parameters and largely eliminate the flexibility of staff by the need to achieve budget efficiency. The new global marketplace is one of rapid change, and this change is revolutionary; in this environment mental agility and speed in decision making is needed. The recommended period between strategic reviews is three years today, not that long ago it was five years and was considerably longer in the not too distant past. Strategic reviews are likely to become a continuum; a continuous creative process where intuitive leaders become catalysts and facilitators of the organisational team rather than the top dog pushing a plan that may well be out of date at time of approval.

For the broad cohort of engineers, what is the likelihood of progressing to the apex of organisations in the future? I believe the odds are diminishing simply because there is little debate within the profession around the broader development needed to steer organisations. Successful managers within industry require training and experience in business and engineering given technically inept managers can be deprived of support by their technical teams, and non-commercial managers may lack the acumen to deliver in a market economy. But a strong background founded in both business and engineering also helps to develop intuition, that is, the ability to reach sound decisions with insufficient information by drawing on personal knowledge and experience. Engineers during the 20th century needed full mastery of computer sciences and mathematics to assist the implementation of rational systems; engineers in the 21st century cannot limit themselves to modelling or optimising. A third skill must now be added: the capability of proposing new concepts through creative reasoning

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Introducing 'Project Procurement'

Michael Paterson
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Introduction

The majority of engineers will become project managers during their careers. While project management has been around since the 1950's, a component of project management is now generating more focus and is becoming a new area of expertise in its own right "project procurement."

Project procurement is a broad term to describe the processes to purchase and install the products and services necessary to see that project goals are met. Procurement may be a simple direct purchase, for example the one-off purchase of a piece of equipment, or it may require a contract for the provision of products and services across a period of time. Each project will require different products and services. The task of those responsible for procurement is to see that all products and services purchased are fit for their intended purpose and represent value for money.

Definitions

The terms purchasing and procurement are often used incorrectly and interchangeably, so we need to initially define them:

- ***Procurement*** is the overarching function that describes the activities and processes to acquire goods and services. Importantly, and distinct from purchasing, procurement includes the activities involved in establishing fundamental requirements, sourcing activities such as market research and vendor evaluation, and negotiation of contracts. It can also include the purchasing activities required to order and receive goods
- The term ***purchasing*** refers to the process of ordering and receiving goods and services. It is a subset of the wider procurement process. Generally, purchasing refers to the process involved in ordering goods such as request, approval, creation of a purchase order record (a Purchase Order or P.O.) and the receipting of goods.

Important Functions

The functions normally carried out by the procurement team such as establishing agreed procurement processes, conducting contracting and procurement activities, managing tenders and contract finalisation processes, reviewing supplier and contractor performance and the evaluating of best practices in supplier selection, many of these functions are also found in the duties of the project manager and his team. Importance is placed on how to best assist and identify with procurement to ensure the best outcome for the project particularly during the pre-planning stage leading into tender preparation and evaluation.

The Activities of Project Procurement

There are four activities of project procurement:- as summarised below in Figure 1:-

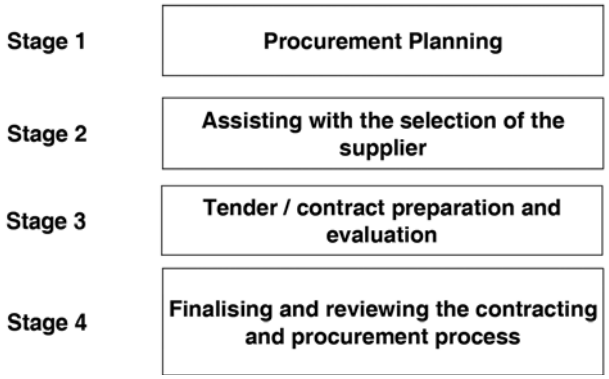

Figure 1: The four stages of Project Procurement

Planning for purchasing

One important aspect of successful procurement is that necessary products and services are available when required, and that the products and services meet necessary conditions and quality requirements. Research and planning is essential.

Assisting in the selection of a supplier

Requires an understanding of the market, as well as clearly articulated specifications and scope for what is being purchased to meet project requirements. The selection of the supplier provides an opportunity to use competitive processes to drive value for money. In some cases such as in the government sector there may be rules and guidelines about tendering and purchasing processes to be used.

Tender / Contract preparation and evaluation

For a direct purchase, once you have selected your vendor and transacted the sale no further interaction with the vendor is usually required. However if there is a contract to provide products and services over a period of time, then the contract must be managed to see that obligations are met. Good contract administration hinges on clear understandings of requirements and good communication.

Finalising the procurement process

Having received products, they must be assessed to ensure they presented value for money. Contracts should also be evaluated to see that performance standards were met and whether the contractor performed well.

Roles to be played by the Project Team in Project Procurement

The roles played by the project team in project procurement are summarised in Figure 2:-

Personnel	Responsibility
Project manager	Has overall responsibility for project contracting and procurement Supervises the work of others in procurement and contracting Leads planning, negotiating, managing and reviewing procurement and contracting
Authorising agent/agency	Oversees procurement and contracting across a range of projects Manages project managers supervising procurement and contracting Directs organisational processes to improve procurement/contracting
Project team member(s)	Works with others to plan project contracting and procurement Assists in developing tendering and contract documentation Gathers information and participates in selecting suppliers and contractors Participates in contract negotiation and contract management Contributes to administering and managing the contract Assists others to review contracts, contractor performance and procurement processes

Figure 2: roles played by the Project Team in Project Procurement

Consultation and communication with stakeholders are important processes when making purchasing decisions. Stakeholders may include those people who will use the products you purchase – they will have clear ideas about what will be required and will be able to assist you with developing the product. Other stakeholders may be people or groups who are not directly part of the project team but who have an investment in seeing that procurement takes certain factors into account. Stakeholders may, for example, be concerned about where certain products were sourced, whether people were paid award wages in the manufacture of the products, whether the product will cause damage to the environment, whether the products have health and safety risks to project workers or to the general community.

