How to Carry Out Problem Solving

Value Chain Competitiveness (VCC)

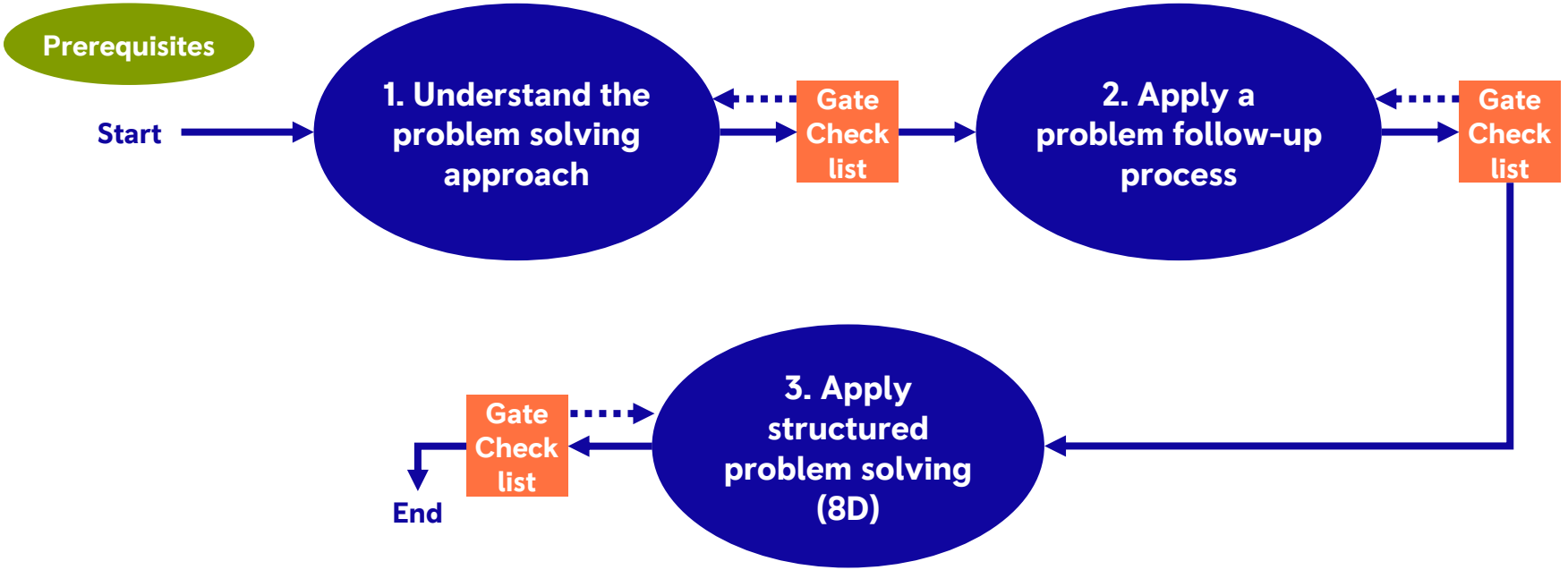
Version: 2

February 2020

How to Carry Out Problem Solving

BACK Map NEXT

Scope | Objectives & Principles



Scope

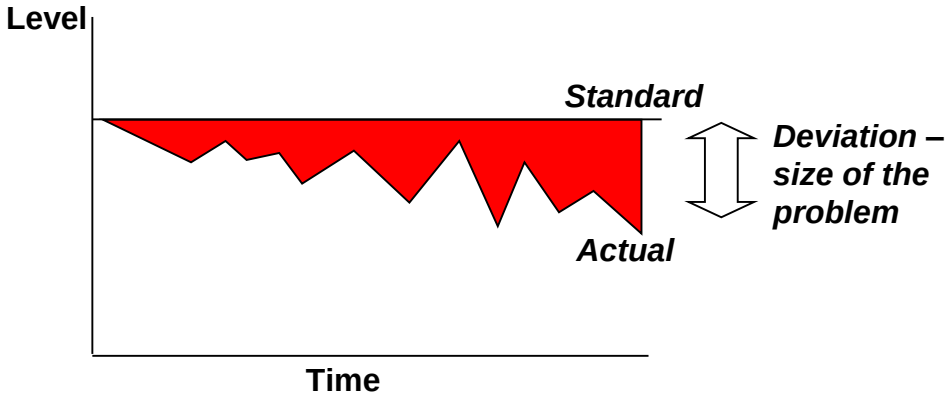
This 'How To' will enable you to:

