

final report

Project code: SCB023
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Date submitted: May 2005

PUBLISHED BY
Meat & Livestock Australia Limited
Locked Bag 991
NORTH SYDNEY NSW 2059

Value chain mapping

Milestone 6: generic report

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

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Executive summary

'Lean Thinking', as an approach to doing business in the most effective way possible has, unlike many passing 'fads' survived the test of time for one simple reason: it works!

Lean Thinking is based on focusing on what the customer wants and 'on doing more for less'. Its simple guiding principles are equally applicable to manufacturing and service businesses alike and have helped companies like Toyota become World - beaters.

It is not an easy option; it will involve some fundamental changes in mind-sets of you and your colleagues from how you do business today. However, the benefits of applying Lean principles to the Red Meat industry are truly substantial. Within the Australia industry the stakes are very high indeed; put simply it really is the only way that we are going to maintain our position of global leadership in the areas of Quality, Customer Service and profitability.

Meat and Livestock Australia have produced this document with the aim of stimulating interest in this area. It not only introduces the reader to Lean Principles but also goes on to demonstrate how you can get started and what it could mean to your company.

In particular it focuses on a technique called Value Chain Mapping. This provides a framework for generating, for your company, 'where you are now', 'where you want to get to' and most importantly, an action plan of how to get there.

Typically it can take at least 2-3 years to make the transition to Lean but early benefits are substantial: a greater than 3:1 annualised payback in the first year is what you can expect if your organisation commits to doing it properly.

It is important to recognise that Lean Thinking is a completely different way of doing business. Once you have started implementing Lean it is a 'never-ending journey in pursuit of perfection'. After all Toyota are still making improvements and they having been doing it for over 30 years!

Examples of Australians red-meat companies that have started down the Lean path are given within the text.

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1 Introduction

This report has been commissioned by Meat and Livestock Australia with the aim of helping the Red Meat industry in Australia become even more competitive through the adoption of 'Lean Thinking' right across the industry.

Its objectives are as follows:

- Introduce the basic idea of 'Lean Thinking'.
- To run through some of the key approaches of 'Lean Thinking' and in particular 'Value Chain Mapping'.
- Describe what it could mean to companies along the Red Meat supply chain.
- Provide information on how your company could get started and who is available to help.
- Describe some case studies that have been undertaken within the Red Meat Industry in Australia.

1.1 Why do we need to change?

In order to maintain the Australian industry's leadership position in the global market place requires that we are continually better at meeting and exceeding what our customers want in terms of quality, delivery performance and cost compared to our international competitors. This is becoming increasingly difficult to achieve with our current levels of performance. Our competitors are catching us up.

The pressures for change are also being driven by rapidly changing expectations from consumers around the world. This in turn is leading to our leading to end users requiring that their suppliers meet increasing standards of quality and delivery at ever-reducing margins.

In order to survive and prosper in this increasingly complex world we need a 'paddock to plate' approach that enables us to address these issues at each stage of the supply chain in a way that is focused on achieving what both the immediate customer and the final consumer wants at the lowest possible cost. The adoption of 'Lean Thinking' and in particular value chain mapping combined with world-class marketing and new product development will ensure that the Australian red meat industry maintains its world beating position.

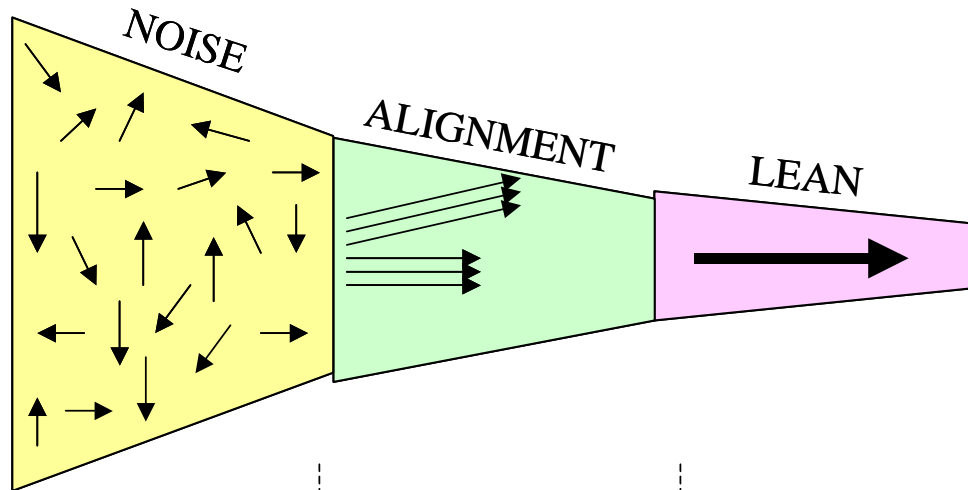
1.2 Lean Thinking

'Lean Thinking' is a simple philosophy, which is defined as follows:

“An operational driven process to eliminate waste in all its forms and to maximise all value-added supply processes to continually meet or exceed customer expectations”

'Lean Thinking' can produce rapid improvements in performance but is not an instant cure and requires commitment to the philosophy, hard work and dedicated effort. It is not revolutionary and is mainly common sense; but it has consistently delivered results for many different industries e.g. in the British automotive parts industry it delivered a 50% cut in variable costs, a 90% reduction in defects and a 75% reduction in inventory, thus helping save the industry from the brink of extinction.

The diagram below illustrates the journey from a 'noisy' present to a 'Lean' future.



Problem

- Conflicting Priorities
- High variability

Resolved by

- Common solutions
- Low sophistication
- Groundwork
- Laying the foundations

Doing 'core things' well and in the same way

- 'Appliance of science'
- Continuous improvement of 'core things'

For a company and/or a whole supply chain to successfully transform to a Lean organisation the following elements should be in place:

- Pressure to change
- Clear-shared vision
- Capacity to change
- Actionable first steps

This is illustrated as follows:

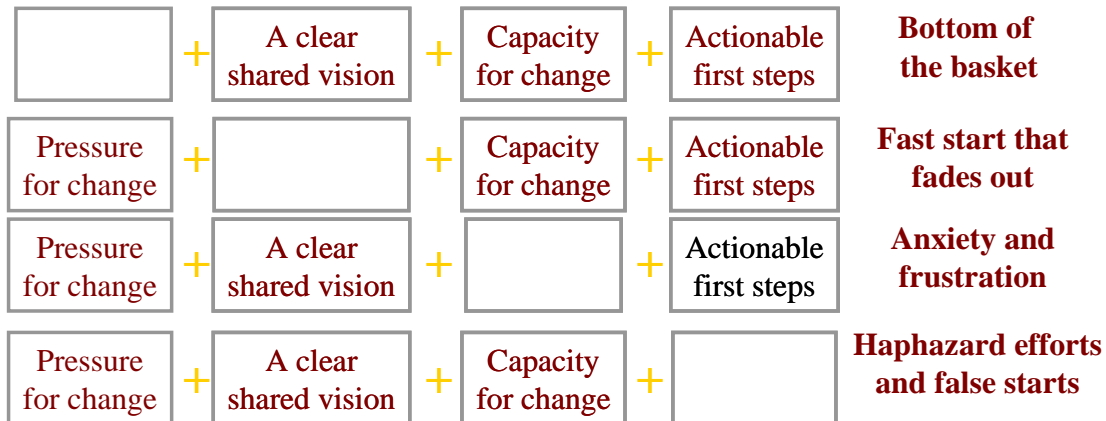
Transformational Change

Requires



When any one of these is missing . . .

. . . RESULT

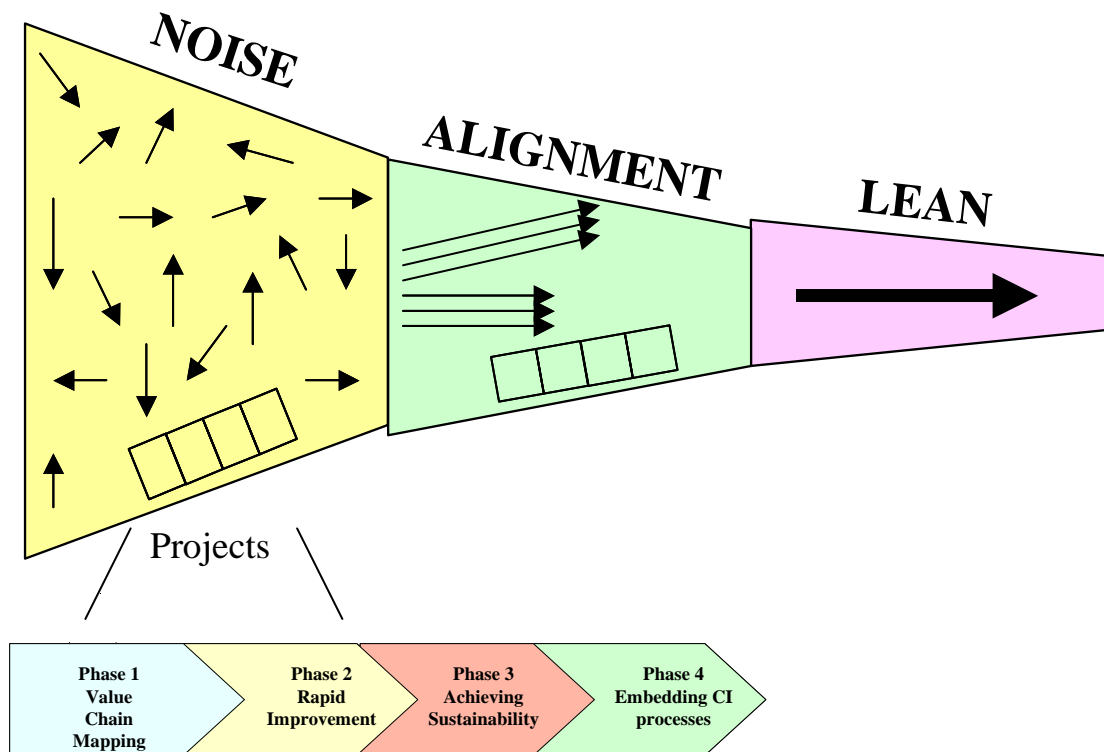


We have discussed the pressure to change in the red meat industry in the last section.