Conclusion

Project Procurement is constantly evolving and while a greater recognition of its importance has started to filter into project management, there is still a long way to go.

Value Stream Mapping – a personal journey

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Introduction

The purpose of this article is to introduce the topic of Value Stream Mapping based on the teaching and research of several noted experts and also to outline some of the basics of the VSM technique. I will also attempt to convey some of the experiences I have gained during various stages of my own VSM project and some of the difficulties encountered. I will not attempt the impossible task of describing all areas of Value Stream Mapping in great detail, but will hopefully generate enough interest with my comments to spark readers to begin their own VSM journey. There is a wealth of books, articles, websites and webinars out there to show you how to get started.

Background

When Womack and Jones in 1996 wrote their performance improvement book titled "Lean Thinking"[1], they based it on five key lean principles:

- Define value
- Identify the value stream and eliminate waste
- Flow
- Pull
- Perfection

Many readers of "Lean Thinking" subsequently embarked on waste elimination and work improvement projects in their own areas armed with the knowledge of these principles and following the five steps below from Womack, et al's "Chapter 11 - An Action Plan":

1. Find a Change agent
2. Get the Knowledge
3. Find a lever by Seizing the crisis, or by creating one
4. Map your Value Streams
5. Begin as Soon as Possible with an Important and Visible Activity

Unfortunately, many companies in their enthusiasm to implement their programs, skipped step four and embarked on waste elimination and continuous improvement initiatives in a small part of the value stream, but failed to improve the overall whole. In many cases there were no cost savings reaching the bottom line and limited benefit to customers in terms of quality or service. Subsequent results from early adopters of 'lean' were at best mixed.

In 1998, Womack and Jones describe the above events in the foreword of the Rother and Shook book "Learning to See"[2] as the catalyst for the new Lean Enterprise Institute to provide lean thinkers with an important tool to make sustainable progress in the war against waste. "Learning to See" is a Value Stream Mapping workbook based on research into lean concepts and the study of material and flow maps used by the Toyota corporation.

Essentially, a Value Stream Map is a visual representation of processes that convert materials and information into a product or service for the customer.

What Rother and Shook are quoted as saying here is that "Whenever there is a product or service for a customer, there is a value stream. The challenge lies in seeing it."

In the 2000s, VSM has been used widely as a tool in manufacturing as a result of the research completed by Womack and Jones in the nineties and the teaching of others who have leveraged the lean systems established by Toyota; however the method has also been used very effectively in the transactional processes of the service environment. The "Complete Lean Enterprise"[3] by Keyte and Locher (2004) covers VSM extensively for use in administrative and office processes and has been further developed by Martin and Osterling[4] with "Value Stream Mapping" (2013). This most recent book has been used to clarify the use of VSM in manufacturing and service settings as well as highlight the benefits for use in areas of leadership and strategy development.

Why Value Stream Mapping

I first encountered Value Stream Mapping as an Industrial Engineer at Bosch during 2005, but the method had remained dormant in my lean toolkit since joining Cummins in 2008 as a Manufacturing Engineer. Thinking about what Womack and Jones had said about the importance of mapping the value streams made me consider previous improvement projects I had been involved in. In many cases the results were as described in the foreword, sub optimal improvements that had limited benefit to the system.

Our team explored the use of VSM at Cummins last year to remedy this, which worked to great effect as part of 6 Sigma projects to reduce waste and improve throughput on a local assembly line. VSM projects are currently underway in a small number of projects in other areas of our business, although we still regard ourselves as beginners at the start of the lean journey involving VSM.

The key benefits of using the VSM tool are:

- Shows the linkage between information and material flows
- Highlights obstacles and opportunities for improvement

in the manufacture of a product family or the provision of a service
- Promotes systems thinking and seeing the whole, avoiding sub-optimisation
- Helps to uncover waste and problems with flow
- Reveals the hidden symptoms of larger problems
- A visual representation of the Value Stream and its key metrics can be displayed simply on one page to drive new improvement initiatives
- VSM helps people reach agreement on what changes need to be made to improve the process and on how to ensure those changes are made.

Ideally VSM should be used as a strategic planning tool with high level management involvement, but in the case that support is not initially forthcoming, it maybe necessary to implement from the bottom up to demonstrate the effectiveness of the method which will generate support later on.

Key Steps in VSM

The key steps in the Value Stream Mapping process can be broadly defined as:

1. Definition
2. Mapping the Current State
3. Mapping the Future State & Implementing the Transformation Plan

1. Definition

The creation of a project charter or similar document is essential to define the What and Why, Who and When elements of the project. The charter should be created by the project sponsor with input from the team and stakeholders. The document should outline the items below and act as the framework for all activities that will be completed during the Value Stream Mapping project.

- Purpose
- Scope – Process Boundaries
- Product, Product Family, Service
- Objectives
- Sponsor, Value Stream Manager (Project Lead), Team members, Stakeholders & Process owners
- Timeline
- Performance measures
- Review and Communication

The rule of thumb at this point is: The larger the project, the more comprehensive and detailed the charter should be.

