hfl consulting
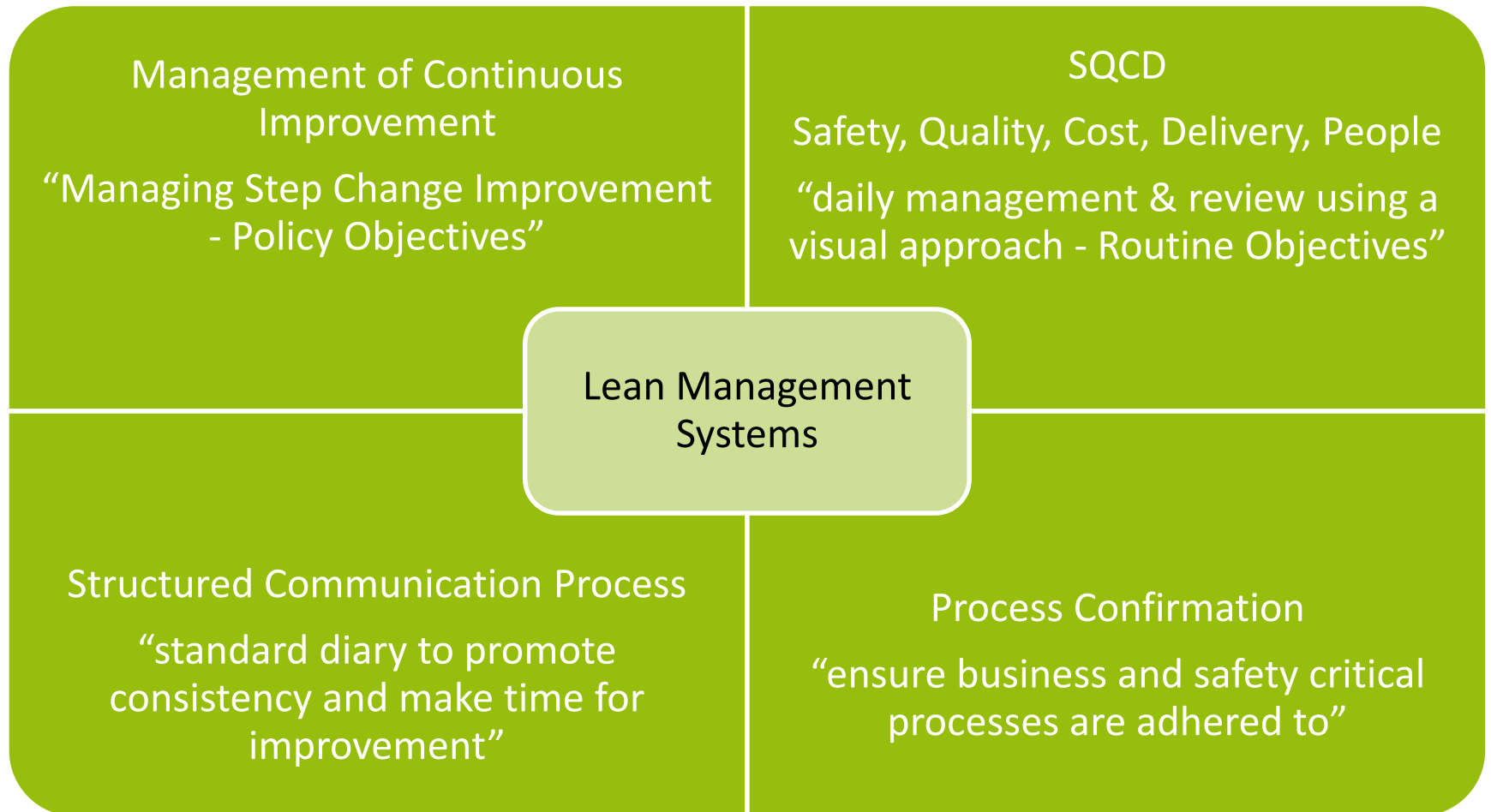Safety Sustainability Profitability