The vision of each company along the lean value chain should include the following aims:

- ***The lowest cost producer of a quality product***
- ***Providing excellent value to its customer base***
- ***Good returns for shareholders***
- ***Excellent careers for its colleagues***

Value Chain Mapping is a systematic approach by which the Pressure to Change and Vision can be linked to a Capacity for Change (skills, resources, tools and attitudes in the organisation) and Actionable First Steps within a strategy, which will ultimately achieve a Lean organisation. A pictorial representation of the strategy is shown below:



We refer to a ‘value’ chain as opposed to a ‘supply’ chain because for a lean value chain each step in the process from the farm paddock to the consumer’s plate should add value for the customer, if it does not it is waste and should be reduced and ultimately eliminated.

A simple way to consider value is to imagine you could show each step of the supply chain process to a consumer: from raising the animal to processing and butchering to packaging and transportation to store presentation and ultimately consumption. In this idealised situation, you could ask them ultimately how much they were willing to pay for each step. If they were not willing to pay for an activity or if the activity costs more than they are willing to pay then this is waste! Lean Thinking is a systematic way of addressing waste reduction whilst maximising customer value.

1.3 Value Chain Mapping

Value Chain (or sometimes known as Value Stream) Mapping is a technique developed by the Toyota motor company. It is a systematic method for measuring the leanness of a current production unit or supply chain versus a future best practice target.

In order to ensure the mapping process and the subsequent implementation process is effective, it is important to keep to the following lean principles:

- The customer and no one else defines value.

- Adopt a value chain 'mind set'.
- Work in partnership along the value chain.
- Implement operational rituals, work methods and skill and mind sets, which act to eliminate all forms of waste and variance.
 - Over production - excess and early production
 - Waiting - time spent at the machine; delays
 - Transport - waste involved in the movement and transportation of units
 - Overprocessing - waste in processing; poor process design
 - Stock - partially completed work or materials not yet needed in production
 - Motion - activity by people or machinery that does not add value to the product.
 - Defects – production items that are scrapped or re-worked.
- Strive for a workflow that is 'pulled' along the supply chain by the customer.
- Continuously strive for perfection.
- Put people first. Provide them with the resources, skills and accountability to enable them to manage their own process accuracy.



Base decisions on real data obtained from 'the shop floor'.

1.4 Competitive Performance Measurement

As mentioned earlier, in an increasingly global market it is essential that the Australian red meat industry remains competitive.

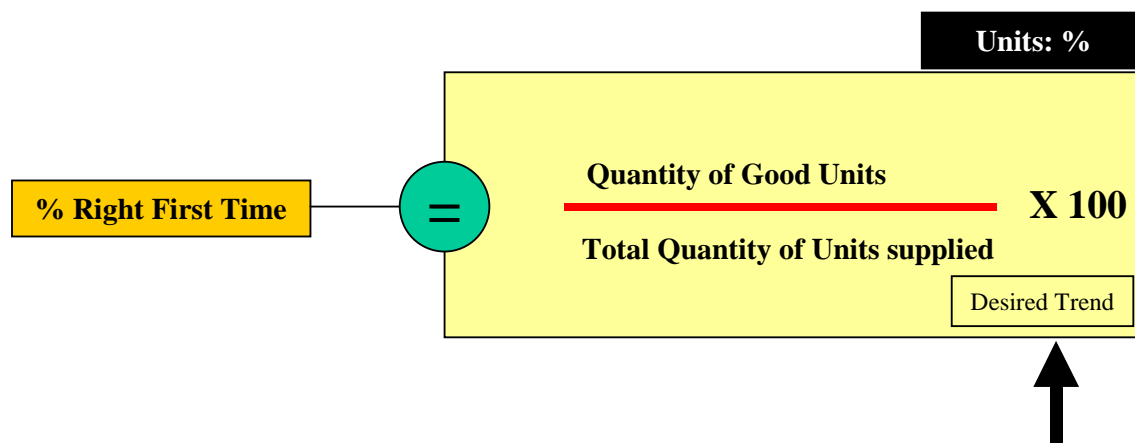
The following set of 7 Key Performance Indicators (KPI's) were originally developed for the automotive sector but have been used and adapted by a whole range of industries as generic measures. They can be used as both a benchmark against best practice and also provide a basis for continuous improvement initiatives.

These KPI's have been identified as the primary drivers for optimising business performance in the areas of quality, cost and delivery, which are, of course, 'the basics of success' in any business.

- Right First Time:

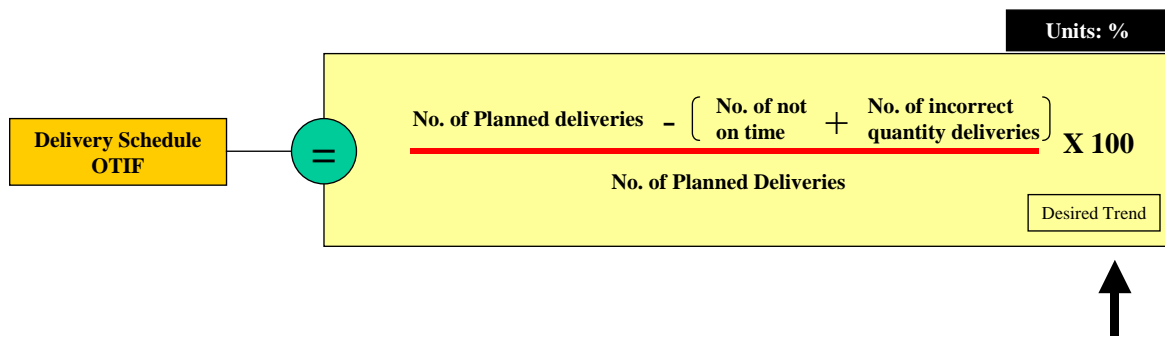
This is a measure of the product's ability to match a specification and is expressed in number of 'good' units (i.e. without defects) per 100. Percentage right first time can be measured both internally and externally in the production cycle:

- Internally: defective units that have to be downgraded or reworked or scrapped which are identified within the production process.
- Externally: defective units that have downgraded or reworked or scrapped or recalled through identification by a customer or a supplier.



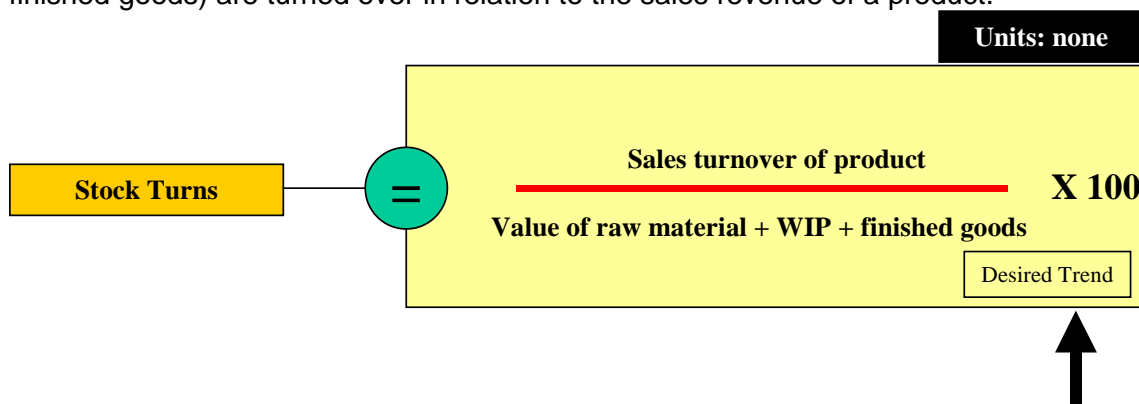
- Delivery Schedule On Time and In Full:

Delivery Schedule On Time and in Full measures how well a supplier matches the planned delivery requirement of the customer.

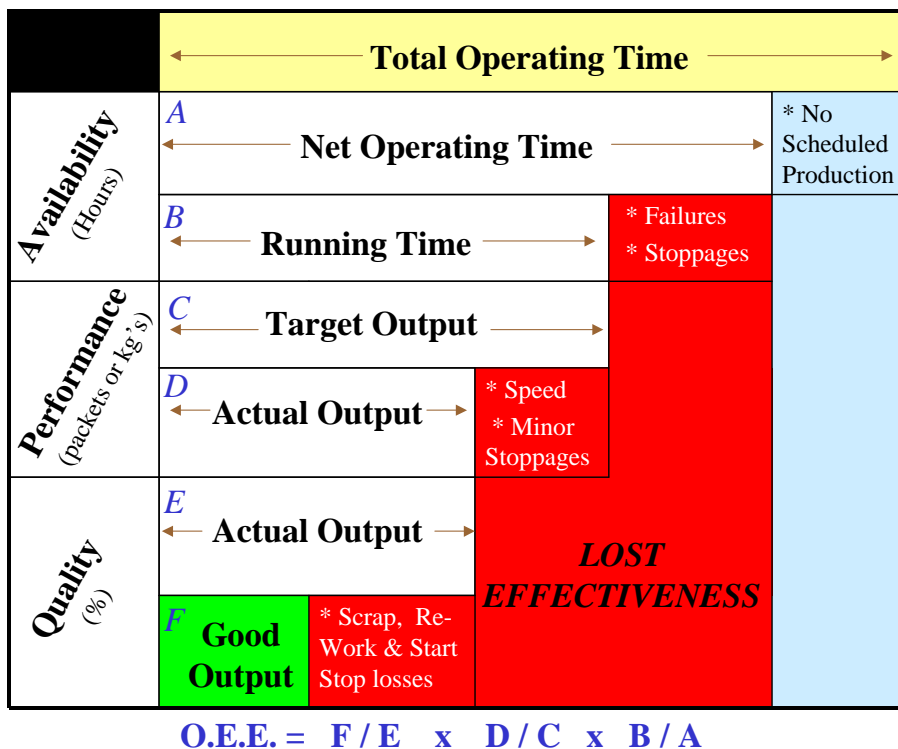


- Stock Turns:

Stock Turns is a measure of how frequently the stock (raw material, work-in-progress and finished goods) are turned over in relation to the sales revenue of a product.