The project that I am currently involved in has been developed as part of a Six Sigma project with a VSM slant. I have the role of the Green belt project leader as well as being the process owner and primary driver in the improvement initiatives. The Six Sigma framework has ensured that the definition of the project is complete and this has been approved by my project sponsor and as well as senior members of the Six Sigma and Quality groups.

2. Mapping the Current State

Key Steps to create a Current State Map are demonstrated in the generic example as shown in Figure 1:

- Select the product or product family – as defined in Project Charter
- Process Boundary - as defined in Project Charter
- Add Process steps & symbols
- Add Information Flows to the Value Stream Map
- Collect Process Data – cycle time and throughput
- Add Inventory and Time Lines

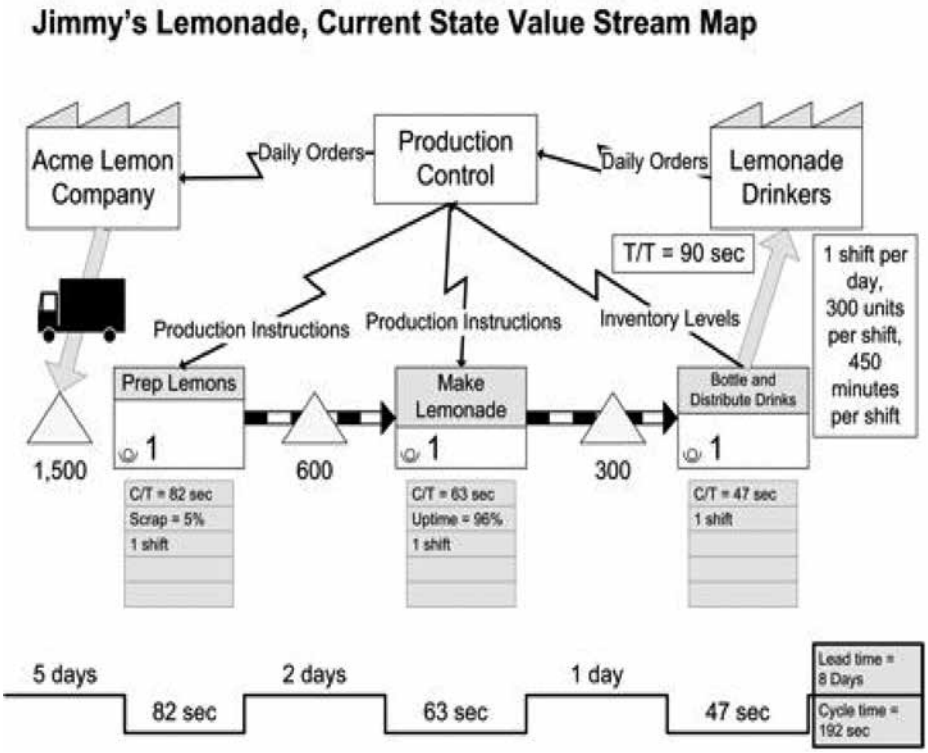

Figure 1: Sample Current State Map[3]

The aim of my project was to improve the yield and remove waste in a remanufacturing line. The product selected was an engine component, specifically a connecting rod as shown in Figure 2 for a thirty eight litre, twelve cylinder engine used in high horse power marine and mining applications.

Figure 2: Sample Connecting rod

The mapping of the current state started when the team walked the process in reverse from the warehouse through packing, testing, assembly, salvage, cleaning and disassembly. The purpose of the walk was to get an understanding of the value stream before performing direct observation and timing to collect cycle and throughput times, inventory levels and improvement opportunities. The improvement opportunities or kaizen bursts were written on Post-it notes and placed on a whiteboard for later review as shown in Figure 3.

Material flow and scheduling information was captured by interviewing department staff and adding this information to the whiteboard also.

Longer term data was collected by shop floor associates using a recording sheet of my own design to identify the percentage of scrap and the location in the value stream where rejects occurred.

Additional information related to product flows and distances travelled were added to a separate spaghetti maps, a sample of which is shown in Figure 4.

Key findings from the mapping of the current state, direct observation and other investigations show:

- Product yield was only 73% on the highest volume part number
- Monthly line efficiency was low and highly variable
- Large amounts of waste and non-value added activity were apparent in the process
- Gaps existed in line side process documentation and shop floor training
- Excess parts and tooling were present on the line
- Customer TAKT, Daily target and Schedule attainment metrics require definition and improvement

3. Future State & Transformation plan

The next stage of the project was to create the Future State map and the Transformation plan.

This step was completed by using a weighted matrix as shown in Figure 5 to prioritise fifty four improvement ideas by giving each a score of 0, 1, 3 or 9 across three key criteria listed below:

- Potential to improve process efficiency
- Opportunity to remove waste
- Potential to improve yield

The criteria multiplied with a weighting (1 to 10) gave each kaizen burst a theoretical score from 0 to 270. Fifty four ideas were reduced to thirty by establishing a cutoff at 150 to funnel the higher ranked ideas to the next stage of Lean and Functional Analysis or Waste Analysis shown in Figure 6.

The kaizen bursts were described in terms of the eight wastes (refer Figure 6) and solutions developed to improve each Key X in the matrix shown in Figure 7.

The final stage of the process is to define the priority of the improvement projects that made up the Transformation plan.