Now part of **SLR**

Reliability and Operations Improvements:
Some Case Studies of How to Improve

20th November 2019
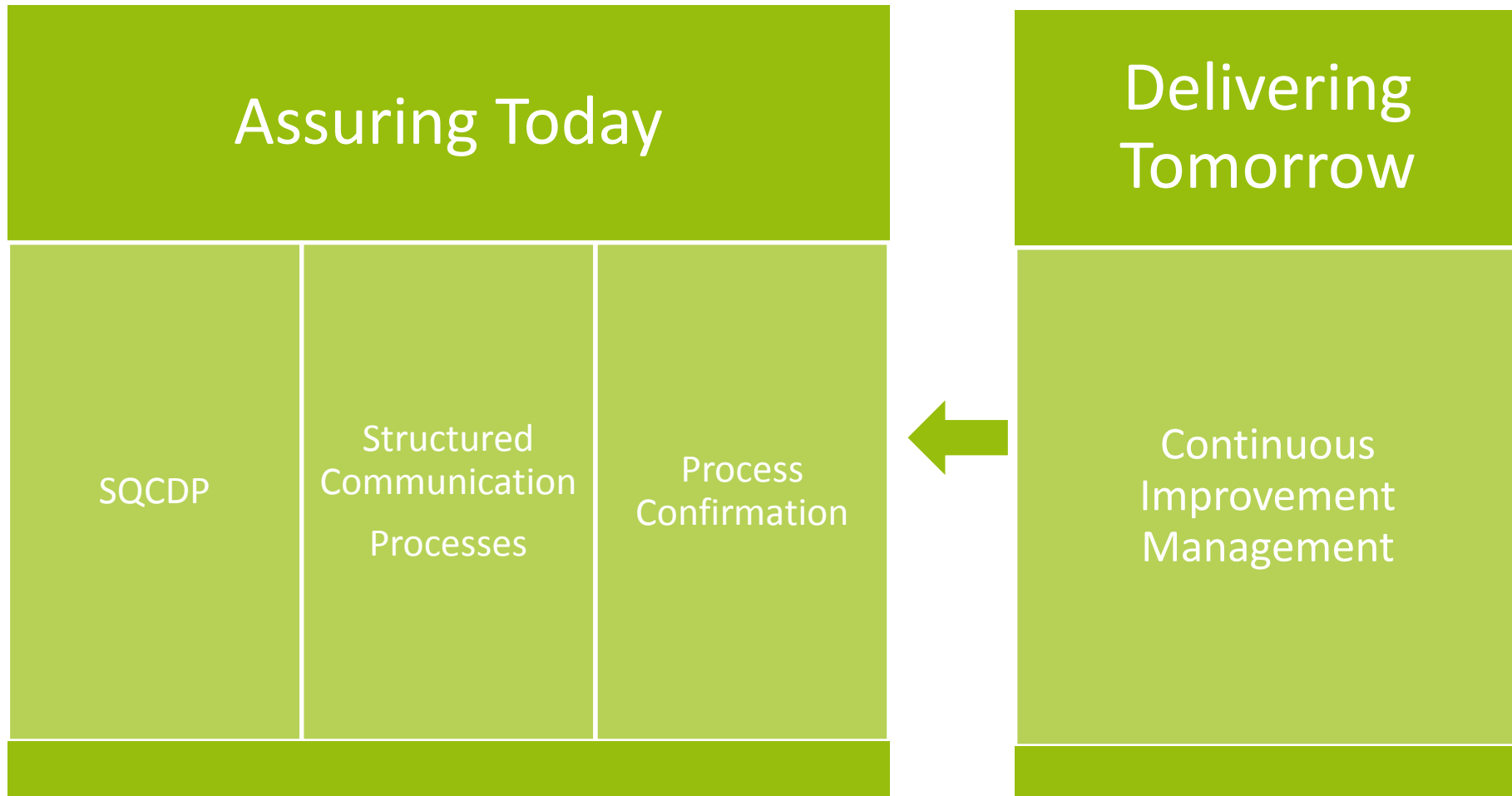
Presentation to NEPIC Asset Management

- Daily visual management

- Root Cause Analysis

- Planned Maintenance Optimisation (PMO)

- Visual Maintenance Management

- Procedures and Standards

Lean Management Systems

Management of Continuous Improvement

"Managing Step Change Improvement - Policy Objectives"

SQCD

Safety, Quality, Cost, Delivery, People

"daily management & review using a visual approach - Routine Objectives"

Lean Management Systems

Structured Communication Process

"standard diary to promote consistency and make time for improvement"

Process Confirmation

"ensure business and safety critical processes are adhered to"

Lean Management Systems

Structured Communication Process

- "Method to develop a structure to an organisation's collective diary"
    - Robust Shiftly, Daily, Weekly and Monthly reporting and escalation mechanism
    - Fixed Calendar and Agenda which maximises meetings and individuals effectiveness
    - Sets aside time for improvement/ other activities

"Cadence Dictates Action"

SQCDP Visual Management System

Aim:

- A visual system to help support the day to day management of the whole supply chain.

Approach:

- A cross site daily meeting structure that:
  - Communicates visually the performance in Safety, Quality, Cost, Delivery & People
  - Uses a traffic light system to display performance versus key measures in each area (spot charts)
  - Multi-layered system that reports key metrics and actions at the appropriate level

Benefits:

- Improves communication of performance
- Clearly defines expectations & promotes consistency
- Provokes a response
- Drives accountability & empowers people at all levels.
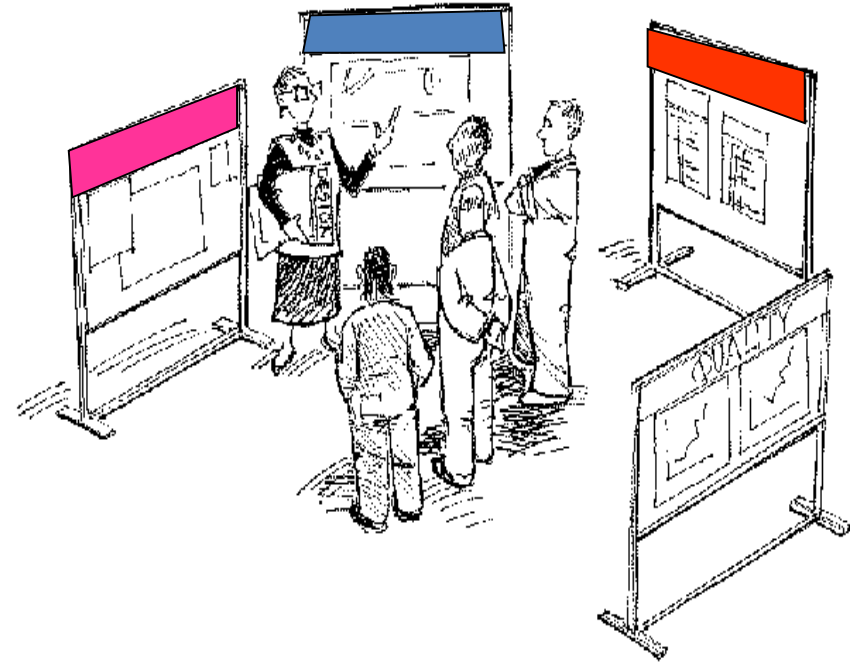
"Description, Judgment, Action"

Results

- Alignment of personnel to business needs
  - Versus focus on departmental objectives

- Focus

- Increased effectiveness

Why Problem Solving/Root Cause Analysis

- When there is a deviation from standard/target we should quickly understand why and correct the situation such that it does not occur again