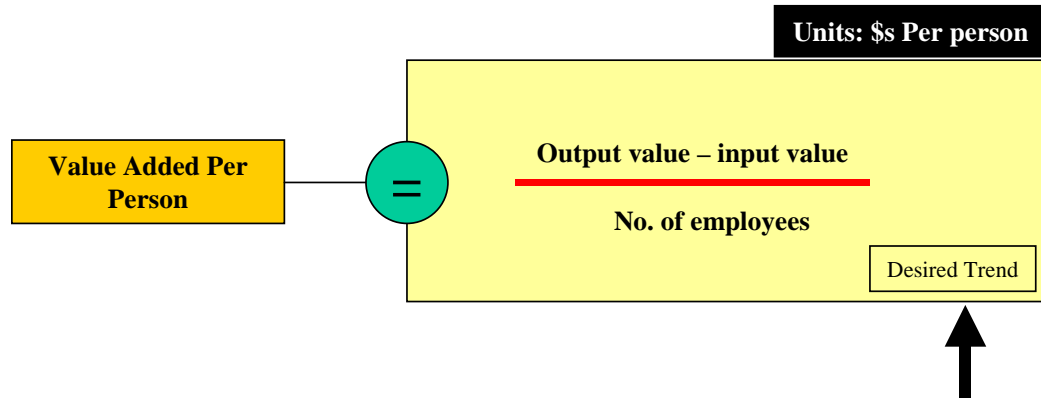
- Overall Equipment Effectiveness:



Overall Equipment Effectiveness measures the output effectiveness of a process, which relates to the availability, performance and quality of that process.

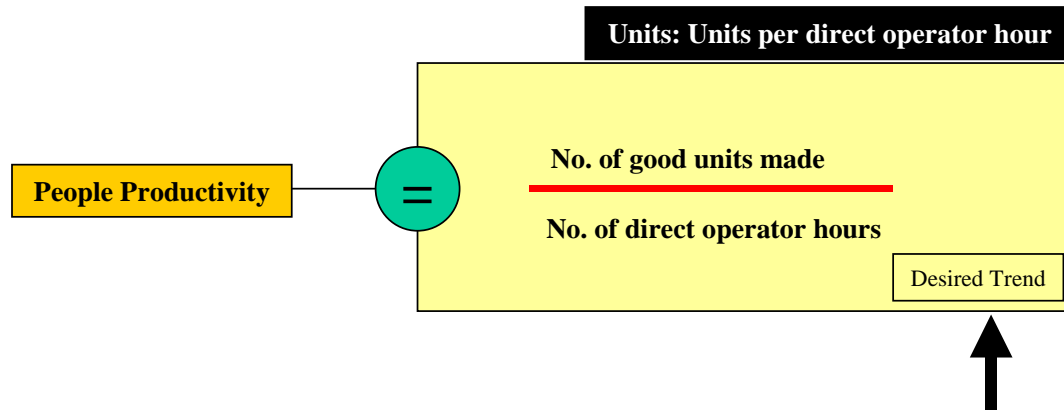
- Value Added Per Person:

Value Added per Person is a financial measure that relates the number of direct people involved in the conversion process to add value to the product.



- People Productivity:

People Productivity is a measure of the ratio between the number of good units made and the number of direct operator hours associated with manufacture of those units.



- Floor Space Utilisation:

Floor Space Utilisation is a measure of the sales revenue generated per square metre of factory floor space.

2 Approach

2.1 Value Chain Mapping Stages

For a Value Chain Mapping exercise of this type, there are certain stages to be undertaken by the company and/or the whole of the value chain in the correct order; these are:

- Stage 1: Commit to the Lean Thinking process.

For a successful implementation of Lean, it is essential that the senior management within the value-chain be committed to the process. This will include the provision of resources and by visibly providing support and encouragement. It is also important to select a team who are going to undertake the mapping process and introduce them to the principles of Lean Thinking. This will enable them to 'have a common language' and provide them with an appreciation of what a Lean value chain looks like and the potential benefits of realising this opportunity.

- Stage 2: Select a value chain / stream to be studied.

Products with similar attributes, routes through the value chain and customers are grouped together to form product 'families'. It is then usual to focus the mapping programme on the value-chain that will have the most impact on the company's customer service and financial performance.

- Stage 3: Draw the current state map.

The mapping team does this by systematically following the complete value chain from start to finish. This involves:

1. Drawing a rough flow diagram and recording any issues that come to mind.
2. Measuring and entering the amount of value added and non-value added time spent at each stage of the value-chain.
3. Reviewing and recording any organisational issues that are identified during the course of the analysis. These can be both problem areas and 'gaps' identified between the current value chain and the characteristics at a benchmark Lean organisation. These are categorised under the headings of 'People', 'Process', 'Plant' and 'Performance'. An example checklist is shown later in this section.
4. Reviewing and recording the KPIs of the value chain and comparing them with a Lean organisation benchmark. This again could suggest gaps and in turn opportunities.

- Stage 4: Develop a future state map:

By incorporating Lean Thinking ideas such as improving 'flow' and 'pull' by introducing systematic methods for reducing waste and improving value.

- Stage 5: Develop an action plan:

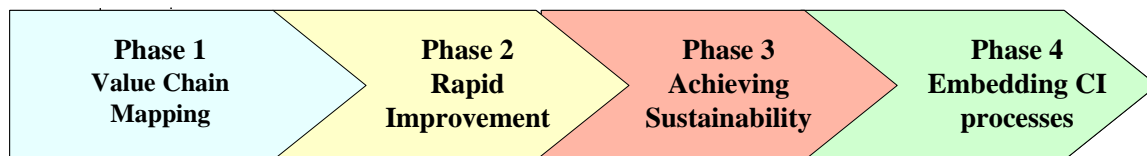
Identify the chosen improvement opportunities by generating a Lean Toolkits Action Plan.

- Stage 6: Commit the necessary resources and implement the plan

This may well involve the use of external resources, especially in the initial “rapid improvement” phase. This phase will also require a great deal of employee training in Lean thinking tools and techniques to get the concept embedded in the organisation’s culture.

It will be appreciated that the Value Chain Mapping process within one company (i.e. from a ‘work centre to work centre’) is a much less complicated exercise than a Value Chain Mapping exercise that encompasses several supplying companies who are linked in a chain to the consumer. Commercial sensitivities and lack of trust are very real barriers, which have to be overcome. This is possible through the adoption of a true partnership approach, which aims to secure a long term success for all the participating parties.

To recap, the Value Chain Mapping approach forms the first stage of a Lean Thinking strategy as illustrated below:

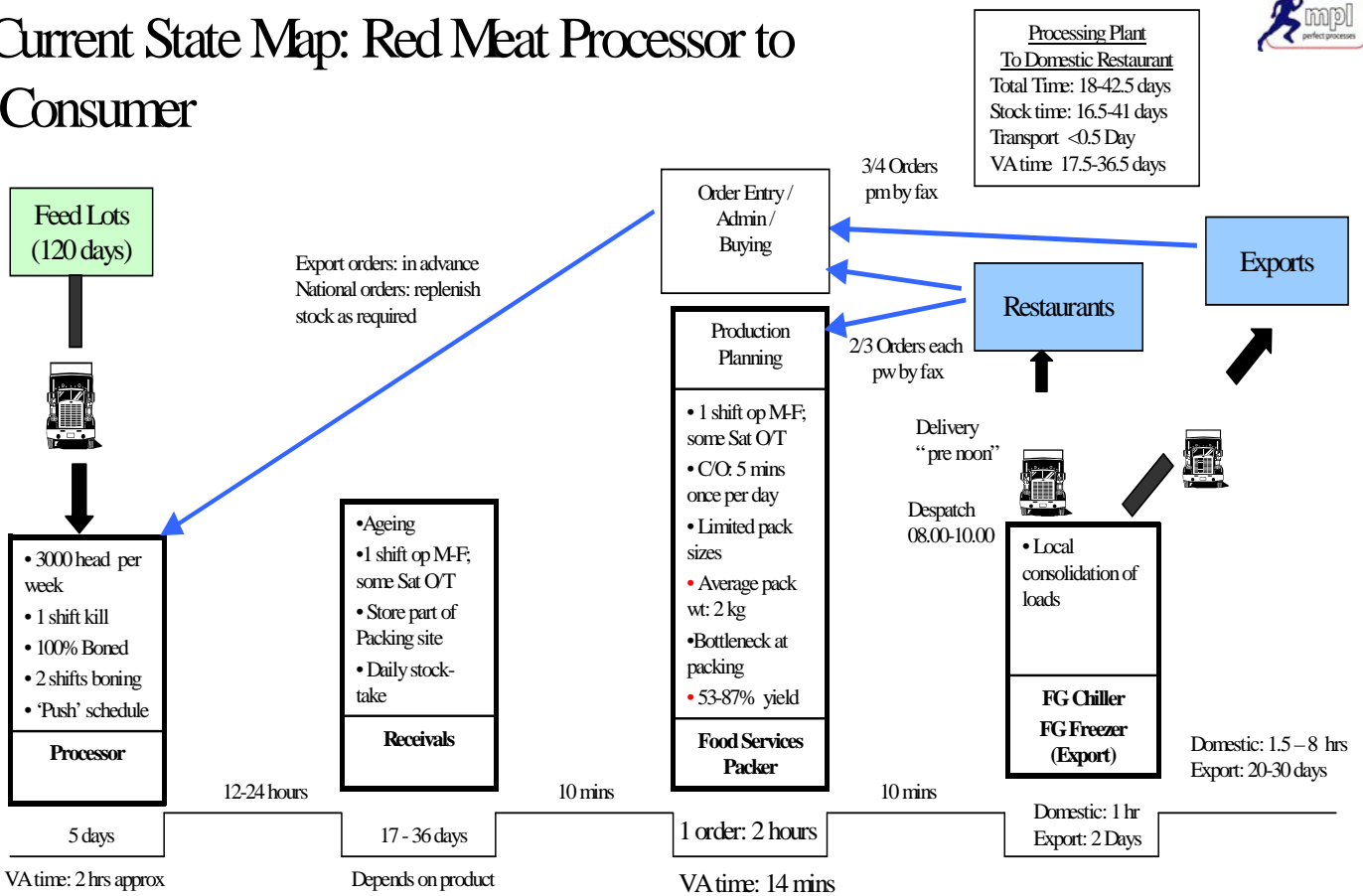


- We will now describe the stages in more detail.

