

# **Operations Excellence**

through

## **TPM & Lean (TPM<sup>3</sup>)**

**14 November 2012**

# **Sustaining Improvements**



**Presentation by:**  
**Ross Kennedy**  
**President CTPM Australasia**

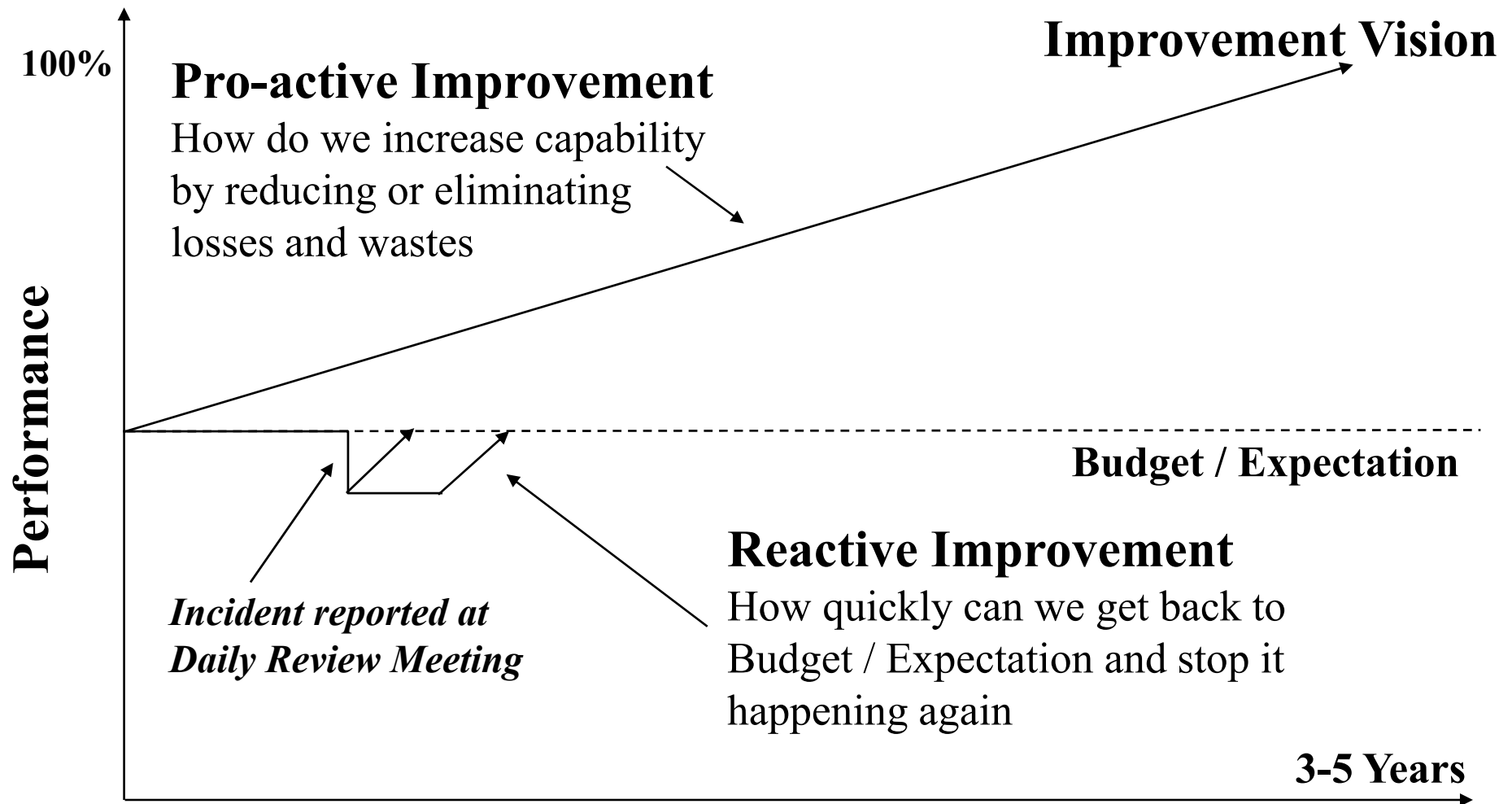
# Welcome & Outline of Presentation

**Sustaining Improvements will cover the following:**



1. Tools vs People Focused Improvement
2. Impact of Natural Decay on Improvement
3. On-going vs Event Improvement

# The Need to Balance the 2 Types of Improvement



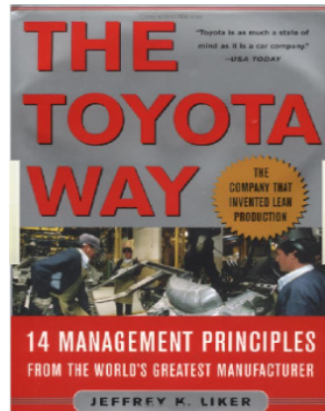
*Note: When Pro-active Improvement is successful, then the need for Reactive Improvement should significantly reduce*

# Jeffrey K Liker

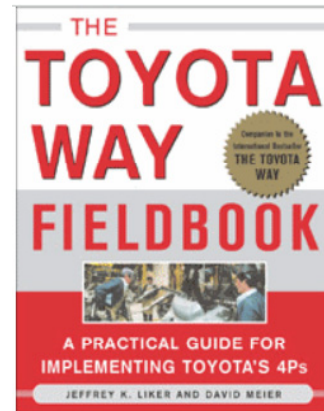
Professor Industrial & Operations Engineering

University of Michigan USA