- Understand techniques for practical problem solving and develop an approach for applying them
- Understand and apply a practical problem solving process used to manage the majority of problems encountered – the problem follow-up process or 3Cs (concern, cause, countermeasure)
- Understand and apply the 8D process (8 Disciplines)

Objective and Principles

Definition: A problem is anything that deviates from the ideal situation or standard

- Three main factors to consider:
  - The standard
  - The deviation away from the standard
  - Time elapsed (for history / trend)



- Problem solving is about logically and methodically analysing the process, evidence and behaviours to:
  - protect the customer and downstream areas from further escapes
  - isolate non-compliance
  - determine the root cause of problems (& escapes) and fix it permanently

- Effective problem solving is only finished when we can:
  - conclusively prove the causes that we have identified
  - demonstrate that we have delivered a sustained fix
  - implement the fix in all similar products and processes required

Objective and Principles

BACK Map NEXT

‘Standard’ approach

Problem description

Problem definition (5W&1H)

Grasp the situation / understand the problem

Locate area / Point of Cause (POC)

Implement Containment

Establish Direct Cause

Investigate and countermeasure

Determine Root Cause (5 Whys / 7Ms)

Countermeasure (MUST address root cause)

Follow-up / monitor / close

Prerequisites

Knowledge:

- Existing problem solving activities

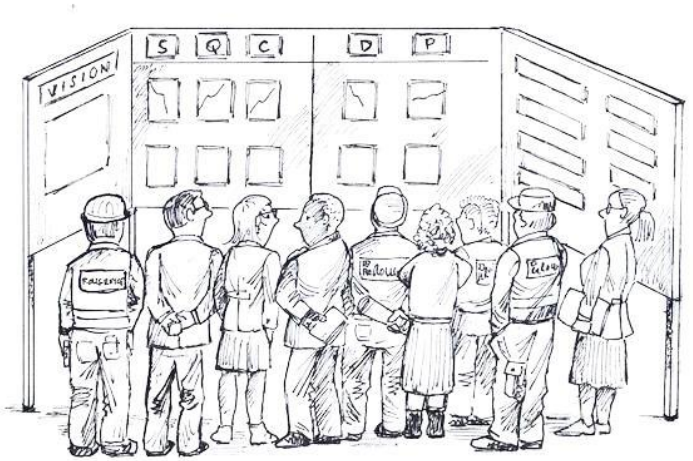
Commitment:

- Buy-in from the team (including the support team) to establish a problem solving process, and to support its effective operation

1. Understand the problem solving approach

Understand problem solving approaches

- The visual management system should allow problems to be highlighted and dealt with immediately, in “real time”
- The responsibilities should be clear and visual showing when to solve problems, when to escalate problems and how to respond to problem escalation
- The environment and leadership support should enable all employees to have a basic capability to solve problems using a structured approach