2.2 Current State Map

Following the commitment to Lean thinking and selecting a value chain (stages 1 and 2) the next stage is for the mapping team to producing the current value chain map which illustrates both the scope of the specific value chain and some of the perceived opportunities and problems identified by the mapping team. An example of a Current State Map is shown below:

Current State Map: Red Meat Processor to Consumer



ISSUES			
<ul style="list-style-type: none"> Product variability is better controlled on grain fed 'Push' schedule not matched to peaks and troughs in demand 10 hr shifts: 4 days on, 3 days off 	<ul style="list-style-type: none"> Beast slaughter is undertaken to a 3 month plan Promotional advertising is decided 4-6 weeks before sales - can upset product "balance" Starting "balanced scorecard" Current KPIs: <ul style="list-style-type: none"> - Yields - Kgs PMH 	<ul style="list-style-type: none"> Raw material variability has a very significant impact on yield Orders are faxed by restaurants / export orderers Domestic orders are received overnight and produced next am (ex. Raw Material stock) for same day delivery Export orders can be built up over a period Cut to stock is undertaken for several, large customers 	<ul style="list-style-type: none"> Don't measure OEE; Customer Service; stoppages etc C/O is for Domestic to Export Prod Planning is manual, done daily, based on kgs per man hour Delivery pre-noon is not guaranteed Portions product often late to Despatch Time in FG Chiller / Freezer for Domestic beef to Outback is 1 hour; for other customers ranges 4 hrs - 7 days, aver: 2.5 days

This map shows the current situation following the completion of sections 1 and 2 of stage 3. A great deal of discussion can then be held around any areas of interest to confirm that this is the current situation, which subsequently can be improved towards the Future State map.

It is important that before you move forward you need to diagnose the problem fully – you should be careful not just to treat symptoms. This is very similar to a situation to a doctor undertaking a whole series of tests before deciding on the true nature of the problem and what has to be done to cure the underlying cause of the problem.

This further analysis is required as described sections 3 and 4 of stage 3, above. Namely:

- A review of organisational inputs (Process, People, Plant).
- A review of organisational outputs or KPIs.

The first area is a review of organisational inputs as shown in the following checklist.

PROCESS

- Customer Service
 - Do we measure delivery performance at various stages in the value chain:
 - To the end customer: On Time and In Full (OTIF)?
 - Tinned achievements between departments or links in the supply chain?
 - Is there a record of customer complaints?
 - Do supply agreements exist?

- Purchasing
 - Is "spot" purchasing used, or do we use a "partnership agreement"?
 - Amount of weeks worth of stock being held at each point in the supply chain?
 - Are Supplier performance records kept?

- Production Planning
 - How done: manually or on a system?
 - Is it a complicated 'art', rather than 'scientific'?
 - Product mix impact?
 - Frequency of order cancellations / addons?
 - Manual spreadsheets used?
 - Accuracy of customer orders (based on historical data)?
 - Are there official measures of achievement against plan?
 - Do clear production standards exist and are these linked to costings?
 - Is actual measured product made measured against forecast?

- What are the Key Performance Indicators (KPIs) by which the company manages the value chain?
 - What daily operational performance measures are used?
 - How are they reviewed and what action processes are used?
 - Are they visually presented and is feedback provided to the staff?
 - What trend analysis is undertaken on these figures e.g.
 - Product variability from farms?
 - Shortfall to customer?
 - Customer order forecast accuracy and variation?
 - Do existing measures need to be reassessed for relevance to decision making?
 - Are certain important KPIs only monitored by exception?

- How often are raw material and finished goods stocktakes undertaken?
 - Is stock control done manually?
 - Is accuracy recorded or trended?

- Production
 - How is production performance measured and analysed by day, by shift, by week etc?
 - How are variances and losses analysed and resolved?

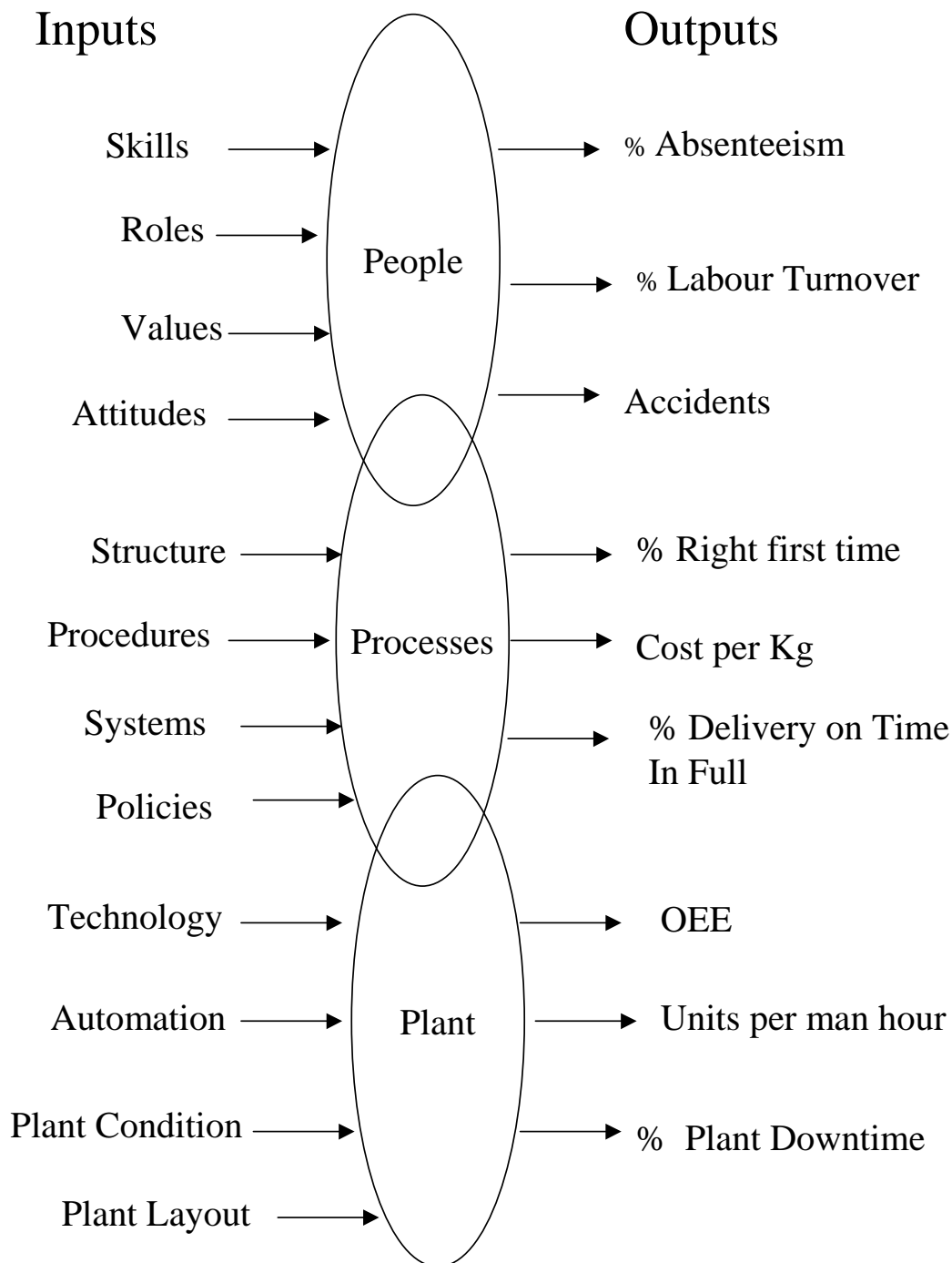
- Could waste management be improved?
 - Product loss?
 - Higher recovery of offal products?
 - Is % of nonvalue added time very high?
 - Is there a high level of rework or defects?

- Does the IT system fully support the Lean supply chain?
 - Better data required?
 - Does it provide 'real time' performance information that enables people to do their jobs effectively?
 - Less double entry required?
 - Easier report preparation needed?
 - Perpetual inventory checks carried out?

- Continuous Improvement (CI)
 - Are projects reviewed at completion against original objectives?
 - Is the project management process consistent?
 - Do projects often run late?