- This continuously drives improvements through small steps
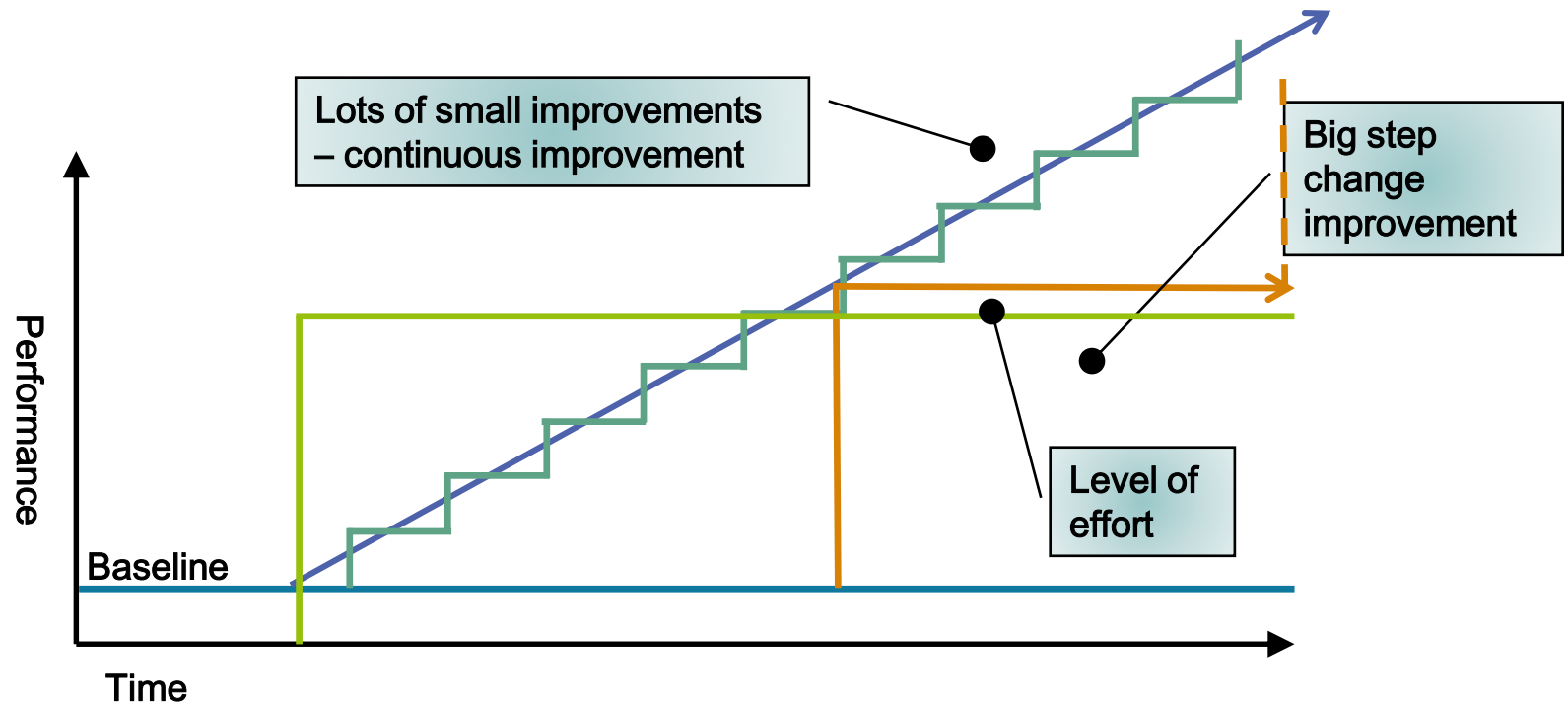
Constituent Parts of Root Cause Analysis

1. The Tool(s)

2. Underpinning Models/Knowledge
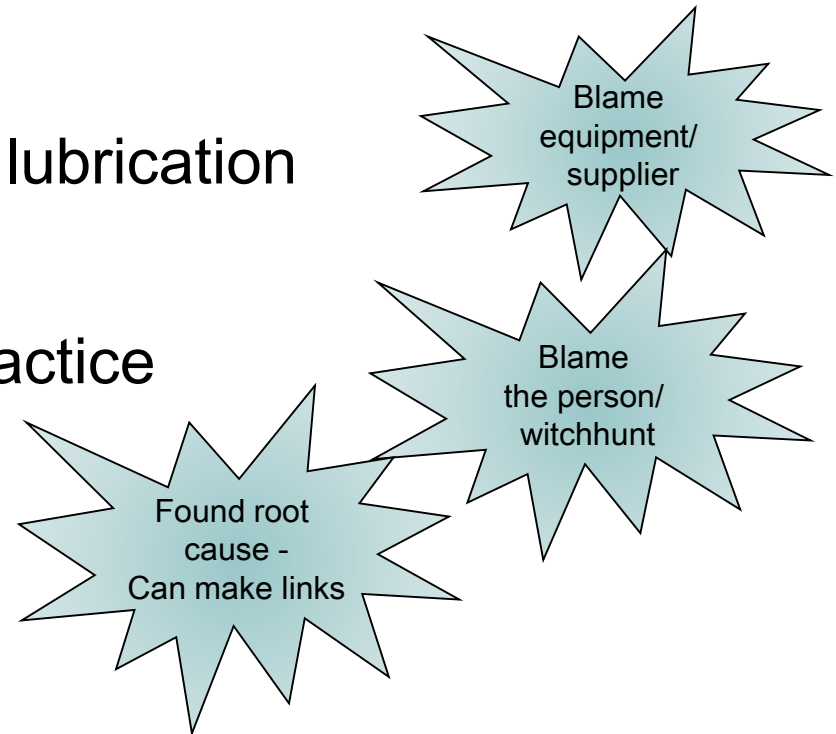
3. The Management System

Increasing Importance

The Tool(s)

