RESULTS

PEOPLE DEVELOPING PEOPLE

Workbook

Understand the problem

Use a team approach

Share the lessons learnt

The Global 8D Programme has been developed by Results Consortium Limited based on 'The Results Method' of training to support the implementation of quality improvement and change programmes.

Contact Results on 01371 859344 or via www.resultsresults.co.uk for more information on their Master Class Programmes and 'The Results Method'.

Contents

Foreword

Have you ever said, or heard someone else say, something like "the last time we had this problem we did *this*"? If this is the case then we have to ask, how effective was the problem solving effort?

In reality we spend a lot of time solving problems, some much more difficult than others. There are four levels of problem that we can consider:

- Simple problems that can be solved by one individual
- Simple problems that we know the answer to (this is more a task than a problem solving effort)
- Difficult problems that we do not know the answer to and will take more than one person/discipline to solve
- Problems that have been around for some time

As humans we have the ability to link an event to an outcome or a **CAUSE** to an **EFFECT**.

There are four patterns of thinking that we have learned to use to survive and thrive:-

"*What's going on here?* ……**Situation Analysis**
"*What caused this to happen"* ……**Problem Solving**
"*What is the best solution?"* ……**Decision Making**
"*What can we do now to stop something happening later?"* ……**Problem Prevention**

When we cooperate in problem solving activities using a structured approach, we become very effective at identifying ***symptoms***, defining ***problems***, establishing ***causes*** and taking ***actions*** that solve, prevent and lead to improvement.

Global 8D problem solving (G8D) was developed by Ford Motor Company in the mid 1990's and is based upon their original Tops 8D problem solving method. Since then it has become one of the most commonly used structured problem solving methodologies throughout the world, in many industries both inside and outside of automotive.

This workbook has been developed to help people less familiar with the G8D process to implement it within their own workplace. With a step by step approach and using several examples, this workbook and the worked examples of the problem solving worksheets, gives a structured guide to the application of G8D.

Graham Cripps
Results Consortium Ltd

Global 8D – Team Based Problem Solving

Using a number of analytical tools and a multi-disciplined team approach, G8D has clearly defined steps. G8D is a comprehensive problem solving methodology developed by Ford Motor Company and used widely in industry throughout the world. However, it must be said that whilst the approach may be used for smaller problems, G8D should be reserved for those problems that: -

- Have a definition of the symptom(s). That is, the symptom has been quantified.
- Have identified the customer(s) and affected parties who experienced, or are experiencing the symptom(s).
- Have measurements to quantify the symptom(s) and demonstrate that a performance gap exists, **and/or** that the priority (severity, urgency, growth) of the symptom warrants initiation of the process.
- Have an unknown cause.
- Has management commitment to dedicating the necessary resources to fix the problem at ***root cause level*** and to prevent recurrence.
- Have a problem symptom complexity that exceeds the ability of one person to resolve the problem.

The G8D Process

D0 Prepare for the Global 8D Process

In response to a symptom, evaluate the need for the G8D process. If necessary, provide an ***Emergency Response Action*** to protect the customer, and initiate the G8D process.

D1 Establish the Team

Establish a small group of people with the process and/or product knowledge, allocated time, authority, and skills in the required technical disciplines to solve the problems and implement corrective actions. The group must have a designated Champion and Team Leader. The group initiates the team building process.

D2 Describe the Problem

Describe the internal/external problem by identifying 'what is wrong with what', and detail the problem in quantifiable terms ***(Problem Description).***

D3 Develop the Interim Containment Action (ICA)

Define, verify and implement the ***Interim Containment Action*** (ICA) to isolate the effects of the problem from any internal/external customer until ***Permanent Corrective Actions*** (PCAs) are implemented. Validate the effectiveness of the containment actions.

D4 Define and Verify Root Cause and Escape Point

Isolate and verify the root cause by testing each possible cause against the ***Problem Description*** and test data. Also isolate and verify the place in the process where the effects of the root cause should have been detected and contained but was not ***(escape point).***

D5 Choose and Verify Permanent Corrective Action (PCA)

Select the best permanent corrective action to remove the root cause. Also select the best permanent corrective action to address the escape point. Verify that both decisions will be successful when implemented without causing undesirable effects.

D6 Implement and Validate Permanent Corrective Actions (PCAs)

Plan and implement selected Permanent Corrective Actions. Remove the ICA. Validate the actions and monitor long-term results.