<p>PLANT</p> <ul style="list-style-type: none"> • Space / workflow <p><input type="checkbox"/> How spreadout is the operation / supply chain, leading to waiting / travelling time when no valueadded work is being carried out</p> <ul style="list-style-type: none"> • Is appropriate technology used in the operation? <ul style="list-style-type: none"> • Have the bottlenecks in the operation been identified? <p><input type="checkbox"/> Is coordinated action to overcome them being undertaken?</p> <ul style="list-style-type: none"> • How is the plant maintained? <p><input type="checkbox"/> Is planned preventative maintenance carried out?</p> <p><input type="checkbox"/> Do the operators participate in asset care?</p>	
<p>PEOPLE</p> <ul style="list-style-type: none"> • HR / Culture <p><input type="checkbox"/> How well do company values, mission statements and goals support the 'Lean Thinking' approach?</p> <p><input type="checkbox"/> Do senior management fully support continuous improvement?</p> <p><input type="checkbox"/> Is there a commitment to the training and career development of employees?</p> <p><input type="checkbox"/> Are employees aware of the company objectives and current performance?</p> <p><input type="checkbox"/> Are accountabilities clear?</p> <p><input type="checkbox"/> Are KPIs linked to roles?</p> <p><input type="checkbox"/> Who is responsible for achieving improvement targets?</p> <p><input type="checkbox"/> Are the organisation charts accurate?</p> <p><input type="checkbox"/> Is temporary labour used and how well is it managed?</p> <p><input type="checkbox"/> What is the absence level?</p> <p><input type="checkbox"/> What is the labour turnover?</p> <ul style="list-style-type: none"> • Skills <p><input type="checkbox"/> How effective are employee's job descriptions?</p> <p><input type="checkbox"/> Do employees have Lean skills?</p>	
<p>PERFORMANCE</p> <p>Have the following been undertaken?</p> <ul style="list-style-type: none"> • Line studies <p><input type="checkbox"/> Availability of plant and machinery</p> <p><input type="checkbox"/> Line speed</p> <p><input type="checkbox"/> Waste and mass balances</p> <p><input type="checkbox"/> Activity studies</p> <p><input type="checkbox"/> Health and Safety and Good manufacturing practice audits</p>	

The second area to review in more depth is that of organisational outputs or KPIs as described section 4 of stage 3 earlier in the document. I.e. reviewing and recording the KPIs of the value chain and comparing them with a Lean organisation benchmark, which could suggest gaps, and in turn opportunities. To do this effectively it is important to have an appreciation of Lean methodologies and understand the link of the performance of an organisation's outputs (its KPIs) to its inputs (its organisational characteristics). Please refer to the following diagram. When a company has Lean inputs, its outputs will enable 'best practice' and, in time, 'World Class' Performance to be attained.



At each stage of the value chain, key performance data is systematically collected in order to compare the value chain with best practice. The best practice key performance indicators may be from the same industry but if these are not available, data can be obtained from comparable processes in other industries. A table such as that shown below, is then populated with the relevant information. This table shows real data that was used to compare a red meat producer's KPIs with best practice (the latter figures were obtained from similar companies in the UK and Europe).

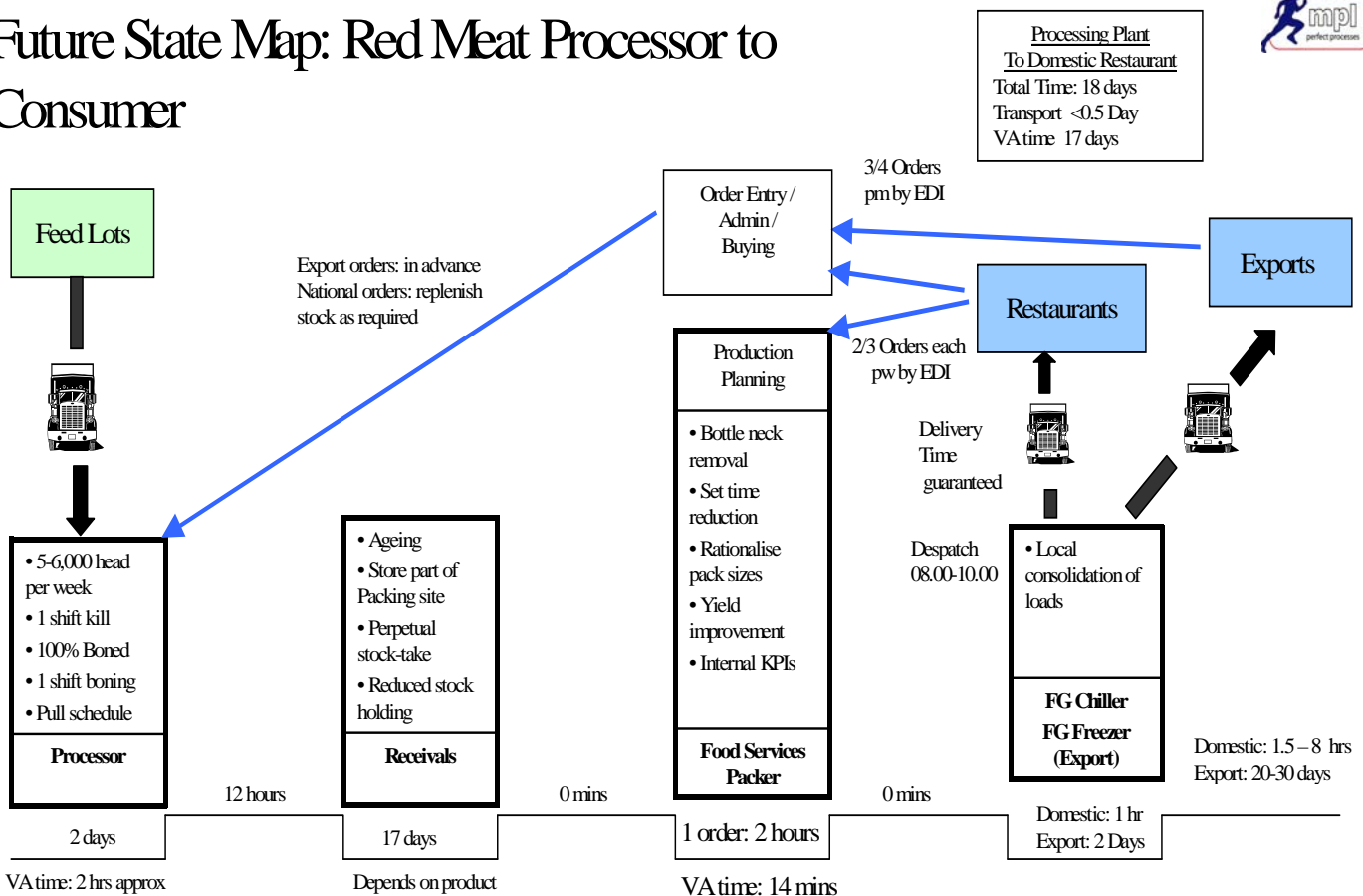
Co X Processing Plant				
Key Performance Indicator	Co X Value Chain	Best Lean Chain	Practice Value	Comments
% On Time in Full		99.75		
% Right First Time		>99		
Boning Hall % OEE		92		
Units per man hour		67		
Yield %		87%		
Lost time accidents		<1%		
% Labour Turnover		<11		
% Absenteeism		6		
Cost per Kg produced		\$0.85		
% Time truck fleet on the road		90		
% Utilisation of trucks		95		

Red Meat Total Value Chain				
Key Performance Indicator	Co X Value Chain	Best Lean Chain	Practice Value	Comments
Lead time/days		<4.5		
Value Added time		Circa 7 mins		
% Customer satisfaction		99.5%		

2.3 Future State Map

- From the data gathered and developing the issues ranged into targeted improvement opportunities the value chain mapping team create a Future State Map – an example is shown below. This map is a summary document that provides a pictorial representation of what the company could look like following the completion of the Lean Toolkit Action Plan i.e. when it is operating at best practice.

Future State Map: Red Meat Processor to Consumer



Opportunities			
<ul style="list-style-type: none"> • Increase % grain fed • Increased capacity & flexibility • More use of Carcass quality attributes e.g. "marble score" • Feed to an "end point" • Introduce Value Chain projects 	<ul style="list-style-type: none"> • Implement Demand Forecasting System • Fully implement Balanced Scorecard <ul style="list-style-type: none"> -Claims -Complaints -SQI -OTIF -Customer Satisfaction Survey 	<ul style="list-style-type: none"> • Identify customer requirements: if want delivery pre-noon, then work towards guaranteeing it • Measure OEE; Customer Service (OTIF; stoppages etc) • Measure internal customer service • Prod Planning to be systematised 	<p>Lean programme ideas</p> <ul style="list-style-type: none"> Define critical KPIs; Introduce Weekly OMP (Variance management, SIC, process reviews; visual management; team 'huddles'; shift logs) Demand Management and Scheduling Role toolkits of lean skills

2.4 Lean Toolkit Action Plan

The identified gaps between the current state and best practice future state maps both in terms of KPIs and methodologies is then addressed by the team through the compilation of comprehensive Lean Toolkit Action Plan.

It is important to recognise that a Lean company is one that has identified what it needs to do to ensure that customer value is continuously improved and waste is systematically reduced on an on-going basis i.e. the operation of Lean Toolkits fundamentally changes ‘the way we do business around here’. The scope of Lean Toolkit Action Plan is, therefore, the installation of all the necessary processes, skills and methodologies that are required to achieve a sustainable continuous improvement culture.

It is worth emphasising that a Lean Toolkit Action Plan is not a list of projects that will achieve specific identified improvements: these benefits will come about a result of the installation of ‘Lean techniques’. Some of the benefits will come through the application of SMART (Specific Measurable Achievable Realistic Target) Action Plans but most will come about because ‘hundreds of little things’ will be improved, carried out with more accuracy and with more focus by everyone in the company. This will be primarily because people will, over time, be taking increasingly more ownership of their jobs. Senior management will not always know the details of why a KPI has improved by so much because front line people have the skills and mind-sets to ‘do it for themselves’.