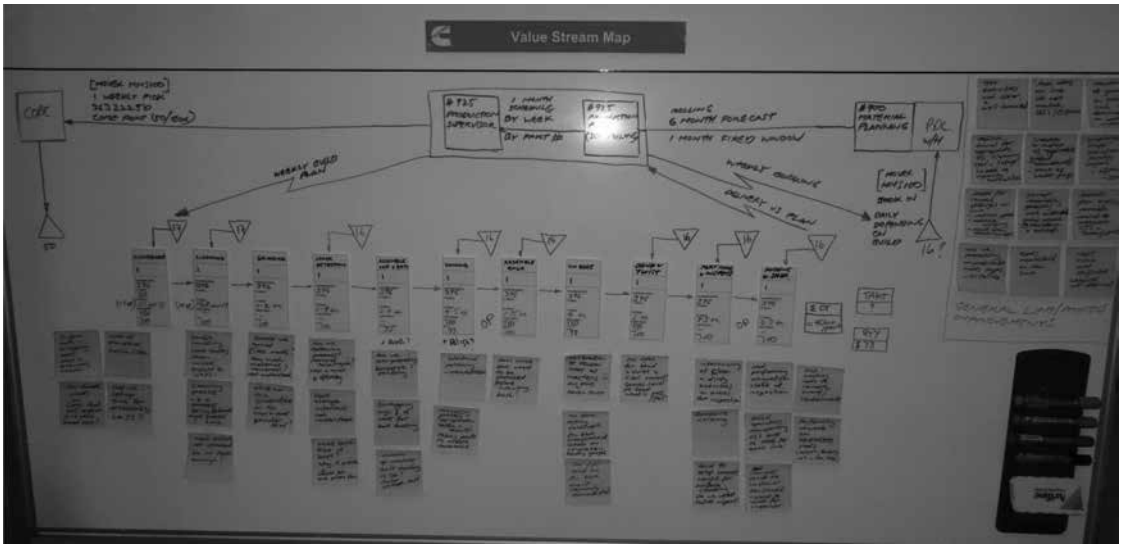

Figure 3: Current state VSM - Connecting rod line

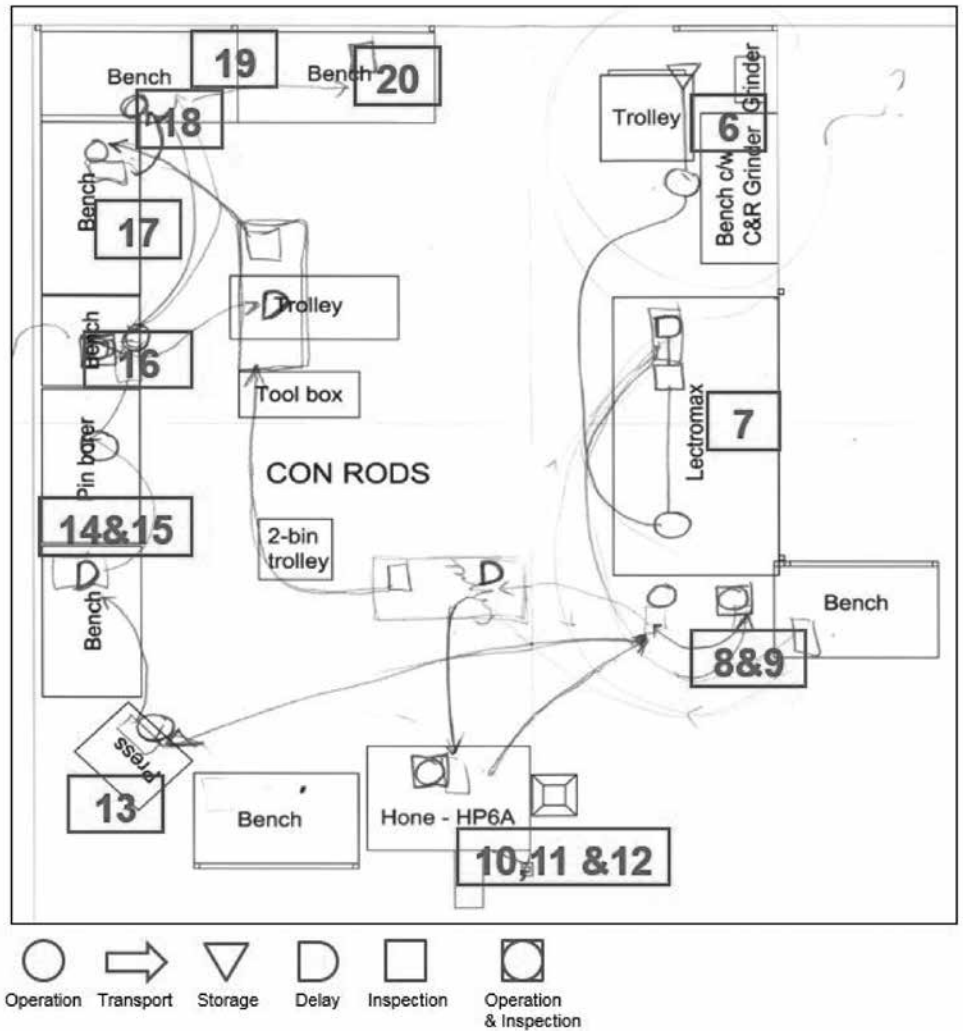

Figure 4: Current state Spaghetti map - Connecting rod line

			Rating of Importance to Customer	10	10	10	
				1	2	3	
Item	Process #	Process name	Kaizen Burst / Description of Waste	Improved Process Efficiency	Opportunity to remove waste	Improving yield	Total
27	8	Assemble	What is allowable for bolt touch before/after honing? Ref Global group Scrapping a high % of rods for bolt touching – what is acceptable (Local and new rods) [Process Review - Assembly & Salvage]	9	9	9	270
57	N/A	General	Visual management not present on line. TAKT time, Daily target, schedule attainment, qty reboxed, scrap, rework data not visible [Production System - General]	9	9	3	210
50	N/A	General	Work instructions on the line co not match the QSi system	9	9	3	210
49	N/A	General	TPM activities not defined [TPM - General]	9	9	3	210
45	20	Pack & Ship	What % are we checking? PCD-0056 says 100% but line aren't doing this. 88uin value not correct either - doesn't match Global RES281V-11 for the small bore 24uin. [Process Review - Assembly & Salvage]	9	9	3	210
32	10	Hone crank bore	Operator doesn't understand how to interpret tolerance – honing rods to middle tolerance [Process Review - Assembly & Salvage]	9	9	3	210
16	6	Grind	Should we be grinding 100% of the rods if they are to size? [Process Review - Assembly & Salvage]	9	9	3	210
			Processing unprofitable rods on the line i.e. C-Series in				

Figure 5: Weighted matrix

Figure 6: The Eight Wastes of Lean Management[4]

Item	Process	Phase	Kaizen Burst / Description of Waste	Types of Waste								Ideas for Improvement (Key X)
				1.Defects	2. Overproduction	3.Transportation	4.Waiting	5.Inventory	6.Motion	7.(Over) Processing	8.Under Utilised Resource	
27	8	Assemble	What is allowable for bolt touch before/after honing? Ref Global group	x						x		Define bolt touch criteria in Assembly and Honing work instructions
57	N/A	General	Visual management not present on line. TAKT time, Daily target, schedule attainment, qty reboxed,		x	x		x				Define TAKT time & Daily target. Create Weekly Production Sheet
50	N/A	General	Work Instructions on the line do not match the QSi system	x						x		Audit Qsi, B-Drive backup and Line folders to ensure alignment and correct errors
49	N/A	General	TPM activities not defined [TPM - General]	x			x				x	Define TPM for key machines on the lines