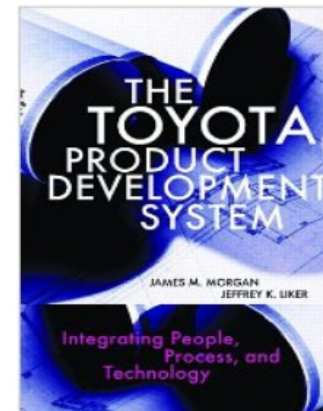
2004



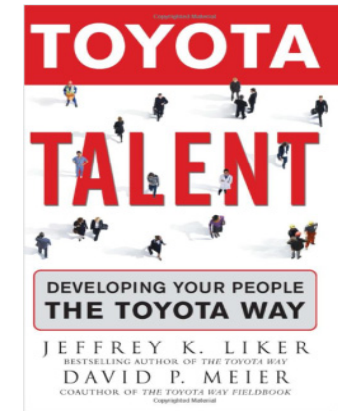
2005



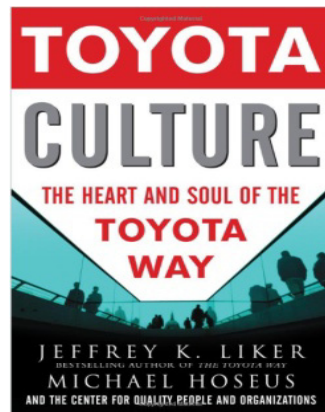
2006



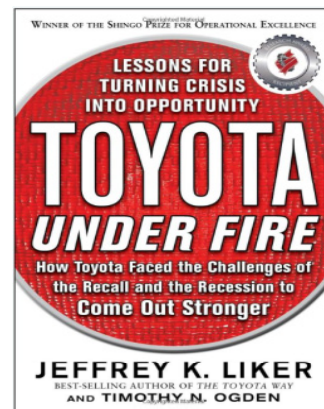
2007



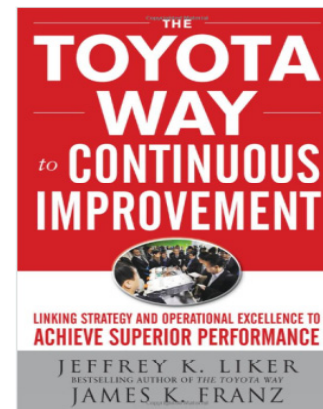
2008



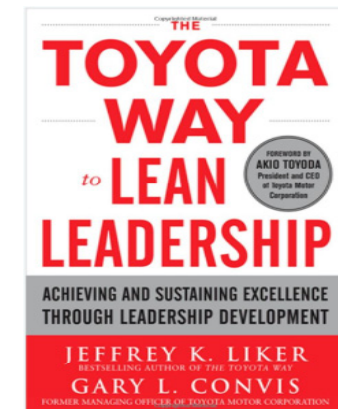
2011



2011



2011



# 1. Tools Vs People Focused Improvement

## Mechanistic Vs Organic approaches

**Mechanistic is a linear view of the workplace**

*Treating the workplace like a machine that requires tools to fix*

**Organic is a systemic view of the workplace**

*Treating the workplace like a living organism that requires nurturing*

**Key Learning:**

***Mechanistic approaches do not sustain***

Professor Jeffrey K Liker – University of Michigan  
The Toyota Way for Continuous Improvement