- Simple tools more than effective for 99% of situations
- 5 Whys most intuitive
  - "5" indicates multiple "why?"s. Can be more. Can be less

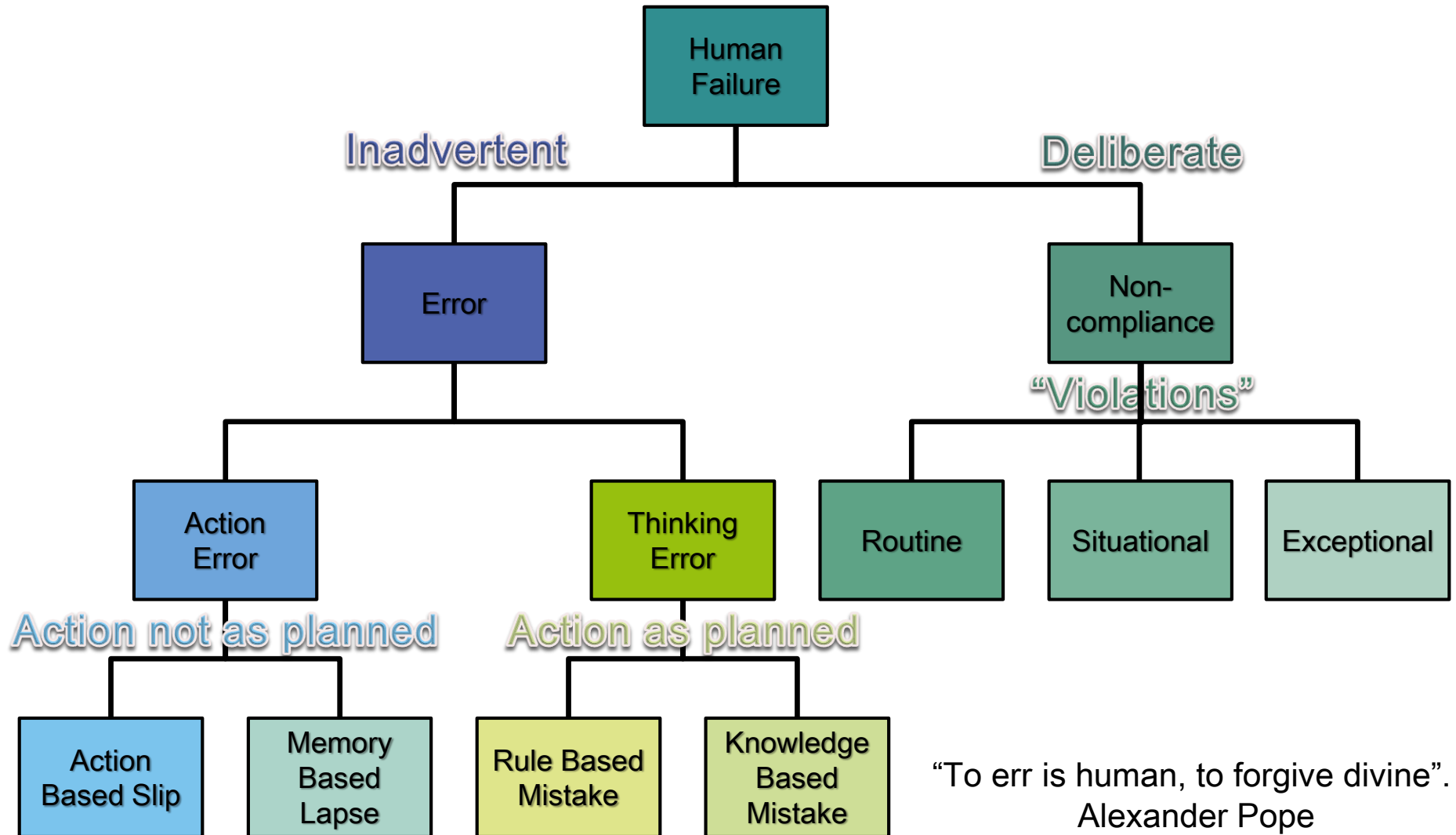- Need tenacity
- Curiosity required
- Takes time