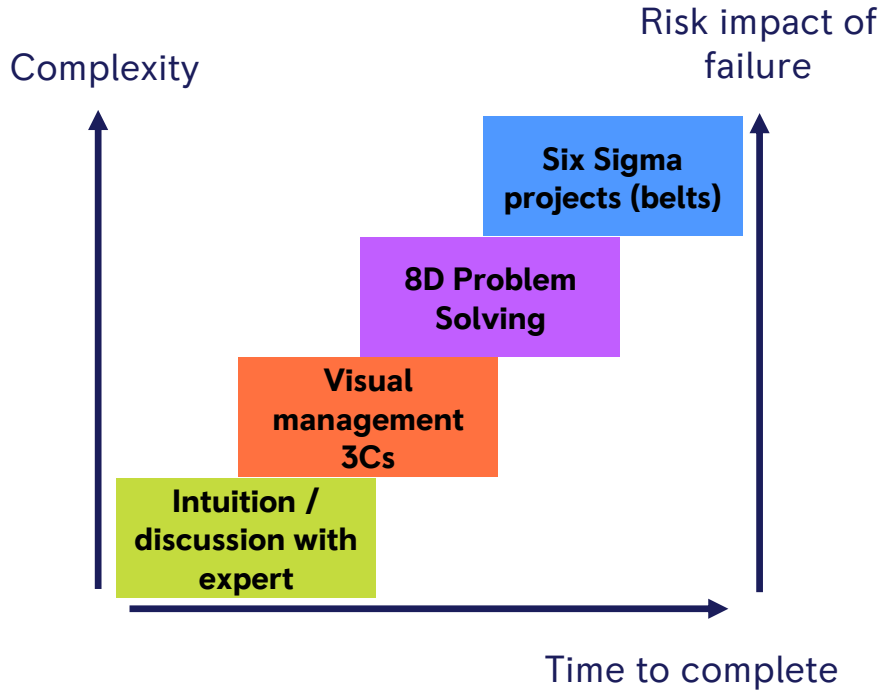


1. Understand the problem solving approach

BACK Map NEXT

Understand problem solving approaches

- There are numerous approaches to problem solving considering complexity, time to complete analysis, and risk impact of failure
- The majority of problems can be solved with a simple Concern/Cause/Countermeasure (3Cs) process and a structured problem solving methodology (eg. 8D process)



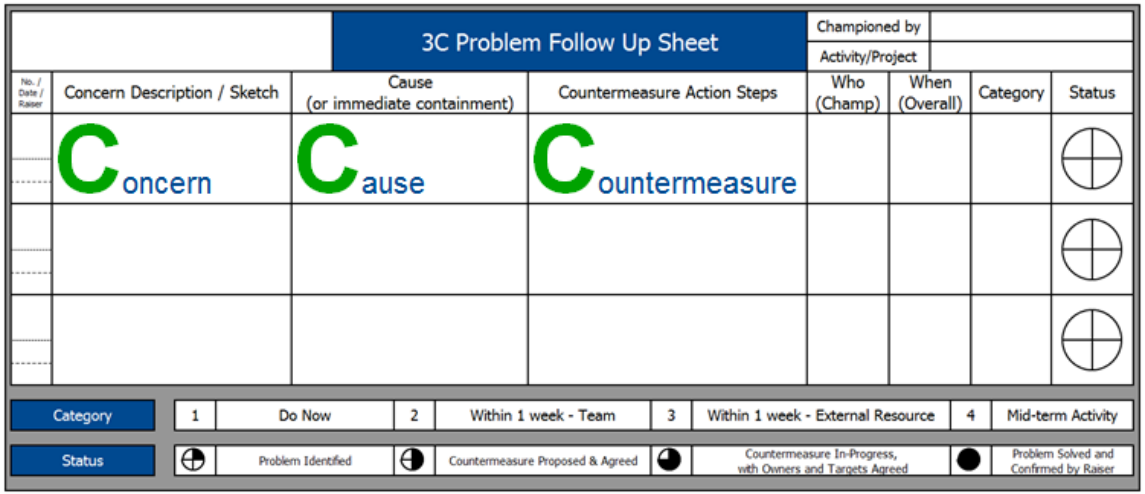
Gate checklist 1: Understand the problem solving approach

- ☑ Team visual management includes problem solving to manage issues
- ☑ The problem solving process is defined and managed, including
  - ☑ Responsibilities
  - ☑ Escalation
  - ☑ Leadership support
- ☑ The problem solving approach is understood and chosen techniques selected for application

2. Apply a problem follow-up process

Applying the 3Cs – Concern, Cause, Countermeasure

- A 3C sheet is a key visual management tool that helps to share and clearly communicate problem volume and status
- The problem follow-up sheet enables anyone to raise a problem, follow a structured process and share progress towards problem resolution



Concern
- Identify the concern

Cause
- Find the root cause of the concern
- Implement any containment actions

Countermeasure
- Identify and implement actions that permanently address the root cause

2. Apply a problem follow-up process

Applying the 3Cs – Concern, Cause, Countermeasure

3C Problem Follow Up Sheet

Championed by	S. James (Red cell P/L)
Activity/Project	Red cell team actions

No. / Date / Raiser	Concern Description / Sketch	Cause (or immediate containment)	Countermeasure Action Steps	Who (Champ)	When (Overall)	Category	Status
1 02 May J. Bloggs	Trip hazard identified by crane lifting tackle located on floor to the side of rack #3 (see sketch)	No home location for lifting tackle from date of delivery. Immediate Containment - locate underneath rack away from aisle	Agree permanent home location & implement storage solution. Train 5S standard & compliance cross-shift.	V. Goode	09 May		

The unique identifier gives an idea of the volume of problems raised. The date shows how long a problem has been open. Raiser id - for further information.