# TPM is about addressing Equipment Problems (Defects) at the Source

*Eg: fix damaged grease lines rather than failed bearings*

**However Toyota was faced with 3 Challenges - How do we:**

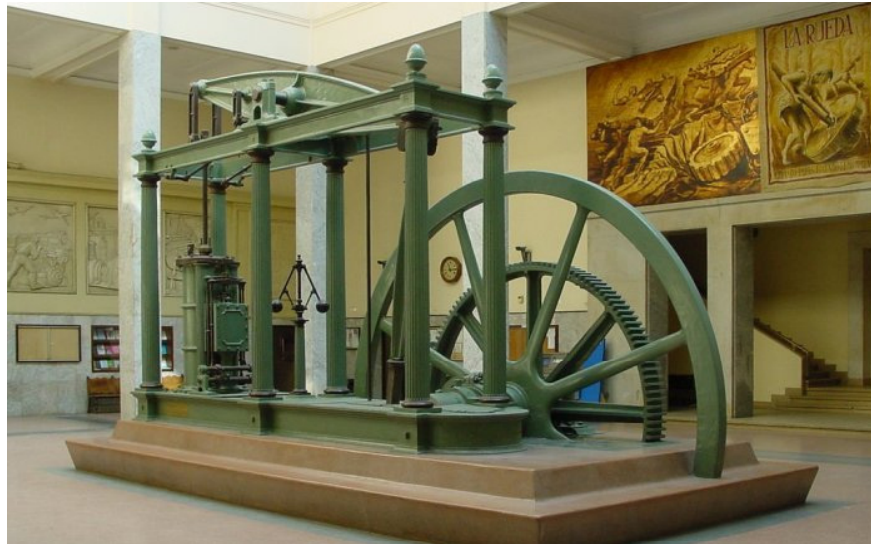
- Train the operators to know what to look for
- Change the equipment so it easy for operators to find the problems
- Create a maintenance support capability that can respond to small problems and issues identified by the operators

***Hence TPM was developed based on a number of integrated activities***



# Organic thinking is like Thermodynamics and Entropy

*Entropy can be viewed as the amount of energy in a physical system that is not available to do work.*