The problem does not occur at your desk,
so don't try to fix it from your desk

Types of Root Cause

- **Physical Root Cause**
  - Bearing failed due to lack of lubrication

- **Human Root Cause**
  - Due to incorrect greasing practice

- **Latent Root Cause**
  - Due to poor greaser training

Blame equipment/ supplier

Blame the person/ witchhunt

Found root cause - Can make links

Human Failure Types

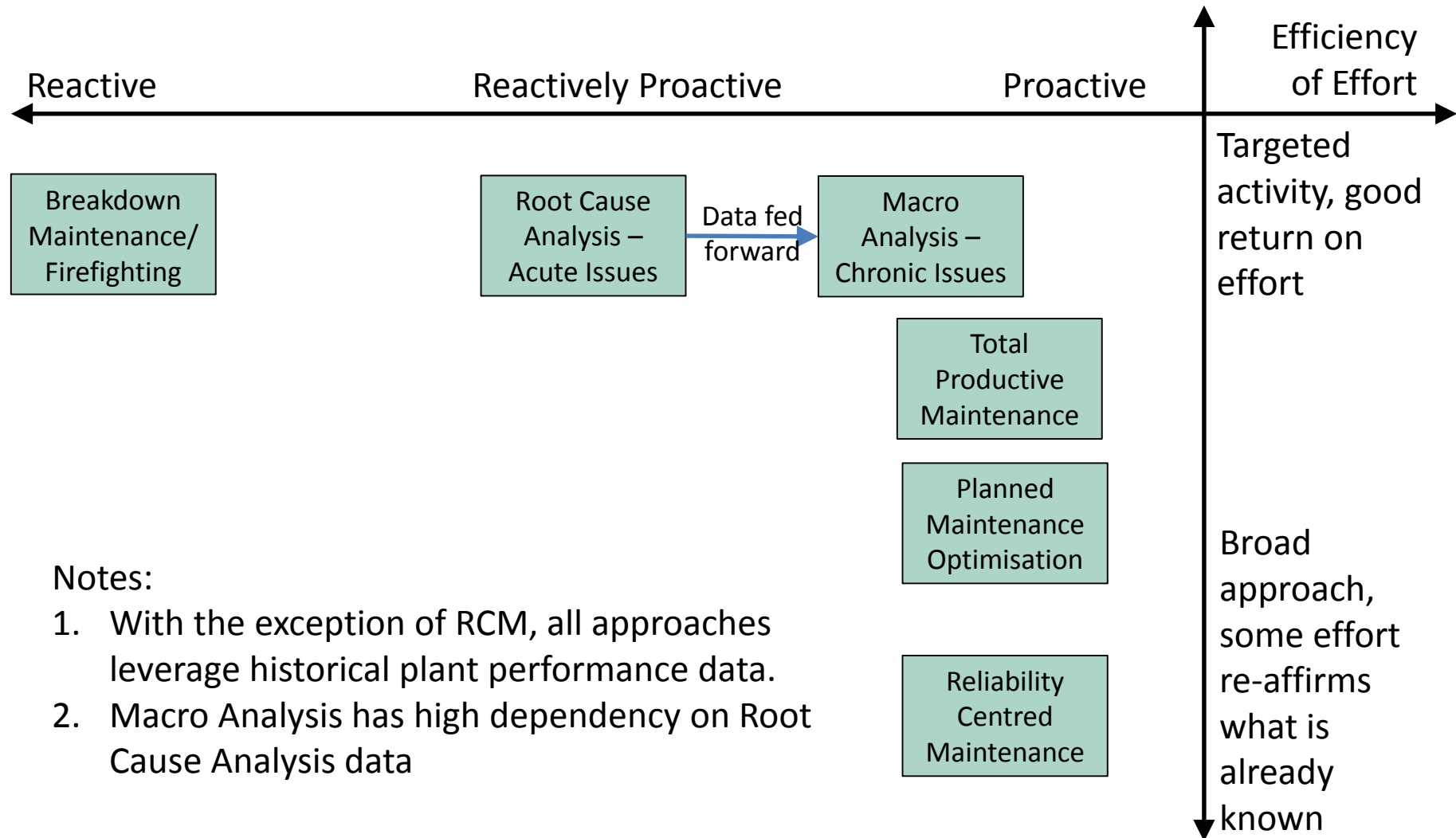"To err is human, to forgive divine".
Alexander Pope

Mapping effective safety measures against human failure classification

Safety measures – improvements in:	Slips	Lapses	Mistakes	Non-compliances (violations)
Control/display design	✓	✓	✓	✓
Equipment/tool design	✓			✓
Memory aids		✓		
Training			✓	✓
Work design	✓	✓		✓
Procedures	*	✓	✓	✓
Supervision	*	*	✓	✓
Reducing distractions	✓	✓	✓	
Environment	✓	✓	✓	✓
Communications	*	*	✓	✓
Decision Aids			✓	
Behavioural Safety			✓	✓

Results

- Reduction in blame

- More co-operative working

- Increased reliability

Some Common Approaches to Reliability Improvement

Efficiency of Effort

Reactive — Reactively Proactive — Proactive

Targeted activity, good return on effort

| Breakdown Maintenance/ Firefighting |

| Root Cause Analysis – Acute Issues | → Data fed forward → | Macro Analysis – Chronic Issues |

| Total Productive Maintenance |

| Planned Maintenance Optimisation |

Broad approach, some effort re-affirms what is already known

| Reliability Centred Maintenance |

Notes:
1. With the exception of RCM, all approaches leverage historical plant performance data.
2. Macro Analysis has high dependency on Root Cause Analysis data