The problem Concern: keep it simple and use facts and data. Use Ws and 1 H where appropriate (what, where, who, why, when, how).

The sheet title box provides traceability to the individual and the related problem activity.

2. Apply a problem follow-up process

Applying the 3Cs – Concern, Cause, Countermeasure

3C Problem Follow Up Sheet

Championed by	S. James (Red cell P/L)
Activity/Project	Red cell team actions

No. / Date / Raiser	Concern Description / Sketch	Cause (or immediate containment)	Countermeasure Action Steps	Who (Champ)	When (Overall)	Category	Status
1 02 May J. Bloggs	Trip hazard identified by crane lifting tackle located on floor to the side of rack #3 (see sketch)	No home location for lifting tackle from date of delivery. Immediate Containment - locate underneath rack away from aisle	Agree permanent home location & implement storage solution. Train 5S standard & compliance cross-shift.	V. Goode	09 May	2	

The problem **C**ause: describe the root cause if known. A risk containment may also be required. Root cause analysis techniques may include the use of a fishbone (or Ishikawa) diagram or a '5 Whys' approach.

The problem **C**ountermeasure: describe the root cause if known. A risk containment may also be required. Root cause analysis techniques may include the use of a fishbone (or Ishikawa) diagram or a '5 Whys' approach.

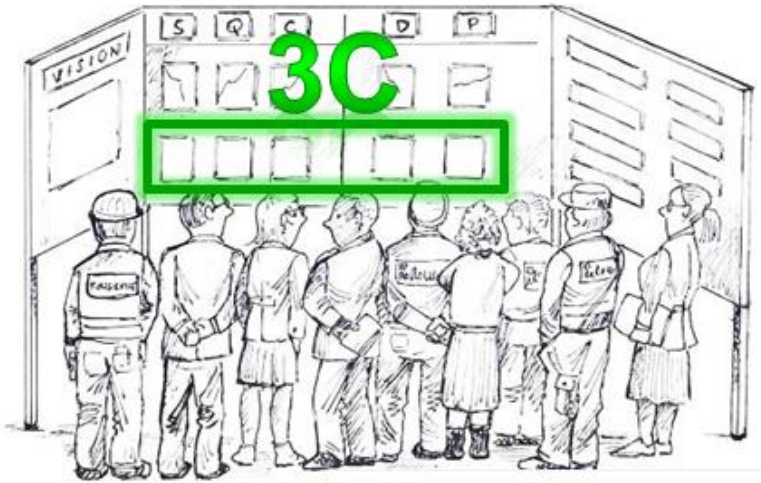
The countermeasure 'who' and 'when' is agreed (not allocated).

Status tracks the problem to closure, confirmed by the raiser of the problem.

2. Apply a problem follow-up process

Applying the 3Cs – Concern, Cause, Countermeasure

- Regular reviews should be held to confirm progress, share status and take action where required
- Wherever possible, problems and concerns should be solved by the local team
- In some cases, for example repeat concerns, more help may be required
- An escalation process should be implemented to enable support to be allocated to overcome more difficult issues
- The 3C process is a great tool for recording, visualising and solving problems to continuously improve performance



3	Blade scrapped during re-cut process	Wrong re-cut programme selected	Create SOP for selecting re-cut programme	Stuart	Fri 11th Feb	2	

Single 3C strips can be separated to be worked on by individuals or teams

Gate checklist 2: Apply a problem follow-up process

- ☑ The problem follow-up process is understood by all
- ☑ The principles of the 3C sheet are incorporated into the applied follow-up process
- ☑ The problem follow-up process is being managed, with
  - ☑ Regular reviews taking place within local team
  - ☑ Escalation being supported
- ☑ Root cause issues are being resolved

3. Apply structured problem solving (8D)

Plan-Do-Check-Act thinking through the 8 disciplined steps (8D)

0	1	2	3	4	5	6	7	8
								
Implement immediate containment and prepare	**Form the team**	Define the Problem	Develop containment action	Identify and verify Root Cause	Identify Corrective Action	Implement Corrective Action	Define and plan Preventative action	Recognise the team

3. Apply structured problem solving (8D)

8D problem solving report 'on a single page'