45	20	Pack & Ship	What % are we checking? PCD-0056 says 100% but line aren't doing this. 88uin value not correct either -	x						x		Create a Work Instruction for Surface finish inspection and define specifications only in the PCD document
32	10	Hone crank bore	Operator doesn't understand how to interpret tolerance – honing rods to middle tolerance	x						x		Update the work instructions to instruct operators how to interpret gauges and tolerances. Organise training by QA.
16	6	Grind	Should we be grinding 100% of the rods if they are to size? [Process Review - Assembly & Salvage]							x		Conduct a trial to determine if con rods can be polished and still pass the measurement criteria for crankbore diameter, taper, ovality and surface finish
56	N/A	General	Processing unprofitable rods on the line i.e. C-Series in small quantities							x		Create a Product Obsolescence Review process to remove unprofitable products from the line
55	N/A	General	Process isn't standard therefore difficult to determine process throughput times. TAKT times							x		Update work instructions to ensure process step are clearer and more tightly defined

Figure 7: Lean and Functional Analysis or Waste Analysis matrix

There are a number of possible methods, but one I found useful is the PACE prioritization grid as shown in Figure 8, a derivative of the traditional Ease and Effect matrix.

Each solution was evaluated by its Ease of Implementation (Easy or Difficult) and Anticipated Benefit (High or Low). Easy/High improvements were defined as projects that can be completed within four weeks. Difficult/High projects were given a time frame of eight weeks. Projects that could not be completed in these time frames were assessed for suitability to be spun off into stand alone projects to be undertaken at a later date.

The projects making the cut as Priority or Action projects were added to the Transformation plan where the project owner and time line were defined. Project reviews were then scheduled at regular intervals to monitor progress of each project.

Results

Preliminary outcomes of the project have seen improvements in yield (from 73% to 94%) and increased stability in monthly line efficiency.

The key projects introduced at this stage that contributed to the improvement were:

- Definition of the Customer TAKT time
- Introduction of a Weekly Production Scoreboard
- Introduction of TPM and 5S systems