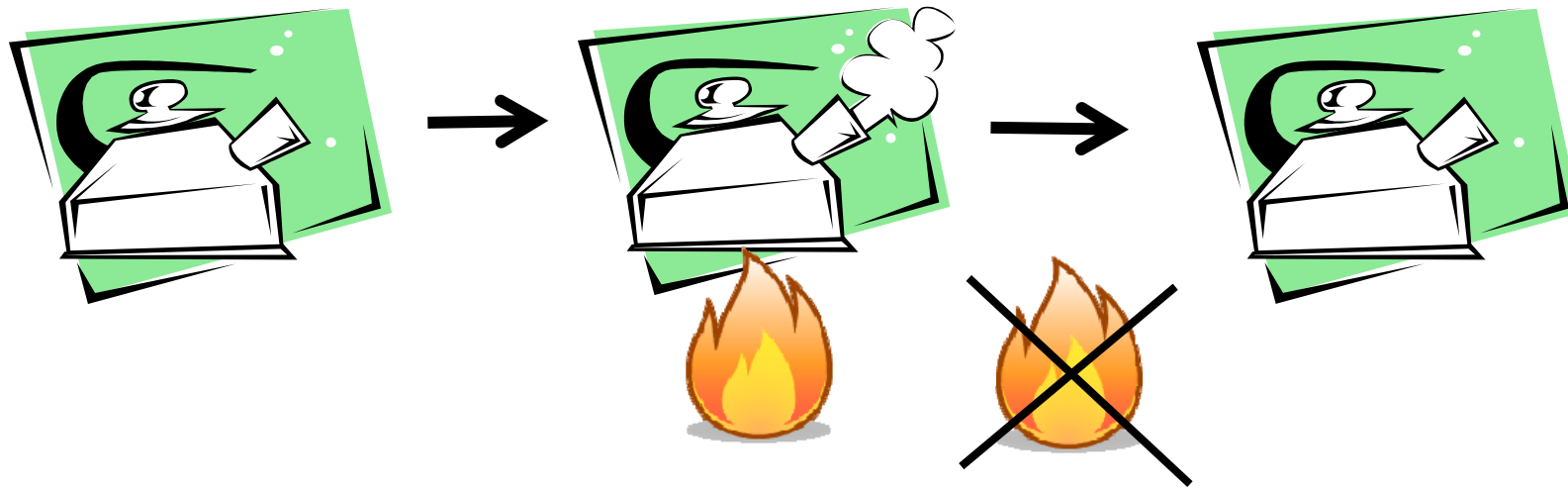
**Watt Steam Engine**

## **2<sup>nd</sup> Law of Thermodynamics**

Entropy, or disorder, will naturally increase over time

## 2. Impact of Natural Decay on Improvement

# Thermodynamics and Entropy in Action



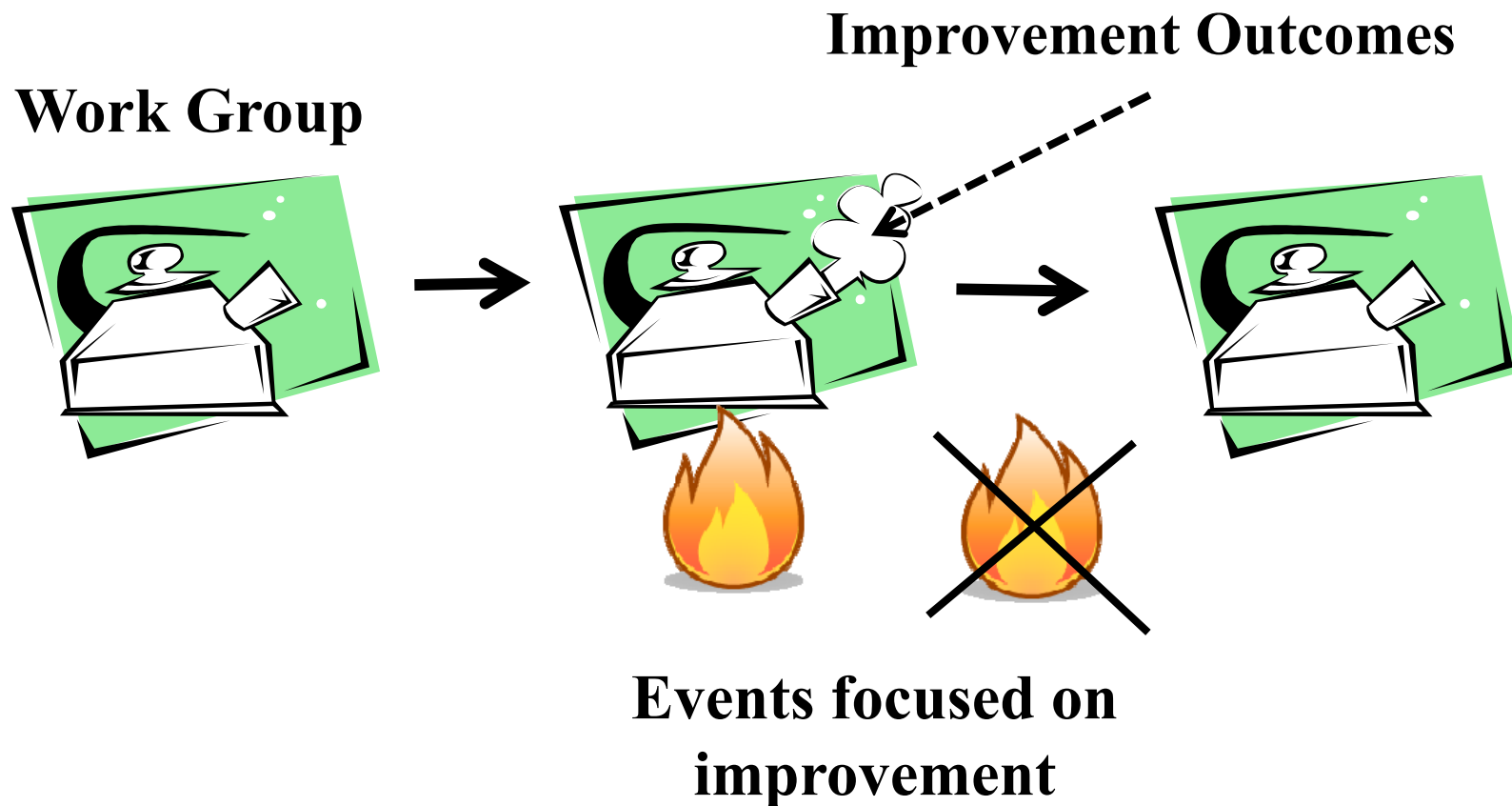
When we stop applying sufficient energy, the heat in the water dissipates into the surrounding environment, and the water cools down – entropy increases