0 Implement immediate containment and prepare

1 Form the team

2 Define the Problem

3 Develop containment action

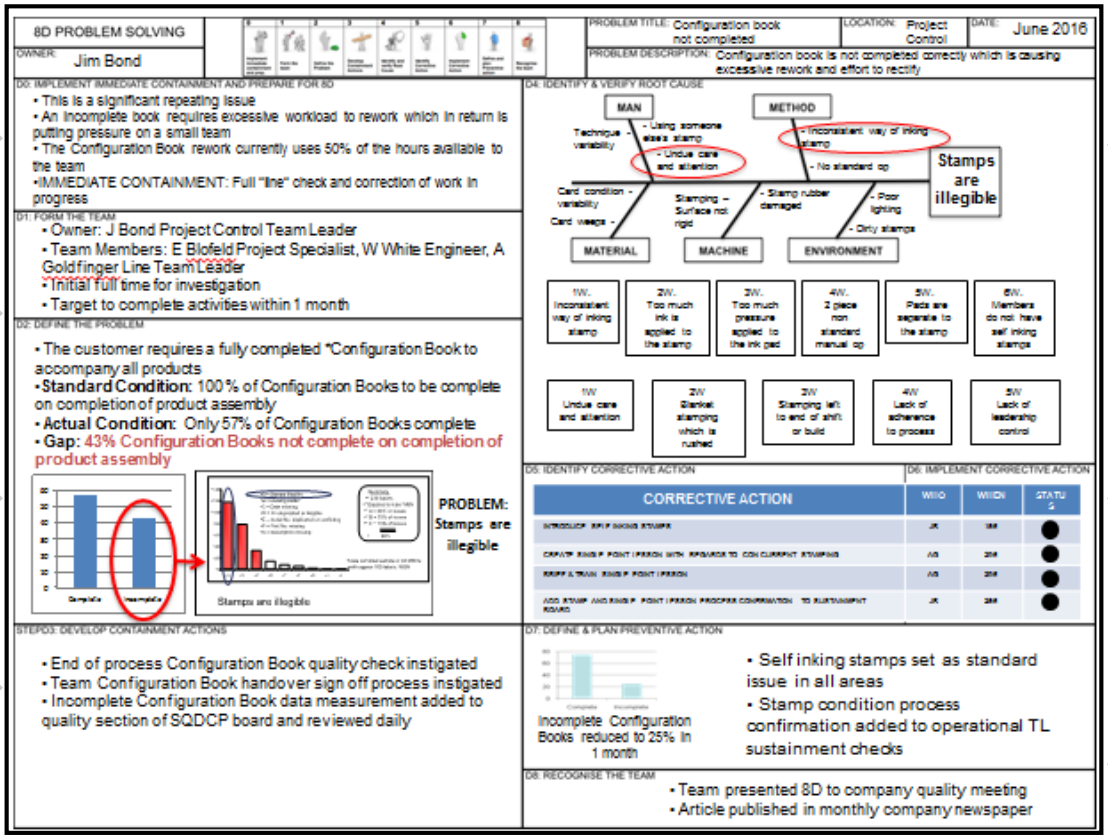
4 Identify and verify Root Cause

5 Identify Corrective Action

6 Implement Corrective Action

7 Define and plan Preventative action

8 Recognise the team



8D PROBLEM SOLVING

OWNER: Jim Bond

PROBLEM TITLE: Configuration book not completed | LOCATION: Project Control | DATE: June 2016

PROBLEM DESCRIPTION: Configuration book is not completed correctly which is causing excessive rework and effort to rectify

D0: IMPLEMENT IMMEDIATE CONTAINMENT AND PREPARE FOR 8D

- This is a significant repeating issue
- An Incomplete book requires excessive workload to rework which in return is putting pressure on a small team
- The Configuration Book rework currently uses 50% of the hours available to the team
- IMMEDIATE CONTAINMENT: Full "line" check and correction of work in progress

D1: FORM THE TEAM

- Owner: J Bond Project Control Team Leader
- Team Members: E Blofeld Project Specialist, W White Engineer, A Goldfinger Line Team Leader
- Initial full time for investigation
- Target to complete activities within 1 month

D2: DEFINE THE PROBLEM

- The customer requires a fully completed "Configuration Book to accompany all products
- **Standard Condition:** 100 % of Configuration Books to be complete on completion of product assembly
- **Actual Condition:** Only 57% of Configuration Books complete
- **Gap:** 43% Configuration Books not complete on completion of product assembly