The following action plan (taken from a real life example and modified slightly to protect commercial sensitivities – e.g. only indicative total financial benefits are shown in *italics*) indicates KPI and financial benefits that could be achieved during the respective stages of the programme. For the sake of prudence, it is usual that only the specific benefits previously identified during the mapping process are included in the Cost Benefit Analysis - this should be sufficient to justify the ‘Rapid Improvement’ phase of the project. Subsequent phases will be justified through the identification of benefits through the Operational Management Processes. It is usual for Lean programmes to achieve at least a 3:1 annualised payback.

- The 4-stage lean strategy will normally take at least 2 years to implement. From then on the organisations involved in the value chain should commit to a never-ending ‘pursuit of perfection’.

Phase	Objective	Toolkit Elements to be installed (please refer to section 6 for examples/ definitions)	Duration	Examples of Potential KPI Improvements vs baseline	Examples of Potential Financial Benefits

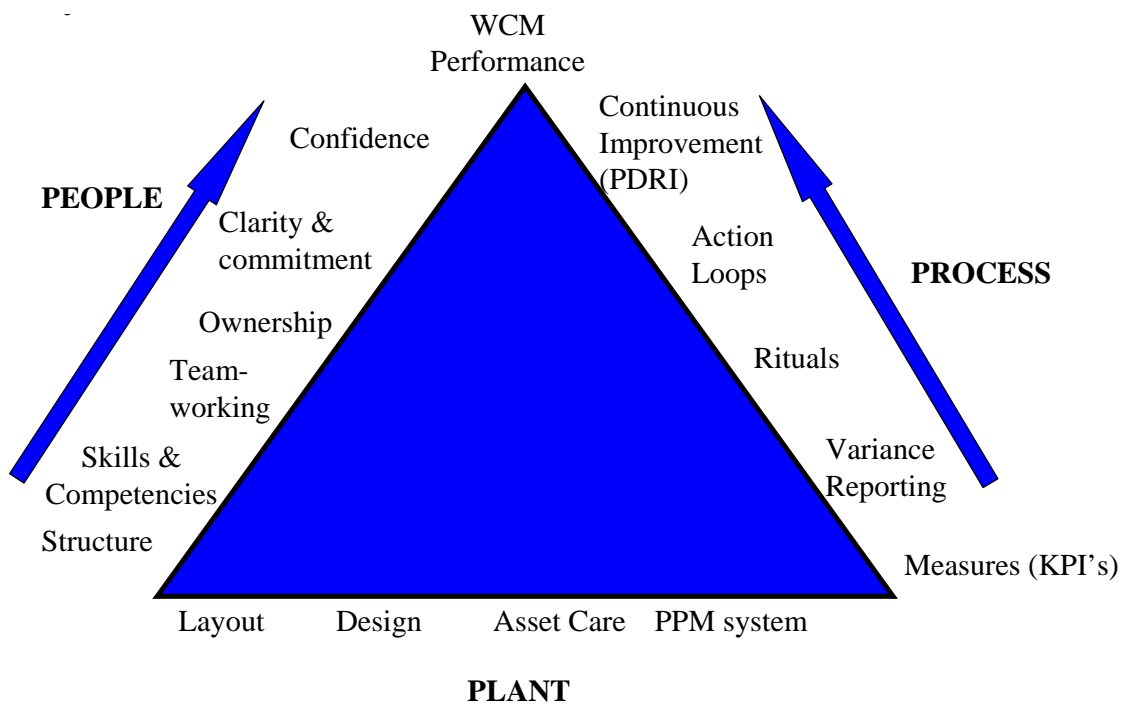
<p>Rapid Improvement</p>	<p>To install the necessary lean data collection measurement processes which will enable the company to plan, do, check and adjust its activities (hourly, daily, weekly, monthly) with regard to the GM and departmental level measures identified in the last section</p>	<p>Operational Management Processes to drive improvements identified KPIs - Please see example in section 2.5</p> <p>Establish Baselines and targets for each KPI</p> <p>Initiate Specific Measurable, Achievable Realistic Target Project Management Process to realise improvements in identified 'top losses'.</p>	<p>3 - 4 Months</p>	<p>Processing %OEE by 5%</p> <p>Reduce % rework by 1.5 %</p> <p>Improve UPMH by 5%</p> <p>Reduce cost per Kg by 5%</p> <p>60% CI projects target</p> <p>Customer Service % OTIF by 0.25%</p>	<p><i>It is estimated financial benefits to the value chain would be in the order of \$600K per annum</i></p>
<p>Sustainability</p>	<p>To align roles and team with the chosen measures in a way that ensures clarity of accountability</p> <p>To provide role holders with the necessary skill toolkits to enable them to manage their own process accuracy</p> <p>To ensure that the work demand is aligned to maximise customer value and minimise waste (Including Demand Planning and Finite Scheduling)</p>	<p>Coach role holders in lean skills. Please see example in section 2.5.</p> <p>Recording of standardised work steps in operational manuals ('Technical Authorship')</p> <p>Improve forecast accuracy & translate into production plan that aligns capacity with customer demand and reduces stock of finished goods and Work in Progress.</p>	<p>3 - 6 months</p>	<p>Processing %OEE by 5%</p> <p>Reduce % rework by 1.5 %</p> <p>Reduce cost per Kg by 10%</p> <p>Customer Service % OTIF by 0.25%</p>	<p><i>It is estimated the financial benefits to the value chain would be in the order of \$600K per annum in addition to that above</i></p>

Continuous Improvement	To sustain a culture where there is continuous improvement of all activities	Kaizen Teams Self Managing Teams	1- 2 years	Achievement of Best Practice levels	<i>It is estimated the financial benefits to the value chain would be in the order of \$1million per annum in addition to that above</i>
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2.5 Lean Toolkit Terms

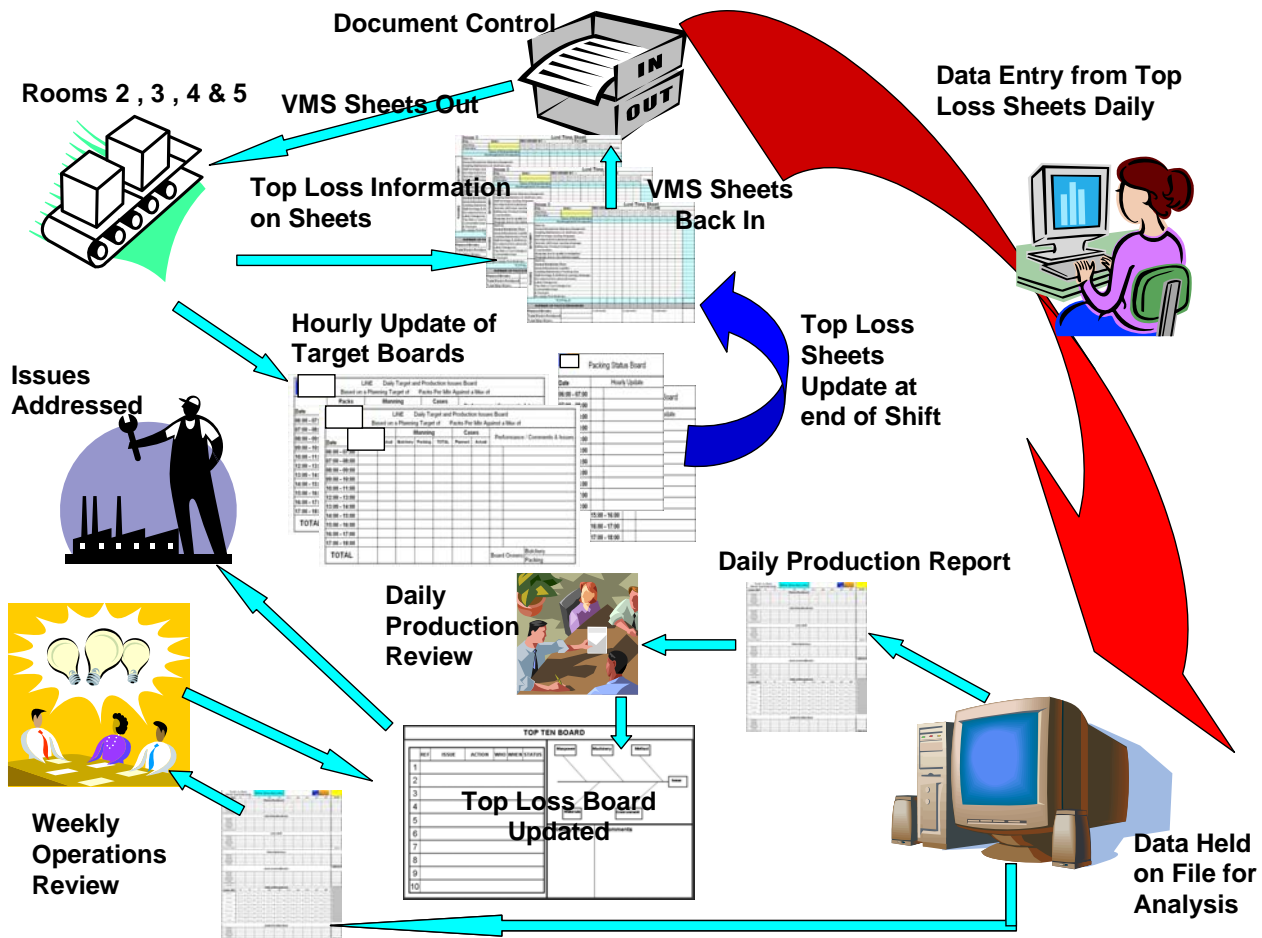
These definitions all relate to the Lean Methods Toolkit terms shown in the Action Plan above plus some commonly used Lean Techniques.