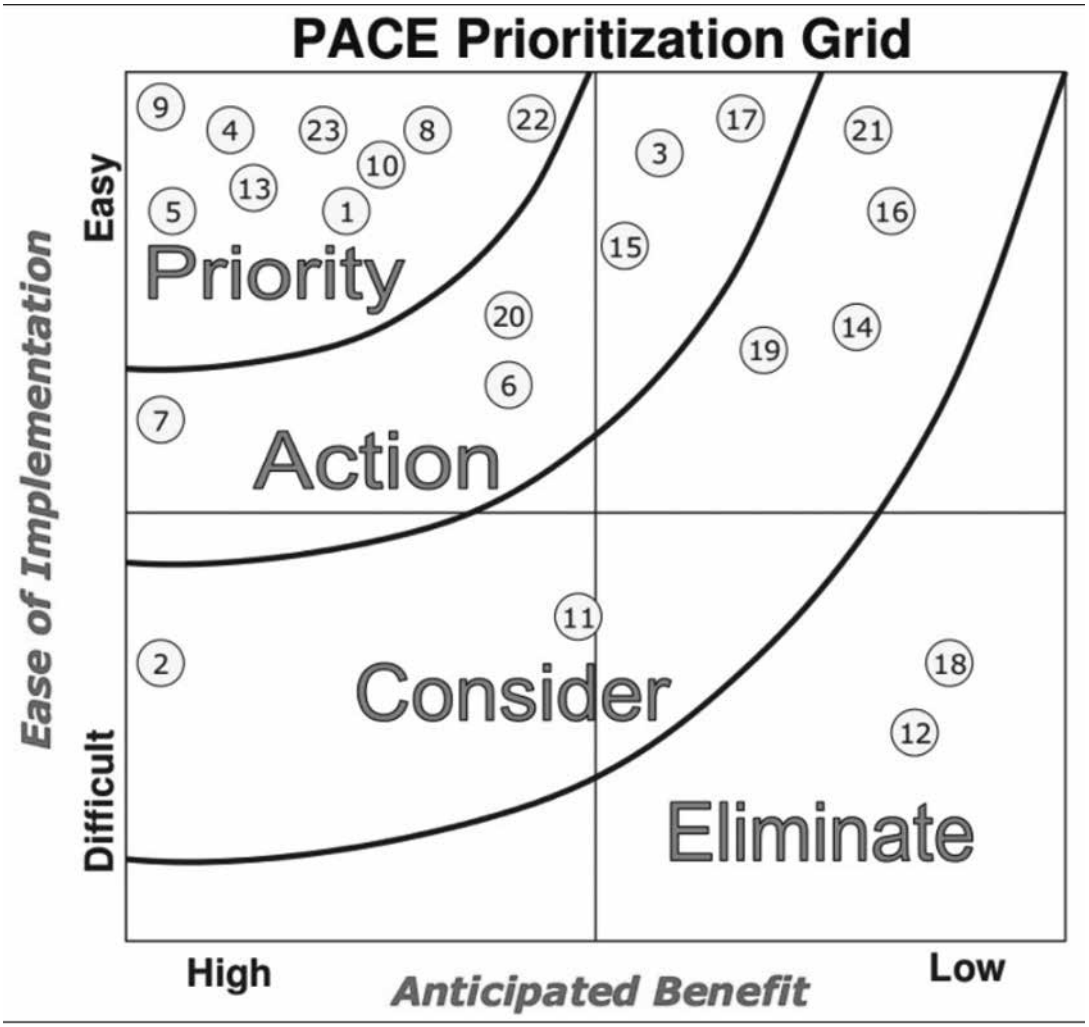

Figure 8: PACE Prioritization Grid[5]

- Targeted changes to the production process, work instructions and training.

Documentation of the improvement in the Future State Map is a work in progress.

Lessons Learned

This article has introduced the topic of Value Stream Mapping and outlined some of the basics. As I stated in the introduction, I am not an expert in the field, but I have discussed some of my own ideas on VSM and described its theory and application in my own project.

My final thoughts about achieving success with Value Stream Mapping are:

- Maps don't have to be works of art or even be 100% accurate, so long as they can lead to improvement
- Gathering data must be done from the shop floor and involve the team. If you're sitting at your desk pulling information from systems and standards then you will miss the opportunity to identify improvement opportunities and find out what it really going on.
- Make rapid progress initially on some of the easier projects with high impact to generate enthusiasm and confidence within the team rather than get bogged down in the details of more complicated tasks.
- Communicate upwards to generate and maintain project support and communicate across and downwards to get the support and ideas from colleagues and the shopfloor who perform many of the key tasks each day.
- Be persistent, have fun and enjoy the process and any positive gains you can make along the way.

After having read many lean books and studied VSM from many sources to undertake my own projects one thought comes to mind. It is always assumed that the resources requited are always available, data is highly visible and easy to collect, brightly coloured and detailed VSM's parade the pages of the user guides. The reality is often, however, very different where the difficulty of lean projects is almost never described. I have found that whilst VSM and other lean tools are valuable, trying to emulate the techniques in the real world is problematic. Organisations often lack the focus and single mindedness to fully embrace the concept of lean and stick with it in the longer term. Lean becomes just another activity to do in the midst of other often counter productive objectives.

Shook and Rother[6] describe what it takes to be successful in improving the value stream:

"At whatever level, from CEO to plant floor supervisor, the words and deeds of managers must be pushing the creation of a lean value stream. It simply won't work if it's relegated to a few minutes at the weekly staff meeting. It's got to be part and parcel of every day's activities. Practice the mapping concept presented here to the point that it becomes an instinctive means of communication."

Conclusion

Despite the process being difficult I still gain enjoyment from trying to think outside the square and add value to an organization through my involvement in VSM projects.

"Success is a journey, not a destination. The doing is often more important than the outcome"[7].

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Introduction to Performance Management – An Effective Productivity reporting tool

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Introduction

Performance measures are used to assist in tracking organisational performance against objectives. It is vital that any system of performance measurement is fully aligned with organisational mission, strategy and values and that is integrated into the overall system of performance management which sets and monitors the achievement of organisational, departmental, team and individual objectives.

In order to evaluate the performance of an organisation or department, credible and reliable performance measures need to be in place. This guideline provides key principles to help **Management /Productivity Consultants** introduce performance measurement in their organisation and considers questions such as what to measure, how to measure it, what targets to set, how to gather, record and analyse performance information and how to take action on the results.

Effective performance measurement can identify areas for improvement, help to keep performance on track and alert the organisation to potential threats and can enable managers to make decisions based on quantifiable results rather than instinct. The generation of meaningful and actionable data can be a powerful tool for influencing behaviour and keeping one step ahead of the competition. To establish a successful performance measurement processes, time, resources and planning are required.