PROBLEM: Stamps are illegible

STEP D3: DEVELOP CONTAINMENT ACTIONS

- End of process Configuration Book quality check instigated
- Team Configuration Book handover sign off process instigated
- Incomplete Configuration Book data measurement added to quality section of SQDCP board and reviewed daily

D4: IDENTIFY & VERIFY ROOT CAUSE

MAN: Technique - variability; - Using someone elses stamp; - Undue care and attention

METHOD: - Inconsistent way of inking stamp; - No standard op

MATERIAL: Card condition - variability; Card warps -

MACHINE: Stamping – Surface not rigid; - Stamp rubber damaged

ENVIRONMENT: - Poor lighting; - Dirty stamps

Stamps are illegible

1W. Inconsistent way of inking stamp

2W. Too much ink is applied to the stamp

3W. Too much pressure applied to the ink pad

4W. 2 piece non standard manual op

5W. Pads are separate to the stamp

6W. Members do not have self inking stamps

1W. Undue care and attention

2W. Stamps stamping which is rushed

3W. Stamping left to end of shift or build

4W. Lack of adherence to process

5W. Lack of leadership control

D5: IDENTIFY CORRECTIVE ACTION | D6: IMPLEMENT CORRECTIVE ACTION

CORRECTIVE ACTION	WHO	WHEN	STATUS
INTRODUCE SELF INKING STAMPS	JK	3M	
CREATE END OF POINT PERSON WITH REQUIRED TO CONFIRM STAMPING	AS	2M	
BRIEF & TRAIN END OF POINT PERSON	AS	2M	
ADD STAMP AND END OF POINT PERSON PROCESS CONFIRMATION TO SUSTAINMENT BOARD	JK	3M	

D7: DEFINE & PLAN PREVENTIVE ACTION

Incomplete Configuration Books reduced to 25% in 1 month

- Self inking stamps set as standard issue in all areas
- Stamp condition process confirmation added to operational TL sustainment checks

D8: RECOGNISE THE TEAM

- Team presented 8D to company quality meeting
- Article published in monthly company newspaper

3. Apply structured problem solving (8D)

0	1	2	3	4	5	6	7	8
								
Implement immediate containment and prepare	**Form the team**	Define the Problem	Develop containment action	Identify and verify Root Cause	Identify Corrective Action	Implement Corrective Action	Define and plan Preventative action	Recognise the team

0: Implement immediate containment and prepare

- Define initial problem symptoms
- Engage stakeholders
- Review problem type history
- Have we seen it before?
- Is emergency action necessary?
- Is an 8D appropriate?

1: Form the team

- Identify key stakeholders & develop a communication plan
- Identify team members
  - Full time / part time
  - Sponsor / investigation owner / coach
- Develop top level plan

3. Apply structured problem solving (8D)

0	1	2	3	4	5	6	7	8
								
Implement immediate containment and prepare	**Form the team**	Define the Problem	Develop containment action	Identify and verify Root Cause	Identify Corrective Action	Implement Corrective Action	Define and plan Preventative action	Recognise the team

2: Define the Problem

- Describe the problem
  - What, where, who, why, when and how? (5Ws & 1H)
- Establish objectives
- Build a timeline of events
- Define boundaries
  - What extent of the value stream is involved?
- Collect and analyse data
  - Decisions based on facts
  - Use 7 Quality tools (break down the problem)