PM Optimisation Methodology

1. Data analysis
   - Understanding plant, equipment and process
   - Visiting plant
   - Gathering and analysis of performance data
   - Gathering and analysis of current job catalogue
2. Failure mode analysis
   - What failure mode(s) is each task addressing
   - What failure modes are occurring that are not currently being addressed
3. Maintenance policy determination
   - What tasks do we want to do to address identified failure modes
4. Implementation
   - Grouping tasks into rational routines
   - Definition and Control of routines
- Ongoing improvements
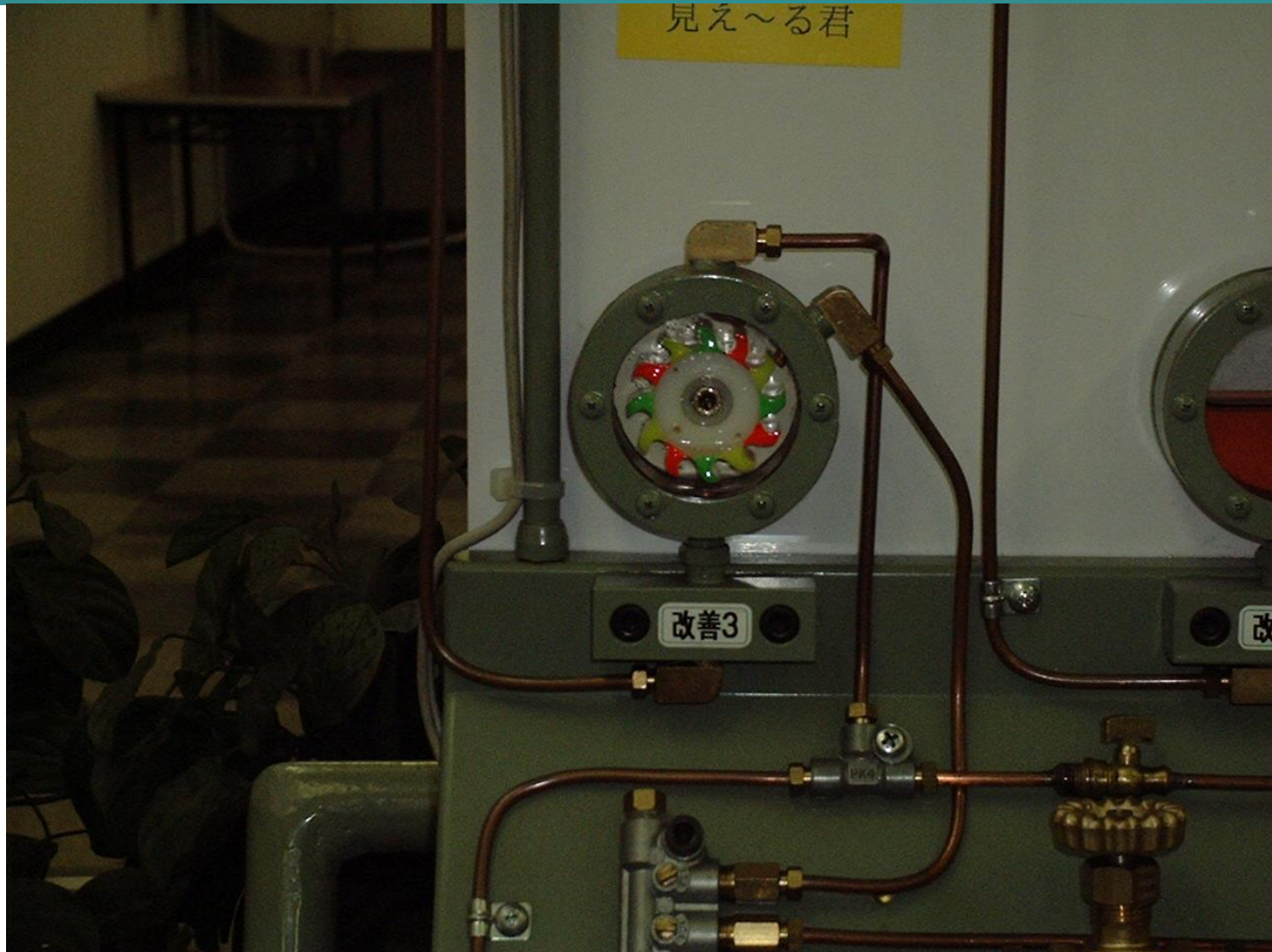   - Use RCA methodology