Measuring performance has many advantages and enables an organisation to:

- Understand the current position
- Predict future financial performance
- Maintain a record of historical performance
- Identify strengths and weaknesses
- Determine whether improvements have actually taken place
- Establish a yardstick to benchmark against competitors and other organisations

Definitions

Performance Measurement System: an organised means of defining measures of performance with the gathering, recording and analysis of information in order to monitor performance against objectives, identify areas for improvement and take action to improve performance as necessary.

Performance measure: a quantitative measure as to whether you are reaching or exceeding set targets. They require the collection of raw data and conversion through a formula into a numerical unit.

Key performance indicator (KPI): a measure against which the management of any activity can be assessed. Measurement against the indicator enables Management to assess how efficiently, effectively or cost effectively the operation is performing with respect to the KPIs.

Steps in the design of an effective Performance Management System.

1. Designate those responsible for the performance measurement strategies.

This should include members from all levels and departments of the organisation who will be responsible for design, implementation, management and review of performance measures. Appoint a coordinator preferably an Industrial engineer to oversee the system.

2. Ensure the coordination of employees

It is fundamental that senior management fully support the system from the outset. Without their support it will be more difficult to instigate change and influence decision-making based upon the results of the measures.

It is equally important to win the support and cooperation of all other employees. Explain the reasons for the measurement system being introduced and the reasons for doing so. Provide an opportunity for employees to raise any concerns they may have.

3. Identify the activities to be measured

The selection of the right measures is crucial as the relevancy of the results will depend on what is being measured.

The following should be considered when deciding what and how to measure performance:

- What products or services do we provide?
- Who are our customers and stakeholders (internal and external)?

- What processes we undertake?
- How do we do it?

Give priority to those activities which contribute most to the achievement of organisational goals and are vital for success.

The number of activities to be measured will vary but as a guide the key performance areas typically cover financial; market; environment; operations; quality; people; and adaptability. Avoid measuring too many activities- this will simply create an overwhelming set of results which will cause confusion and be difficult to analyse and act upon.

4. Establish Key Performance Indicators (KPIs)

Once the activities have been defined it is necessary to identify what information is required in relation to each one. Consider what success actually looks like and decide what level of performance needs to be achieved. Consider indicators that will best reflect the key success factors. For each of the critical activities selected for measurement, it is necessary to establish a key performance indicator (KPI).

Good key performance indicators are:

- Realistic- they do not require unreasonable effort to meet
- Understandable- they should be expressed in simple and clear terms
- Adaptable- they can be changed if conditions change
- Economic- the cost of setting and administering should be low in relation to the activity covered
- Measurable—they should be communicable with accuracy.

5. Provide a balanced set of measures

Linking measures to key success factors is critical to effective performance measurement and introducing a balance of financial and non-financial metrics offers the flexibility to achieve this. A company's success is often judged by how it performs financially. However, many performance aspects simply can't be captured by financial measures alone such as customer satisfaction, product quality and delivery times. Use both forms of measurement to gain a complete picture of overall performance.

6. Data collection and statistics

Once the measures have been decided and agreed, the next step is to determine how the data will be collected and by whom. Apply a questioning technique:

- What am I trying to measure?
- Where will I make the measurement?
- How accurate and precise must the measurements be?
- How often do I need to take a measurement?

As appropriate, inform personnel as to when they should start collecting data and what format it should be presented in, e.g. graphs, tables, datasheets or spreadsheet format(s).

All the data should be timely routed to those responsible for analysis.

7. Implementation

The implementation process of any new performance measurement system is a major operation in itself. Communicate the timescale for implementation widely, and ensure that everyone is fully aware of its intended format and use. Carrying out a pilot study will help to identify any potential teething problems.

8. Data Analysis

Before drawing conclusions from the data, verify that:

- The data appear to answer the questions that were originally asked
- There is no evidence of bias in the collection process.
- There is enough data to draw meaningful conclusions.

Once the data have been verified, the required performance measurement can be formulated and calculated. This may involve the use of a computer spread sheet if there is a large amount of data. The results of the performance measures should then be compared to the key performance indicator set for each activity.

9. Consider whether the indicators need to be adjusted

Once the indicators have been analysed the following may be observed:

- the activity is under- performing- the indicator should be left as is, but the reasons for failure should be identified and action to remedy the situation be taken
- Variance is not significant- a more appropriate value indicator should then be set to encourage achievement of further continuous improvement.
- The indicator is easily achieved – if indicators are not challenging then further continuous improvement is unlikely to be encouraged and /or achieved.

10. Communicate the results

Summarise the data and formulate a report as per the following:

- Categorise the data and use graphs to show trends
- Make the report comparative to goals or pre set standards.
- Ensure all performance measurements start and end on the same month or year.
- Adopt a standard format by using the same size paper and charts.

Choose the most appropriate communication channel to suit the audience – email, intranet, newsletter, or a formal presentation or meeting.

11. Take action

Identify areas for improvement and consider what steps may be needed to achieve improvements. Negative results may raise awareness of issues that may have been largely unknown, or confirm what was suspected. Positive results can also be used to make further improvements. Even good practice can be improved upon, so avoid complacency and utilise the results to continue to make innovative improvements Discuss the need for changes with relevant individuals, assign responsibility for action, and monitor improvements .Equip employees with required resources needed, and consider whether training or further development activities are required.