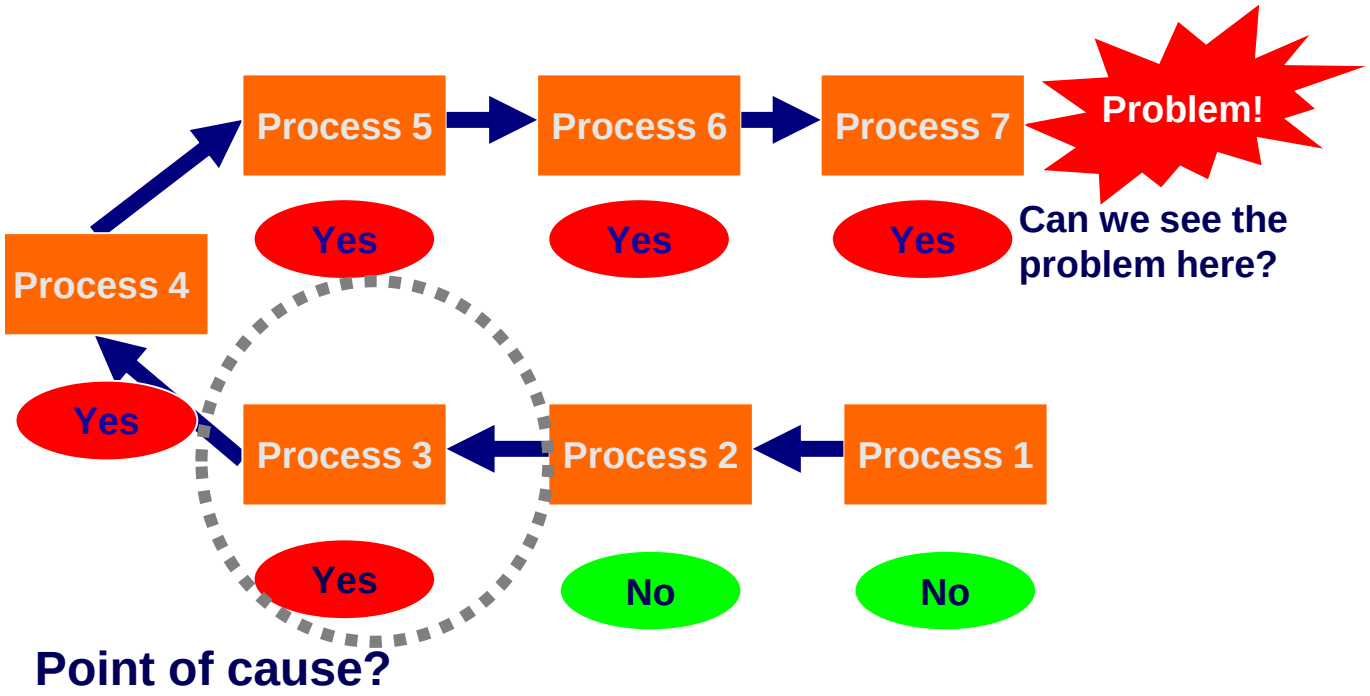
3: Develop containment action

- Protect the customer and your company
- Evaluate the risk
- Contain – Locate, Check, Sentence, Record
- Maintain the supply chain
- Read across

Pareto diagrams
Graphs & control sheets
Check sheets
Scatter diagram
Stratification
Histogram
Cause & effect (fishbone) diagrams

3. Apply structured problem solving (8D)

Establish the Point of Cause (POC)



3. Apply structured problem solving (8D)

Grasp the situation using '5Ws & 1H'

- To understand and communicate the problem effectively, use the 5Ws & 1H tools:

- **What?**
- **Where?**
- **Who?**
- **Why?**
- **When?**
- **How?**

3. Apply structured problem solving (8D)

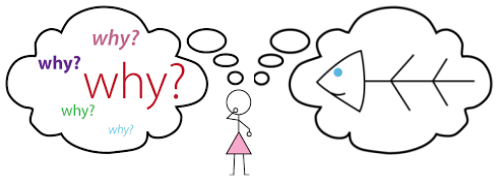
0	1	2	3	4	5	6	7	8
								
Implement immediate containment and prepare	**Form the team**	Define the Problem	Develop containment action	Identify and verify Root Cause	Identify Corrective Action	Implement Corrective Action	Define and plan Preventative action	Recognise the team

4: Identify and Verify Root Cause

- Identify possible causes
  - Escape
  - Problem
  - Management system failure
- Evaluate them
- Verify them
- Check for multiple causes

5: Identify Corrective Action

- Develop possible solutions
  - Escape
  - Problem
  - Management system failure
- Evaluate solutions
- Best effectiveness / time / cost balance
- Verify actions address all the causes



3. Apply structured problem solving (8D)

'5 Whys' Root Cause Analysis (RCA)

How many times do you ask why?

- Until you establish the Root Cause of the problem

The Root Cause:

- Rarely obvious
- Established theory may be tested by switching the problem on and off

Containment:

- Often countermeasures cannot be implemented immediately; a containment action will be required
- Implement on the spot to prevent the abnormal occurrence, maintaining the required Customer requirement rate
- A containment must never be interpreted as a countermeasure! Implement with an agreed target closure date, and follow-up with frequent progress / status reviews.