Results

- Improved, more effective, more efficient job catalogue

- Involvement of workshop in creating tasks – ownership increase

- Reduced breakdowns

Equipment Status

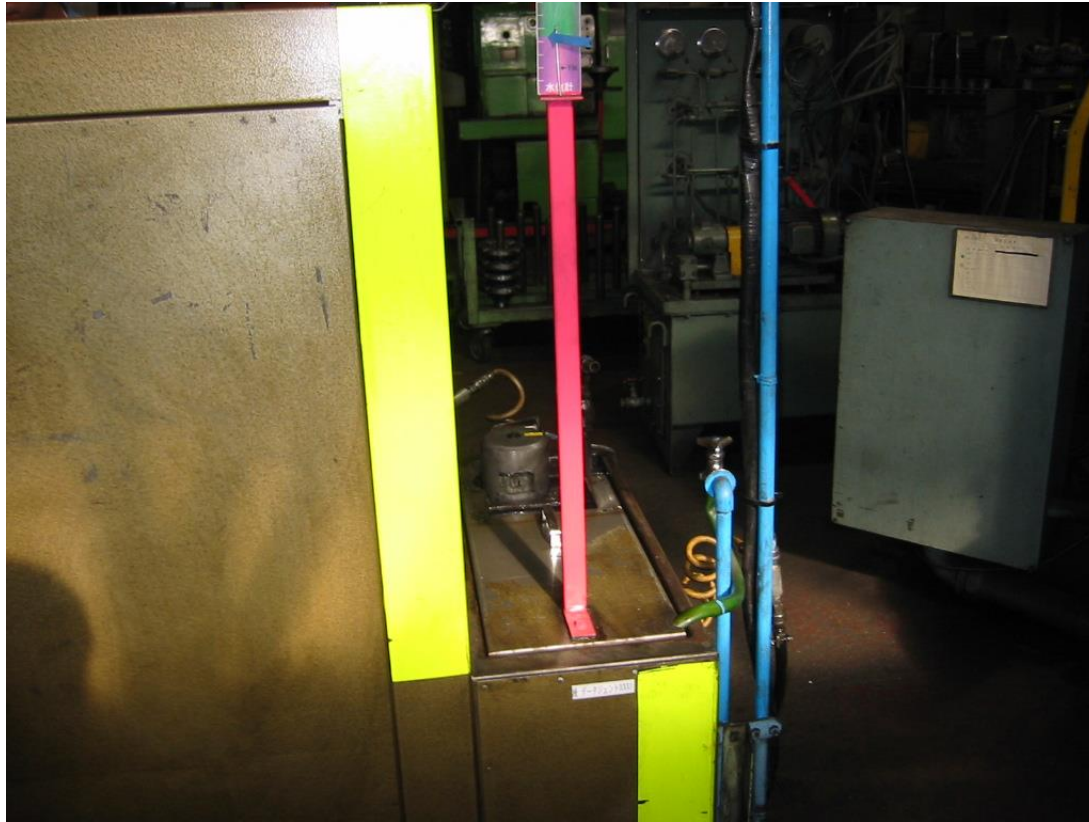# Flow Indicator

Oil Condition & Level

Inspection Points
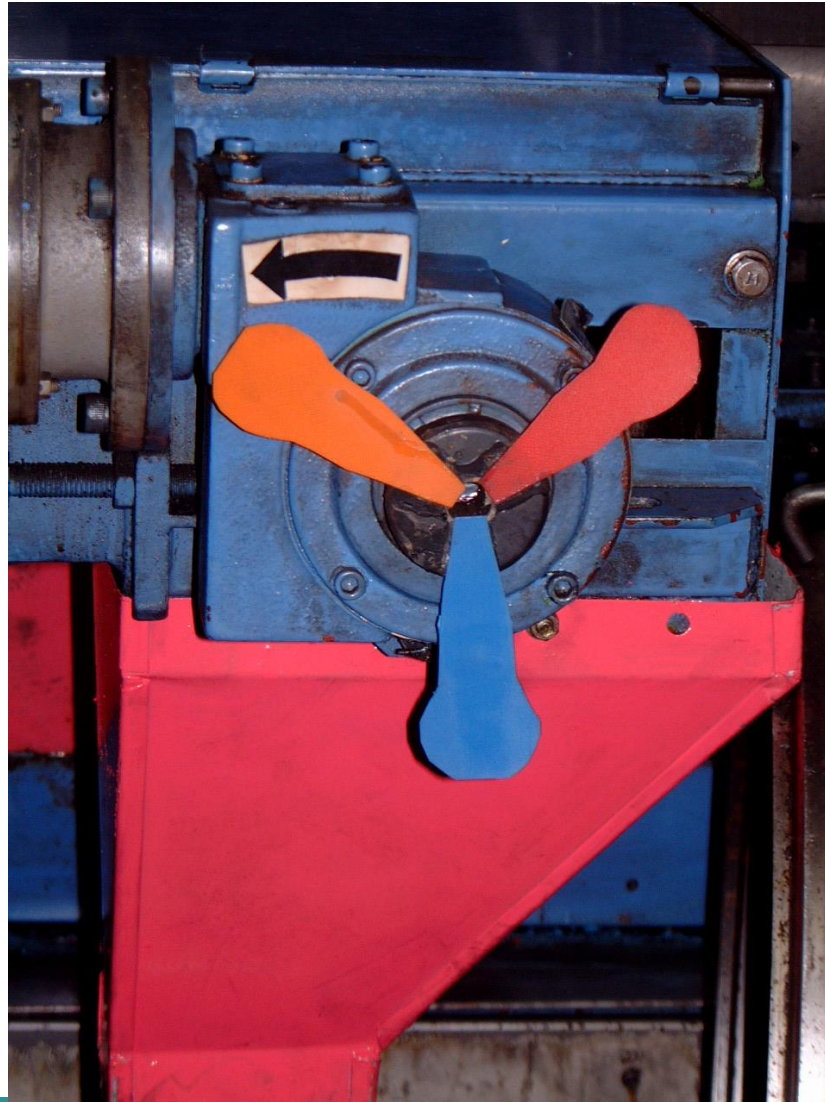
Inspection Routines

Motor Condition (Vibration)
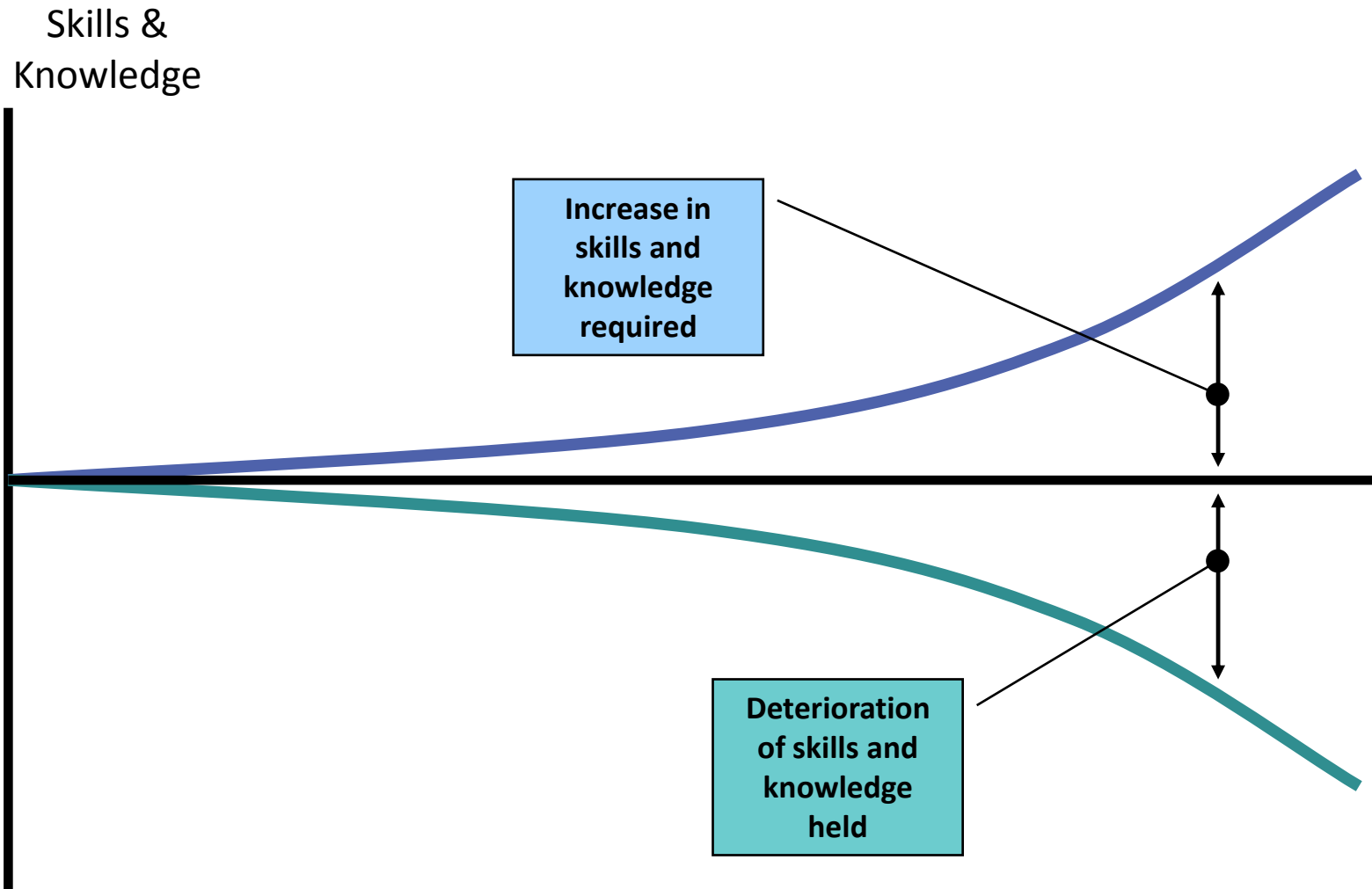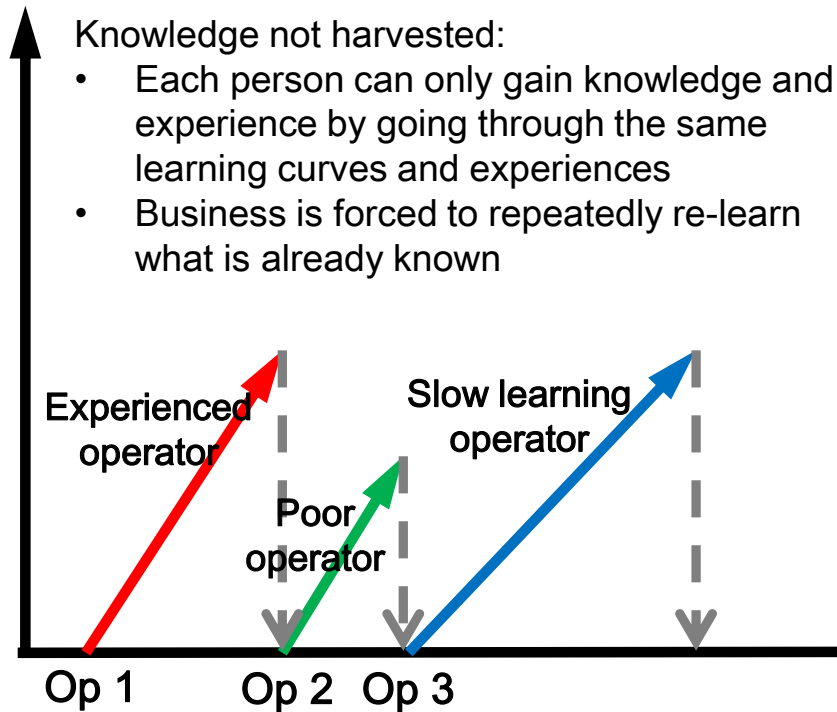
Oil Level

Correct Rotation

Results

- Ownership and involvement passed down to workshop staff

- Visibility of tasks and issues
  - Lots of inconsistencies found and corrected

- Increased line speeds and throughput

Divergence of skills held and skills needed

Skills & Knowledge

Increase in skills and knowledge required

Deterioration of skills and knowledge held