D7 Prevent Recurrence

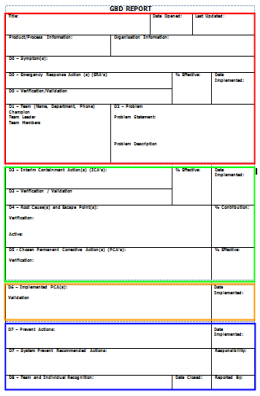
Modify the necessary systems including policies, practices and procedures, to prevent recurrence of this and similar problems. Make recommendations for systemic improvements, as necessary.

D8 Recognise Team and Individual Contributions

Complete the team experience, recognise both team and individual contributions, and celebrate success.

The process steps are summarised graphically on ***page 10***.

Global 8D Reporting



G8D Report

The G8D process uses a Report Form to record and communicate the progress of the problem solving effort.

This form is backed up by the data, activity reports and other evidence of the problem solving activity which includes: -

- Pre-data analysis
- Is/Is not report
- Differences and changes
- Root Cause analysis
- After-data analysis
- Decision Making worksheets
- Action plans

The key forms and explanations for their use are covered in this Workbook at the appropriate stages of the problem solving process.

Assessing Questions

At the end of each stage of the G8D problem solving process there are a number of assessing questions that should be asked by the ***Team Leader**** or ***G8D Champion**** to ensure that all the factors have been considered and all necessary actions completed.

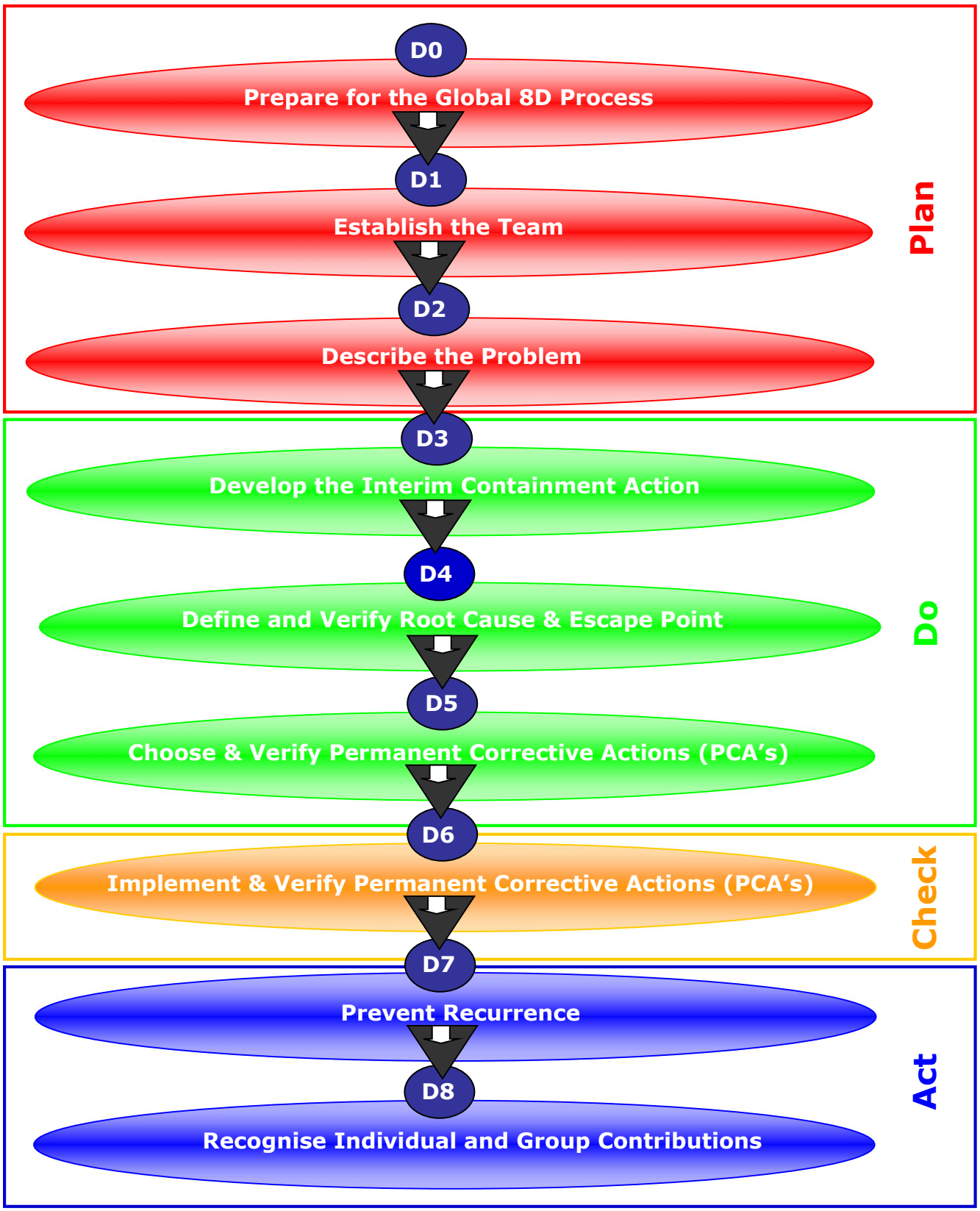
***More about these roles in **D1**.