*The energy level of the water decreases naturally if we do nothing.*



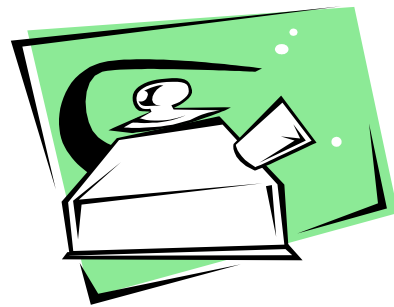
## 2. Impact of Natural Decay on Improvement

### Mechanistic approach to Operations Excellence

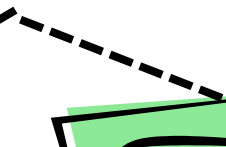
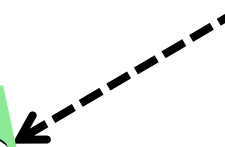


# Organic approach to Operations Excellence

**Work Group**



**Small Improvement Outcomes**



**Weekly Improvement  
Activities focusing on  
developing people**

**Resulting in  
on-going improvement  
and sustained results**

# To Sustain Operations Excellence

**Need to ultimately having everyone engaged  
at least 10% of their normal work time in  
On-going Pro-active Improvement activities**

Cross-functional Teams	Area Based Teams
5%	5%
Problem Solving	Prevention at Source
Visual Workplace	

**Where 5% = approx 2 hrs / week**

# **Operations Excellence through TPM & Lean is about developing new skills and abilities within our workforce especially at the frontline**

## **Production Team Leaders and Team Members**

- **Frontline Safety & Environment**
- **Frontline Quality**
- **Frontline Equipment Care**
- **Frontline Energy Management**
- **Achieve the Production Plan**
- **Formal On-going Improvement**

**Problem Solving / Visual Workplace / Prevention at Source**

# **Operations Excellence through TPM & Lean is about developing new skills and abilities within our workforce especially at the frontline**

As such we need a well proven means to develop these new skills and abilities

**Question:** What activity do we know of that has been around for centuries that requires a person to develop new skills and abilities?

**Answer:** Playing a musical instrument



What does a person sound like when they first take-up playing a musical instrument?

# **Operations Excellence through TPM & Lean is about developing new skills and abilities within our workforce especially at the frontline**

History has taught us that the best way to learn to play a musical instrument (develop a new skill set) is to have a structured half-hour lesson each week from a competent teacher with regular practice and encouragement .....



recognising it may take several years to become competent and many years to become a master



# Role of the Site Management Team

**Achieve the Production  
Plan & Satisfy the  
Customer**

**Pro-active Improvement**

Improve the way they  
Achieve the Production Plan  
& Satisfy the Customer



Cross-functional Teams	Area Based Teams
5%	5%
Problem Solving	Prevention at Source
Visual Workplace	

# The Role of Site Management in the TPM & Lean Journey to ensure sustainability

Site Management need to:

1. Establish a Site Leadership Team for Pro-active Improvement along with a clearly defined and resourced support structure;
2. **Plan and monitor progress through quarterly (or at least 4 monthly) Pro-active Improvement strategy planning sessions and weekly review meetings; and**
3. Establish the Visions, Philosophy & Goal Alignment for the site.