Lean Operational Management Process (OMP)



To achieve a 'World Class Manufacturing' (WCM) performance an organisation should systematically, over time, build 'leanness' into all aspects of it organisational resources (People, Processes and Plant). The diagram above represents this 'journey'

On a practical basis, a Lean OMP will comprise of a number interconnected business processes that comprise hourly, daily and weekly performance management systems. A 'Rich Picture' of a typical lean process is shown in the following diagram.



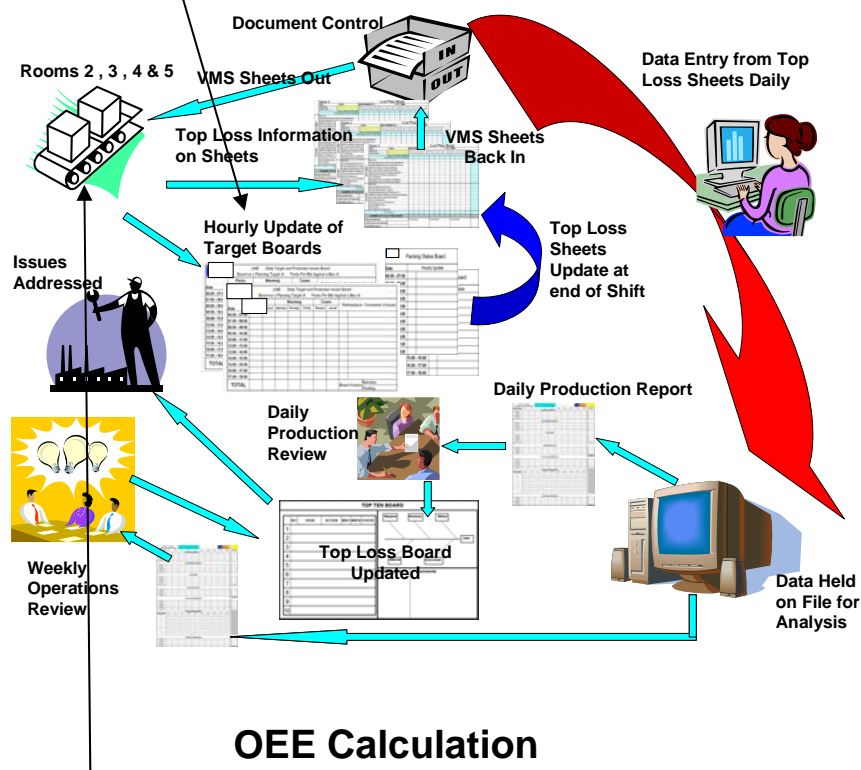
When each stage of this process and indeed all the other business processes are being undertaken by staff in a manner consistent with Lean Philosophy then a business can be said to have achieved a 'Lean State'. It is important to point out that Lean Philosophy states that individuals are able to manage their own performance variance and continuously improve their own processes.

The above process stages on the 'Rich Picture' are described in the flowing diagrams:

The SIC Board

The SIC Boards are the main tool used by the Charge Hands and their teams to monitor the hourly performance of the line. The products are listed down the left hand side and the no. of cases required for the shift production is written next to the product in red. The no. of extra cases to be produced & stored is then written in blue. The time taken to produce the required cases for the products is indicated by drawing a coloured line (Red or Blue depending on cases required for shift or not.) within the corresponding time frame. A green line is then drawn under the red and/or blue lines to indicate total cases produced of that product. The total no. is then written in the totals column. An example is shown below.

HR	TARGET	ACTUAL	%	ISSUES	UPH	PTS/STOPS	D/T	ISSUES & CORRECTIVE ACTIONS
Min	Min	Min	Min	Min	Min	Min	Min	
6-7								
7-8								
8-9								
9-10								
10-11								
11-12								
12-13								
13-14								
DATE	LINE PERFORMANCE						BREAKS	SET
14-15							Min	Min
15-16								
16-17								
17-18								
18-19								
19-20								
20-21								
21-22								
22-23								
23-24								
TOTAL	ISS	ISS	ISS	ISS	ISS	ISS	ISS	ISS
14-24								



OEE Calculation

What is OEE?

- Overall Equipment Effectiveness
- $OEE = \text{Availability} \times \text{Performance Efficiency} \times \text{Quality Rate} / \text{Output Rate}$
- When calculating OEE always use the same basis for the components of the calculation.

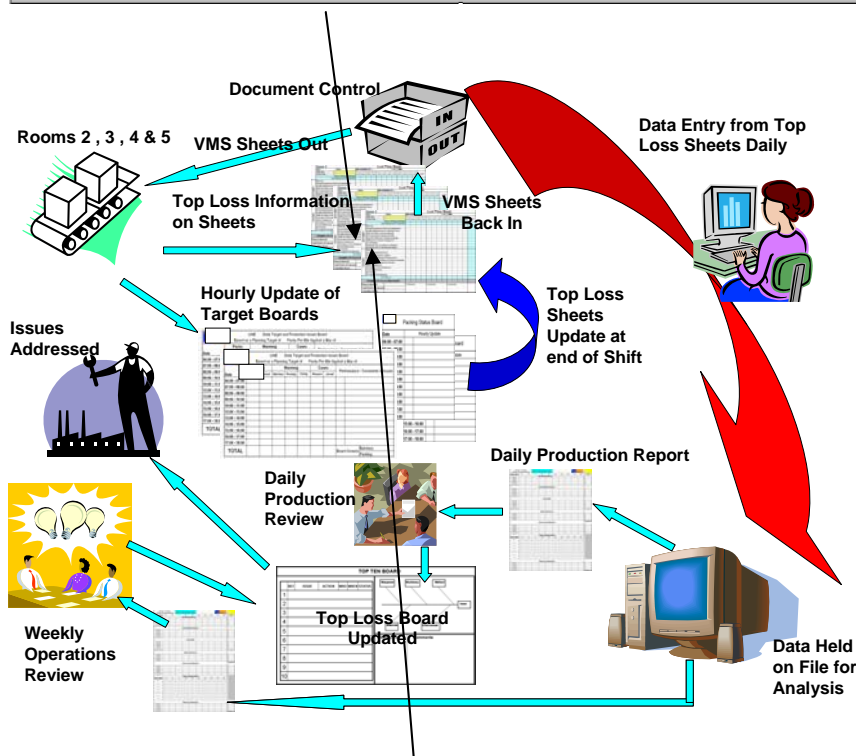
OEE Calculation

- Availability equals the time you are expected to run the machine or total time on the job, less planned unmanned downtime such as lunch and breaks. From this time we deduct unplanned downtime such as Breakdowns, Set-up and adjustment losses.
- The second factor in OEE is Performance Efficiency or "How close to design rate did your machine run when it was available". This will be affected by idling and minor stoppages and reduced speed losses.
- The last factor we are concerned with is the Quality Rate or first time through Quality

Downtime Sheets

The following is a completed example of the Lost Time sheet which every Line Leader must update throughout the shift

Top Level Loss Analysis	Recorded By :-Shayne Barker Retail Packing - Lost Time Sheet										For Line	6	
	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	TOTALS
Not Required for Prodn and Planned Breaks													3
Main Process													179
Stoppages													
Start Up & Product Change Over (Set Up)			10	5	3			5	4				27
Stopped Waiting for Material								20					20
Mechanical Breakdown													15
Waiting for Consumables						8 Labels				5 Top Foil			13
Machine Problems										15 Label Printer			15
Machine Problems Details													3 ½ Hrs 90 Mins
PERIOD	6 till 9			9 till 12			12 till 3			After 3 O'Clock			
General Comments	Line was not scheduled till 9 o'clock												
Date	23/02/04			Start Time	06:00			Finish Time	15:00			Not Required for Prodn.	3 Hours



Data Capture Checklist

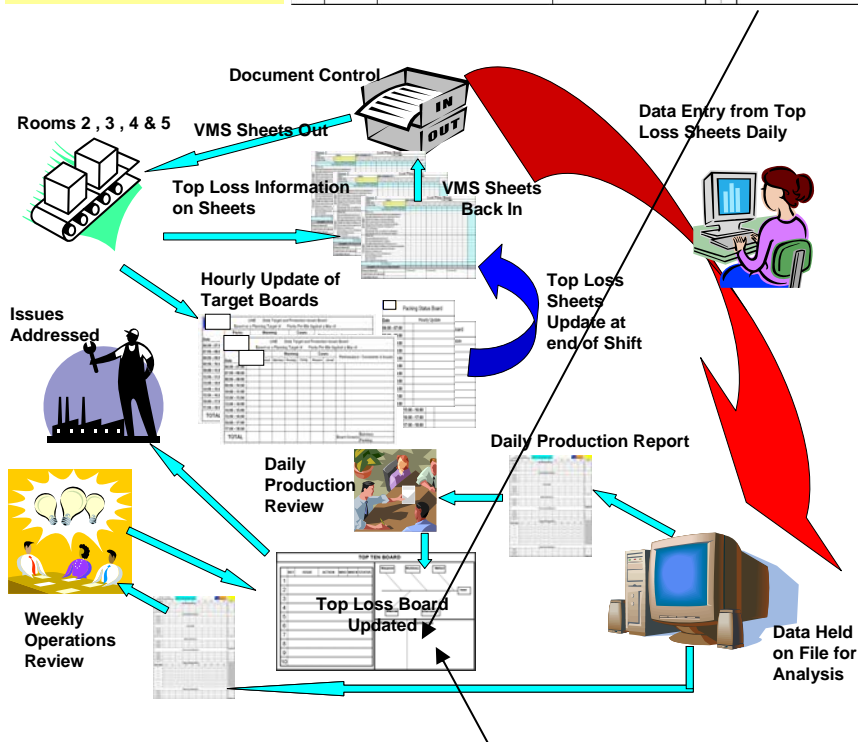
- Fill in Shift Start Details:
 - A) Recorded By
 - B) For Line
 - C) Date
 - D) Start Time
- Draw a line through the boxes corresponding to the time Not Required For Production and add a General Comment (e.g. "line not scheduled until 9")
- When a lost time occurs put the length (in minutes) next to the lost time type and within the corresponding time of shift box.
- Add machine Performance details for the lost time if required.
- Draw a line through the boxes corresponding to the planned breaks
- Fill in Shift End Details:
 - A) Totals
 - B) Finish Time
 - C) Not Required For Production
- Draw a diagonal line across the remaining lost time boxes to signify that the shift has ended.