3. Apply structured problem solving (8D)

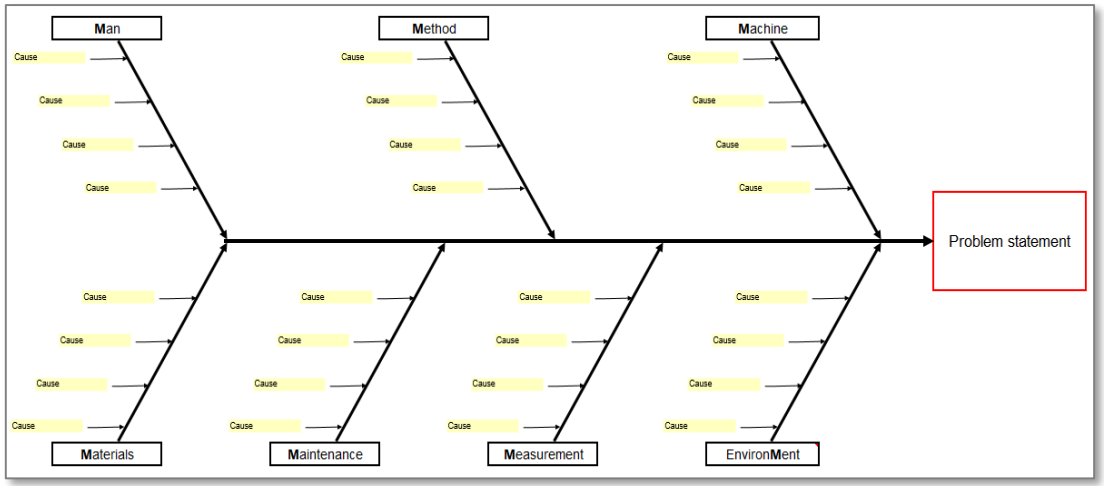
Taiichi Ohno's '5 Whys' example

Problem:	**Robot stops operating suddenly**
1st Why:	Why did it stop?
	No power as the fuse melted…
2nd Why:	Why did the fuse melt?
	Current draw was too high for the fuse which overloaded…
3rd Why:	Why did it overload?
	Excessive friction through inadequate bearing lubrication…
4th Why:	Why was the lubrication inadequate?
	The oil pump was not drawing enough oil…
5th Why:	Why was the oil pump not drawing enough oil?
	The pump shaft was worn…
6th Why:	Why was the pump shaft worn?
	The oil was contaminated with abrasive particles…
7th Why:	Why was the oil contaminated?
	No oil filter on the intake pump…

3. Apply structured problem solving (8D)

7Ms Root Cause Analysis (RCA)

Fishbone/Ishikawa Diagram



- **Causal factor** – removal may reduce the risk of a problematic outcome but **won't** remove it with any certainty
- **Root cause** – removal / countermeasure **will** prevent a problem occurring
- Addressing a **causal factor** instead of the **root cause** does not solve the **problem**, so we need to determine the problem root cause through **Root Cause Analysis**

3. Apply structured problem solving (8D)

0	1	2	3	4	5	6	7	8
								
Implement immediate containment and prepare	**Form the team**	Define the Problem	Develop containment action	Identify and verify Root Cause	Identify Corrective Action	Implement Corrective Action	Define and plan Preventative action	Recognise the team

6: Implement Corrective Action

- Project management
  - Plan
  - Timing
  - RACI (responsible, accountable, consulted, informed)
- Remove containment
- Validate that actions do what they should

7: Define and plan Preventative action

- Identify opportunities for similar problems
- Look for systematic causes
- Identify changes, reinforcements & improvements
- Develop and implement action plans

8: Recognise the team

- Document the investigation
- Look at lessons learnt
- Recognise the team effort / celebrate

Gate checklist 3: Apply structured problem solving (8D)

BACK Map

- ☑ A structured problem solving process is understood by all
- ☑ Appropriate training of structured problem solving has taken place (incl. the 7 quality tools)
- ☑ The principles of the 8 Disciplines are incorporated into the applied process
- ☑ The structured problem solving process is being managed, with
  - ☑ Regular reviews of status and process effectiveness
  - ☑ Escalation being supported
- ☑ Root cause issues are being resolved