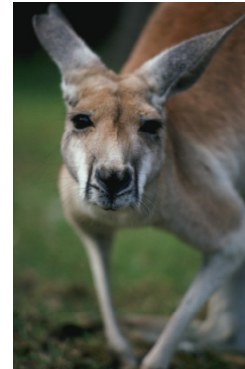
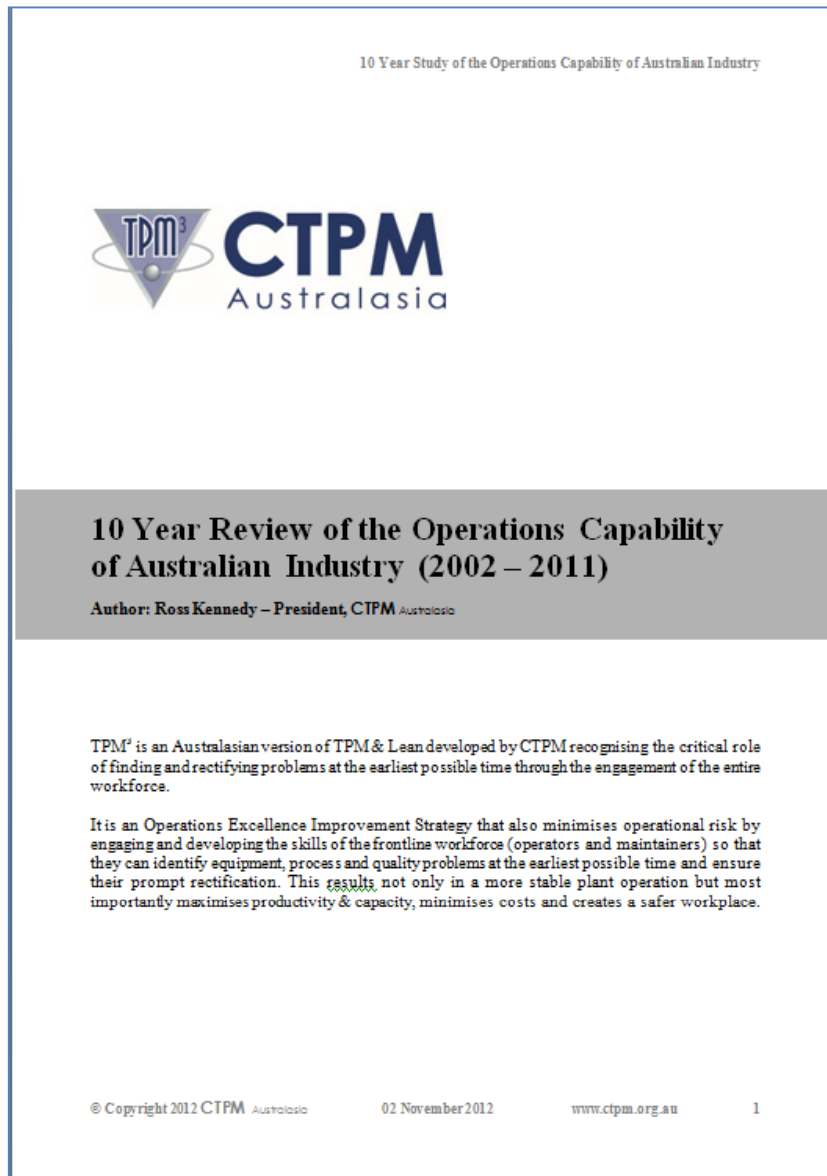
# The Role of Site Management in the TPM & Lean Journey to ensure sustainability

We have found the most successful sites have broken their Pro-active Improvement journey into 3-4 month improvement cycles supported by a 3-5 year Master Plan.

A question we often get asked is why 3-4 month improvement cycles. This comes from the research which has identified that human's physiology is such that we can focus on events for up to about 12 weeks.