What Are SOPs For? – Harvesting the Knowledge

Performance

Knowledge not harvested:
- Each person can only gain knowledge and experience by going through the same learning curves and experiences
- Business is forced to repeatedly re-learn what is already known

Experienced operator

Poor operator

Slow learning operator

SOP

Knowledge regularly "harvested"
- SOPs act as wedge to prevent degradation of procedures
- Each operator able to build on and add to what has been previously learnt

Op 1   Op 2   Op 3

Time
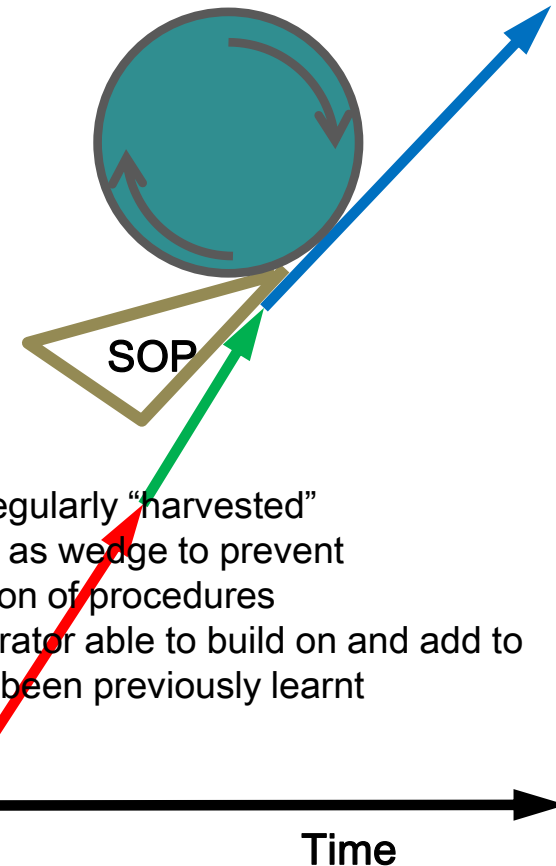
Results

- Reduction in variation in executing tasks

- Knowledge vulnerabilities addressed

- Reduced infant mortality/ early life failure

- Daily visual management

- Root Cause Analysis

- Planned Maintenance Optimisation (PMO)

- Visual Maintenance Management

- Procedures and Standards