The assessing questions are a means of reflecting upon each stage of the process to establish if all data required has been gathered, the team composition remains relevant, records are kept and that communication is appropriate. It also gives the team the opportunity to reflect on what went well and what would need to be changed next time.

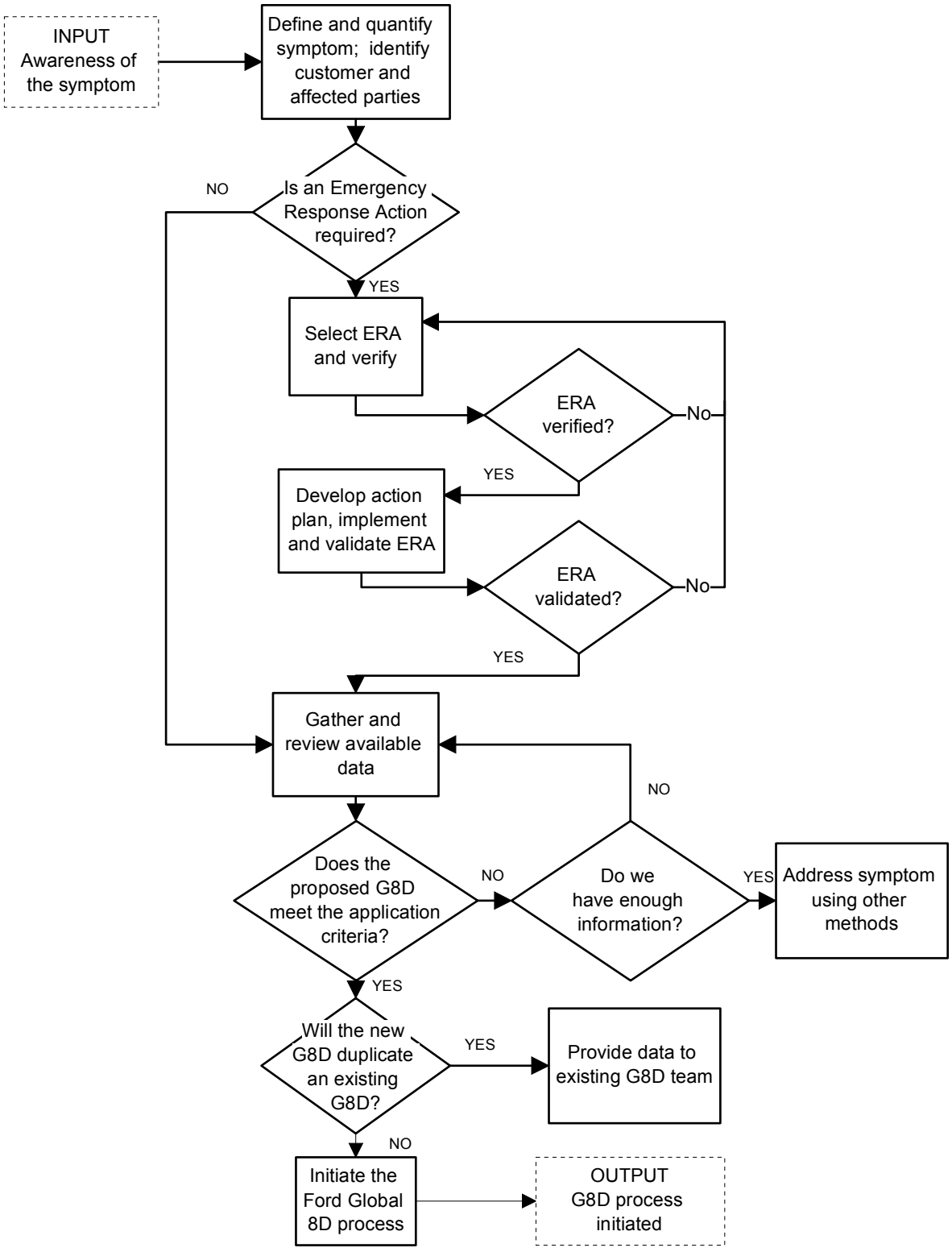
Samples of assessing questions are included in this workbook and a more complete listing is available in a separate document.