It you look on the internet you will be amazed at just how many 12 week programs exist for this very reason.

# On-going Improvement versus Events



[www.ctpm.org.au](http://www.ctpm.org.au)

Navigation

TPM<sup>3</sup> Methodology

TPM & Lean Papers



# Operations Capability Innocence to Excellence Rating

Innocence										Excellence
0	1	2	3	4	5	6	7	8	9	10

Quality Performance		
Machines and processes unable to hold desired tolerances, high rate of 'off-spec'.	Good machine and process capability supported with Statistical Process Control monitoring and quality improvement tools training but with limited application.	Excellent process capability continuously monitored using Statistical Process Controls supported by the application of quality improvement tools.
Large and powerful inspection departments, 'off-spec' discovered by inspection and customers.	Strong quality assurance department with analytical capability and charged with primary quality responsibility.	Very low 'off spec' rate measured in parts per million.
Low Skills training, especially in quality.	Good skills training.	Highly trained and versatile work force responsible for quality inspection and corrective action.
Large discrepancy between documents and the actual practices, frequent non-conformances.	Few non-conformances.	High application of mistake - proof devices to ensure no non-conformances to specification.
Large number of customers' complaints.	Low number of customer complaints, however problems do remain and are handled by QA department.	Virtually no problems with complaints and customer inputs solicited for continuous improvement.

Response Performance		
Frequent replanning / rescheduling of production	Relatively stable production schedule with limited expediting.	Production schedule directly coupled with market usage.
'Fix it when it breaks' maintenance.	Established preventive maintenance, infrequent breakdowns.	TPM as the key equipment management strategy.
Low process flexibility, lengthy changeovers, set-ups, or transitions.	Faster changeovers, set-ups or transitions, however frequent bottlenecks.	Quick changeovers, set-ups or transitions (measured in minutes) and virtually no bottlenecks.
Inventory levels between equipment or process high.	Inventory levels under control.	Inventory levels stable and low.
Long Lead Times.	Relatively shorter Lead Times for selected products / outputs.	All Lead Times less than one-day.

Employee Engagement Performance		
Adversarial labour management relations.	Stable labour management relations.	Labour management relations based on trust and continuous two-way communication.
Little employee involvement (especially all operators) in formal improvements.	Some employee involvement in formal improvement activities with main focus on Cross-functional teams.	All employees involved in formal improvement activities through both Cross-functional and Area Based Teams ensuring a high rate of implemented improvements.
Leadership based on seniority rather than skills with many job classifications.	Structure is based on a cascading team environment where each organisation layer is seen as a team of people.	Cascading team organisational structure is aligned and is capable of supporting continuous learning by all employees through well-led synergistic Area Based Teams with dedicated support.
High employee turnover or high use of casuals.	Stable work force with good employee morale.	High focus on learning by employees with low turnover and high morale.
Highly demarcated work force resulting in high inefficiencies.	Skills training well developed to achieve both flexibility and expertise in well-defined areas of responsibility.	Continuous learning environment with good root cause problem-solving capability by all employees.