12. Maintenance

The process of collecting data and analysing performance should be continuous with Goals and standards being made more challenging as performance improves, or adjusted as activities change. Measures will only be relevant for as long as the activity being measured remains the same. Review each set of measures at least on an annual basis to ensure that they remain relevant. Consistency in the testing and measurement of different activities will help to track performance during the period.

Conclusion

Management should take into consideration the steps as outlined above when designing an effective performance measurement system.

Reference

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Cycle Work - My FIFO Experience

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Introduction

Growing up in an inner city suburb, going to school in the neighboring suburb, starting my professional career only two train stops away from home, I never pictured myself leaving the secure nest which I still call home, Melbourne. However, in 2010 an opportunity arose which I saw as my chance to break out of my comfort zone and, at the same time, open the door to an array of new possibilities that I did not have access to with a Zone 1 Myki pass. The Queensland Coal Seam Gas mining boom.

The Lead Up

Everyone's heard the rumors of the "mega bucks" that are offered to do work in isolated areas of Australia. And after working for nearly two years at a company that did not recognize my engineering skills, which was reflected in my pay cheque, these rumors were enough to spark my interest.

The scene had been set, my Fly-In-Fly-Out (FIFO) contract stated that I'd fly to Brisbane, work 28 days straight onsite then fly back to Melbourne for 9 days of rest and relaxation (R&R). It was a hard to imagine concept after working 8 to 5, Monday to Friday for the previous two years. The project was a vital part of the fifth largest Oil & Gas investments in the world (at the time) and was expected to last 12 to 18 months. A perfect opportunity to advance my career and expedite the financial goals I had been working for.

On Site

I can still remember my first cycle in a 600 man camp we had constructed just outside the, then small, Queensland town of Chinchilla. Since then the town has doubled in size with the prerequisite mining town additions of McDonalds and a strip club. The camp construction was a project in itself, they included: individual rooms with bathroom and living facilities, kitchen and dining rooms, bars, gyms and laundries, basically all the essential elements of regular life. There were also offices, car parks, sewage treatment, water tanks, plant facilities and work areas all located in a cleared area of a local farmer's land. We constructed 5 camps during the project spaced along the pipeline route.

That first cycle felt more like 6 months than 28 days, with the last 7 days dragging out for what felt like an eternity. I realized in that first cycle, and still recognize today, that working 28 days consecutively in a remote area allows you to get completely immersed in your work. It's quite a surreal thing looking back and you realize that your life and your work blended into one while onsite. Personally I relished the comfort of waking up each day knowing exactly where my crews had left off from the day before. There were no delays in getting back up and going after a weekend where you always had the concern workers may have attended a music festival or party which has left them not 100% in their abilities to operate large pieces of plant. Onsite workers (and office staff) were tested for alcohol each day and regularly drug tested, this eased the worries on potential incidents.

Social drinking seems to be a part of the culture onsite, it could be said that it is a part of the construction industry in general. Apart from the few exceptions, I found most commonly everyone was out there for the same reason - to make some money and to enjoy their time onsite as best they could. Personally I found it more enjoyable to utilize the gym which was empty most of the time but became very busy in the few days leading up to R&R.

There were always occasions, however, which required a trip to the bar to help celebrate a milestone in construction, a football grand final or a birthday. I really enjoyed the opportunity to celebrate with the guys doing the hard yards on the ground day in, day out.

"Time Flies When You're Having Fun"

If the person who interviewed me four years ago had told me I'd be working 28/9 cycles for the next three to four years I probably would have reconsidered my decision to chase the adventure of working away from home. But if they had also explained that some of the people you would meet and work with would become some of your closest friends and future mentors it would have steadied my decision.

Because this was one of the first mega oil & gas construction projects in Australia meant that there was a great variety of nationalities employed. Greek, Arab, English, Irish, New Zealand just to name a few. Different cultures, backgrounds, ages and beliefs, but only one shared goal – to be involved in a successful project on a mega construction stage.

Working with people I respect and others that I had shared interests made the time away from friends and family much more enjoyable which in turn made the time go by much more quickly.

In my swift four years onsite I was privileged to work with very experienced and professional people, many of whom I now consider mentors who have helped in developing my management style. There are not many industries where you get the opportunity to work with these sorts of people at such a young age. Furthermore,

I think working with these people in a FIFO scenario accelerates real life learnings and results in developing key professional skills faster.

Back To The Real World

I have read many articles that discuss the negative effects of FIFO work on individuals, however, I can only comment on my own personal experience. The last four years have been a blast. Not only do I recommend that people take the jump into the unknown, whether that be FIFO work or moving to a city with a vastly different culture to experience it while still furthering your career. For a young person, at the time it may seem like you are missing out on things back home but you need to look at the bigger picture. Life is in fact long, not short. Once you finish a stint working away from home I guarantee you will feel better for having done it, you will achieve the goals you set faster and will have plenty of stories to keep your friends, family and co-workers entertained.

Conclusion

I believe it is critical to set both short and long-term goals in life and to do whatever it takes to reach and even exceed these goals. I'm not saying that FIFO work is the only way to achieve your goals but had I not spent the last four years flying in and flying out I would not have been able to set new goals because I would not yet have achieved the original goals I'd set.

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RSVP by 19 November 2014 to secure your seat(s) as places are limited. Email Lambros Zigouras or call +61 414 845 875 to advise of your attendance, number of guests and meal selections.

***Please select a main meal from the below options:**
•Beef Lasagne served with a side salad
•Chicken Parmigiana served with chips
•Butter chicken curry served with rice
•Vegetarian pasta of the day
•Chicken Scaloppini served with a side salad.

We hope to see you there!