- Do you and your team understand all the 'REASON' Definitions on the sheet?
- Are you confident that all lost time is being captured (Non-accounted time has been high on some days/lines)?
- Are you monitoring the sheets during the day to both ensure they are being completed correctly and also using them to manage the process?
- At the end of the day are you adding up the times?
- Have you checked that the start and finish times are on the sheet before you hand the sheet in at the end of the day?
- Are you making sure that the sheet is being handed in to the correct place on a daily basis?
- Are you making comments on the sheet and explaining losses to Steve?
- Do you know what a top loss is?
- Do you fully understand the definitions of efficiency and non-accounted time?
- Do you fully understand the daily report format?
- Do you understand the content of the weekly report?
- Are you using the sheets on a Saturday to the same procedure?

Top Loss Analysis

- The Process**
- Produce OEE Pareto Graphs.
 - Collate weekly Pareto Graphs.
 - Analyse in weekly meeting.
 - Define major problems and concerns
 - Create Action Plan
 - Review

Ref No.	Date Raised	Issue Description	Proposed Action	Status	Summary Status	Date Closed
1	23/10/2003	Non-Accounted Lines 1 & 2			Link at Charge Hand performance and consider reactivity. (Shan for Ely?)	
2	23/10/2003	Label Printer Line 1			Closed, Ribbon, Design / Format and in general familiar	04/11/2003
3	23/10/2003	Mince Depositor Line 1 / 2			Two new photos of equipment being purchased. (Management Share?)	04/11/2003
4	23/10/2003	Break Management Line 1			WIP, closer supervision required.	
5	23/10/2003	Start Up / Awaiting Meat Line 3	Need to manage line start up better.			
6	23/10/2003	Break Management Line 3				
7	23/10/2003	General Issues Line 4	Monitor situation and identify specific action points.		Closed	
8	23/10/2003	Tray Forming Line 4 (Very High)				
9	23/10/2003	Awaiting Meat / People Issue? Line 5	Staff Shortage identified as potential root cause.			
10	23/10/2003	High Level of Un-Accounted Line 6				
11	23/10/2003	Tray Feeder Line 6			New Trays being looked at.	
12	23/10/2003	Washer Line 5				
13	04/11/2003	Across the board - Non-Accounted	Shan into Line 1 & 2?			
14	04/11/2003	Lines 3 & 4 Exception Report consistency	Charge Hand Line 3			
15	04/11/2003	Line 4 Data Gathering	Needs to be focussed a bit better.			
16						
17						
18						
19						
20						
21						



Tools and Techniques

- Use the Following process to Determine Root Cause**
1. Gather information and analyse using **Pareto**.
 2. Brainstorm potential causes using Post It's.
 3. Place Post It's onto a Fishbone Diagram.
 4. Priority Window.
 5. Interrogate causes using the 5 Whys.

- Using Tools in a Structured Way**
- A BOS such as the VMS will include:
- A **Trend Analysis** of the issue being measured (Tramlines)
 - A **Pareto Breakdown** of the elements contributing to the issue with a priority list of top contributors (Wk by Month by Line)
 - A **Structured Action Plan** to reduce or eliminate the root cause of the issues will be developed by the team (Weekly Meetings)

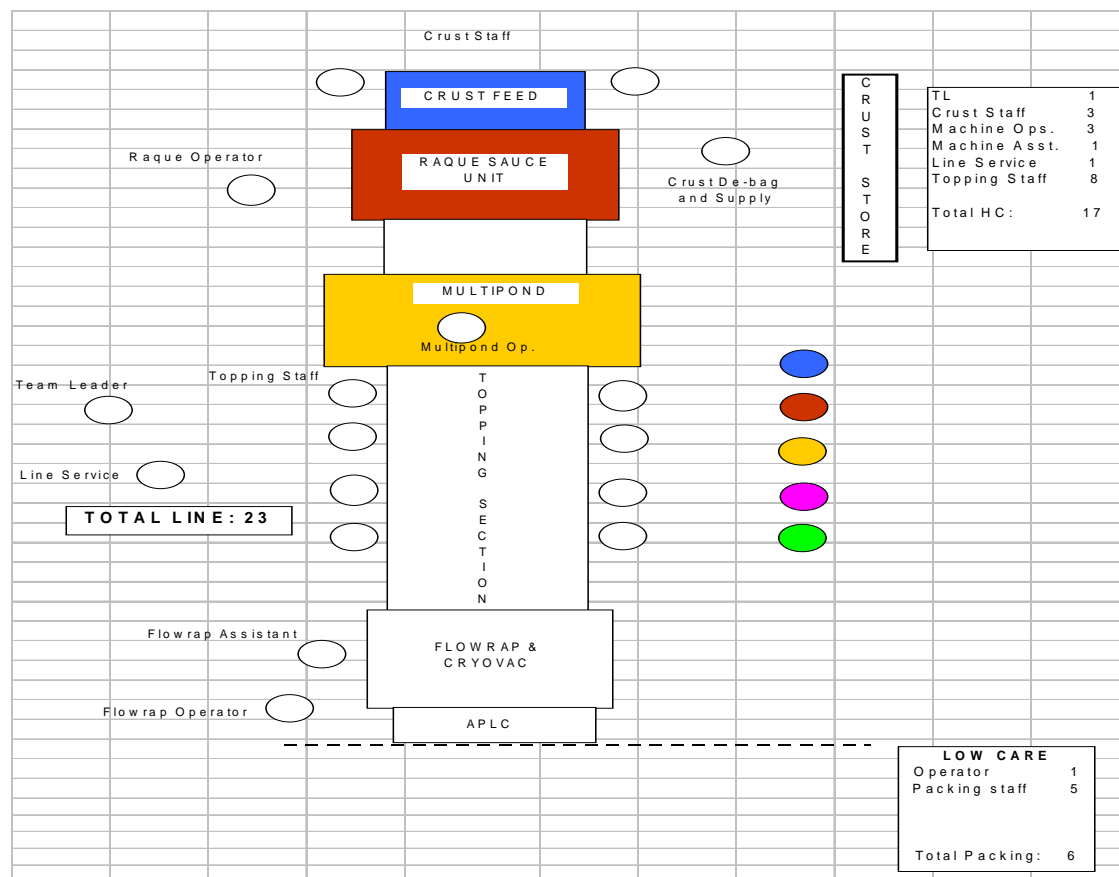
Standardised Work

An agreed upon set of work procedures that establishes the best method and sequence for each manufacturing or management process. Standardised work is implemented to maximise human and machine efficiency whilst simultaneously ensuring safe conditions. The Operational Management Process and the Role Toolkit shown earlier are examples of Standardised Work.

Technical Authorship

This is a collection of methods for recording lean methods and standards in a way that is both standardised and very 'user friendly' (e.g. using digital photography). These documents form the basis of training schedules for both existing and new team members.

To ensure consistent, reliable and predictable performance, it is also important to identify and record best practice. It is important to coach the operational teams in techniques that help them precipitate out what constitutes best practice and in a manner that ensures ownership of the solution by all the team. The following diagram is an example of a 'best practice crewing for a specific product on a pizza line.



Demand Planning

The demand from the market place needs to be both properly understood and forecasted. Demand Planning tools and processes take market requirements and translate the customer requirements into a daily/weekly production plans. Ideally, the capacity and capability of the value chain should be closely matched to the customer demand to prevent over production and other types of waste.

Finite Scheduling

A tool and process whereby the production plant is scheduled according to customer demand and the constraints of the plant in a way that assures 100% customer service at lowest produced and delivered cost.

Kaizen (Problem Solving).

To ensure sustainable continuous improvement of production processes, it is important to equip teams with skills that will enable them to determine what problems should be given highest priority (i.e. those that will lead to the greatest improvements in performance) and then generate solutions and implement actions to solve the problems.

Structured problem solving methodology will also teach the teams that solutions must be justifiable in terms of the cost/benefits and should not be implemented without investigating the cost benefit. The teams should also be equipped with techniques to ensure that the solutions generated are permanent i.e. effective at solving the original problem. Finally, the teams should also be coached in how to avoid complexity and arrive at the most simple solution.

Kanban

An inventory control card at the heart of a pull system. The card is a means of communicating upstream precisely what is required (in terms of product specifications and quantity) at the time it is required.

Flow Levelling

Balancing the amount of work to be done during a shift with the capacity to complete the work, factoring in volume and variety.

Takt Time

The 'beat' of customer demand – the time required between completion of successive units of end product. It determines how fast the process needs to run to meet customer demand. It is calculated by dividing the total time available for production by the total customer requirement

Pitch

The amount of time – based on Takt - required for an upstream operation to release a pre-determined 'pack out' quantity of work in progress to a downstream operation. Pitch is therefore the product of the Takt time and the 'pack out' quantity

5 S

Consists of five activities:

Sort - Sorting through the contents of an area and removing unnecessary items.

Set in order - Arranging necessary items for easy and efficient access, and keeping them that way.

Shine - Cleaning everything, keeping it clean, and using cleaning as a way to ensure that your area and equipment is maintained as it should be.

Standardise - Creating guidelines for keeping the area organised, orderly, and clean, and making the standards visual and obvious.

Sustain - Educating and communicating to ensure that everyone follows the 5S standards.