# **On-going Improvement versus Events**

## **10 Year Review of the Operations Capability of Australian Industry (2002 – 2011)**

### **3 Ways to Improve Operations Capability**

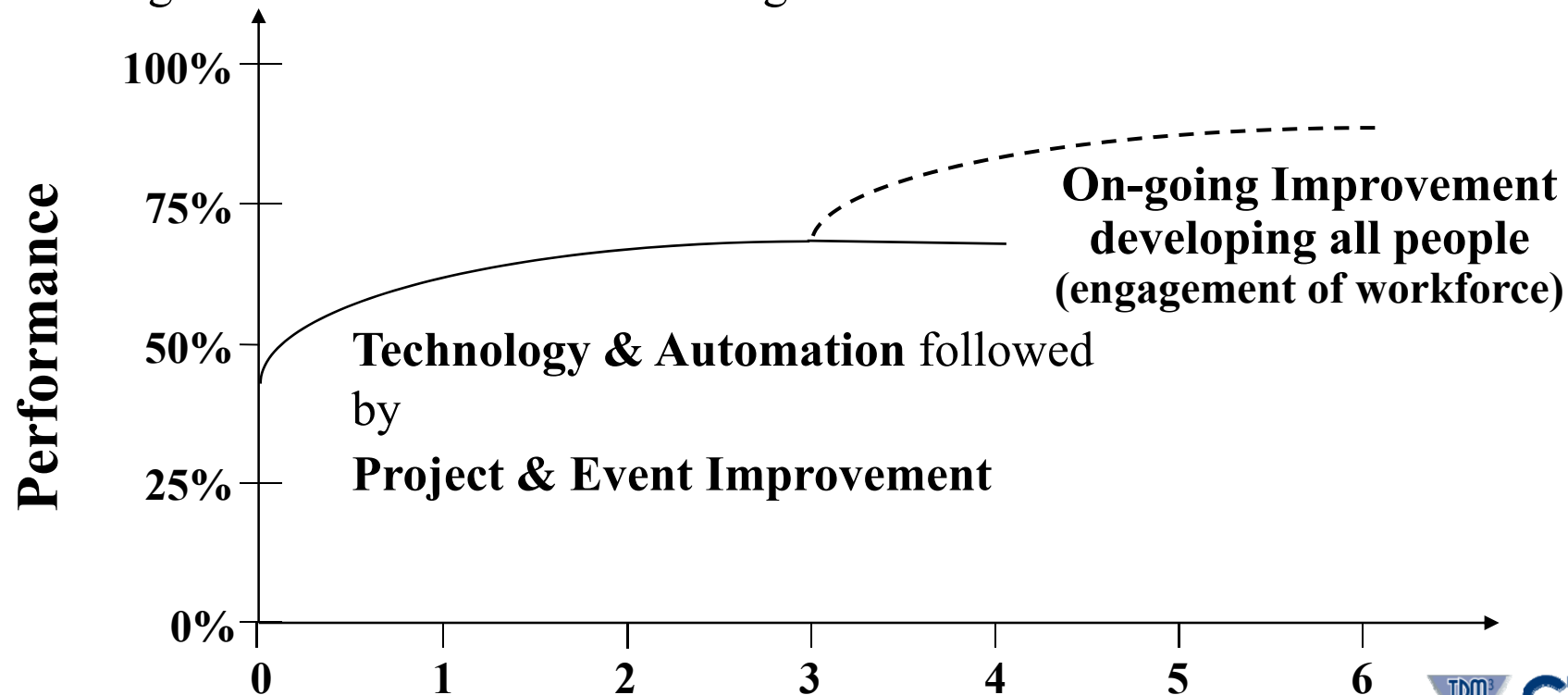
- Technology & Automation Improvement
- Project or Event Improvement
- On-going Improvement focused on developing all people to enhance their Practices & Behaviours



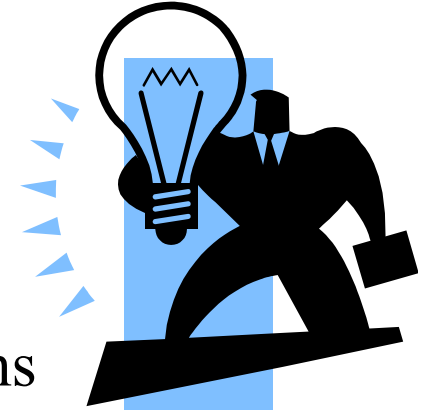
# Operations Capability Solutions: Case Study

**Situation:** New packaging equipment was installed and project & event improvement was initiated to address the many initial problems, however expected performance improvement started to plateau after several years.

**Solution:** Introduction of On-going Improvement through Area Based Teams closed the gap to Operational Excellence by more than 50% within 3 years resulting in millions of dollars in savings.



# Key Learnings



- All Leadership Teams only have about 8-12 teams reporting directly to them
- All Pro-active Improvement Teams report to a Leadership Team that reviews progress on a weekly basis
- All Reactive Improvement activity reports to a Daily Review Meeting
- Once a person is in a Cross-functional Team ensure they continue being in future Cross-functional Teams
- Ensure all Pro-active Improvement Teams successfully achieve their mandate within 12-14 weeks (3-4 months)