See ***"Global 8D – Assessing Questions".***

The Global 8D problem solving process



D0 - Prepare for Global 8D – Process Flow



D0 – Prepare for G8D

There are number of activities within this first step: -

- Define and quantify the symptom
- Identify the customer and other affected parties
- Protect the customer
- Determine if the problem warrants the effort of a full G8D process.

Define and quantify the symptom

The symptom is that which is being experienced in terms of an unwanted outcome and can be described using data to identify the gap between expected and actual outcome.

Example: A bakery is experiencing a variation in the weight of a sliced loaf (this is the symptom). The symptom has been defined and quantified as follows. "The weight specification is being breached by ± 45 grams in 8% of all white medium sliced loaves".

Identify the customer and other parties affected by the symptom

The customer could be either an internal or external customer.

Who is feeling the pain or will be affected by the symptom? Is it the next operation/process, a process further down the line, an intermediary or the end customer? What about other parties that may be affected indirectly by the symptom?

In identifying all of these affected parties we now know who to protect which will have an impact on the how we go about protecting them.

Protect the customer

Protect the customer from the effects of the problem (symptom) by introducing an ***Emergency Response Action (ERA)***. Depending on the complexity of the problem there may be more than one ERA required.

Once an ERA has been identified it must be verified as being effective, before full implementation, to ensure that it stops the symptom reaching the customer.

Verification must evidence that by installing the ERA the effects of the problem are removed and when taken away, they return.

By its nature, an ERA will add cost so it is important to progress the problem solving effort as quickly as possible.

An ERA will be an additional operation within the business process and could include any of the following activities: -

- 100% inspection

- Rework
- Additional operations
- Field service action

The Deming Cycle of Plan Do Check Act is used to plan and implement the ERA. This is a core methodology and is used throughout the G8D and other quality improvement methodologies. The way that it is applied in this case is:

PLAN – establish a plan for the communication, verification, implementation and validation of the ERA. Ensure that operational instructions (standard operating procedure) and training have been included as part of the communication. Ensure the plan includes actions to be taken if the ERA fails validation.

DO – implement the ERA according to the plan

CHECK – verify the ERA

ACT – review outcomes and take actions to validate that an effective ERA is in place.

By their nature, ERA's will add cost and complexity to the product or service but does protect the customer from the effect (symptom) of the problem and buys valuable time for the problem to be resolved at root cause level.

Determine if the problem warrants the effort of a full G8D process

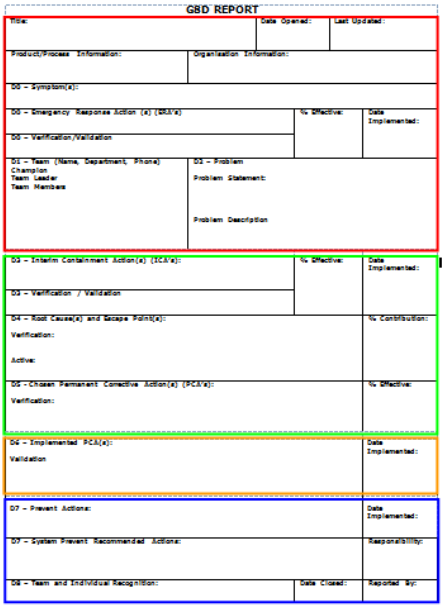
The G8D process is a team based problem solving methodology. Team members will be involved, some times over long periods of time. So if the problem meets the following criteria, the G8D process is used.

- Have a definition of the symptom(s). That is, the symptom has been quantified.
- Have identified the customer(s) and affected parties who experienced the symptom(s).
- Have measurements to quantify the symptom(s) and demonstrate that a performance gap exists, **and/or** that the priority (severity, urgency, growth) of the symptom warrants initiation of the process.
- Have an unknown cause.
- Has management commitment to dedicating the necessary resources to fix the problem at ***root cause level*** and to prevent recurrence.
- Have a problem symptom complexity that exceeds the ability of one person to resolve the problem.

If any of the above are not met then a practical problem solving method should be applied. E.g. 5Y's analysis (also see process flow for D0).

Complete the G8D report

The G8D report has is a reporting summary for the G8D process efforts and is designed to be completed at each stage of the process.



The report is laid out to facilitate a summary report at each stage of the process and is fully supported by all the data and activity reports that will be generated as a result of the problem solving effort.

The G8D report cannot be fully completed without the problem solving effort having identified the root cause or root causes and the necessary corrective actions having taken place.

At every stage the necessary data and information needs to be gathered and recorded to ensure the corrective actions are effective.

Assessing Questions

At the end of each stage there are a number of assessing questions that should be asked by the ***team leader*** or ***G8D Champion*** to ensure that all the factors have been considered and all necessary actions completed.

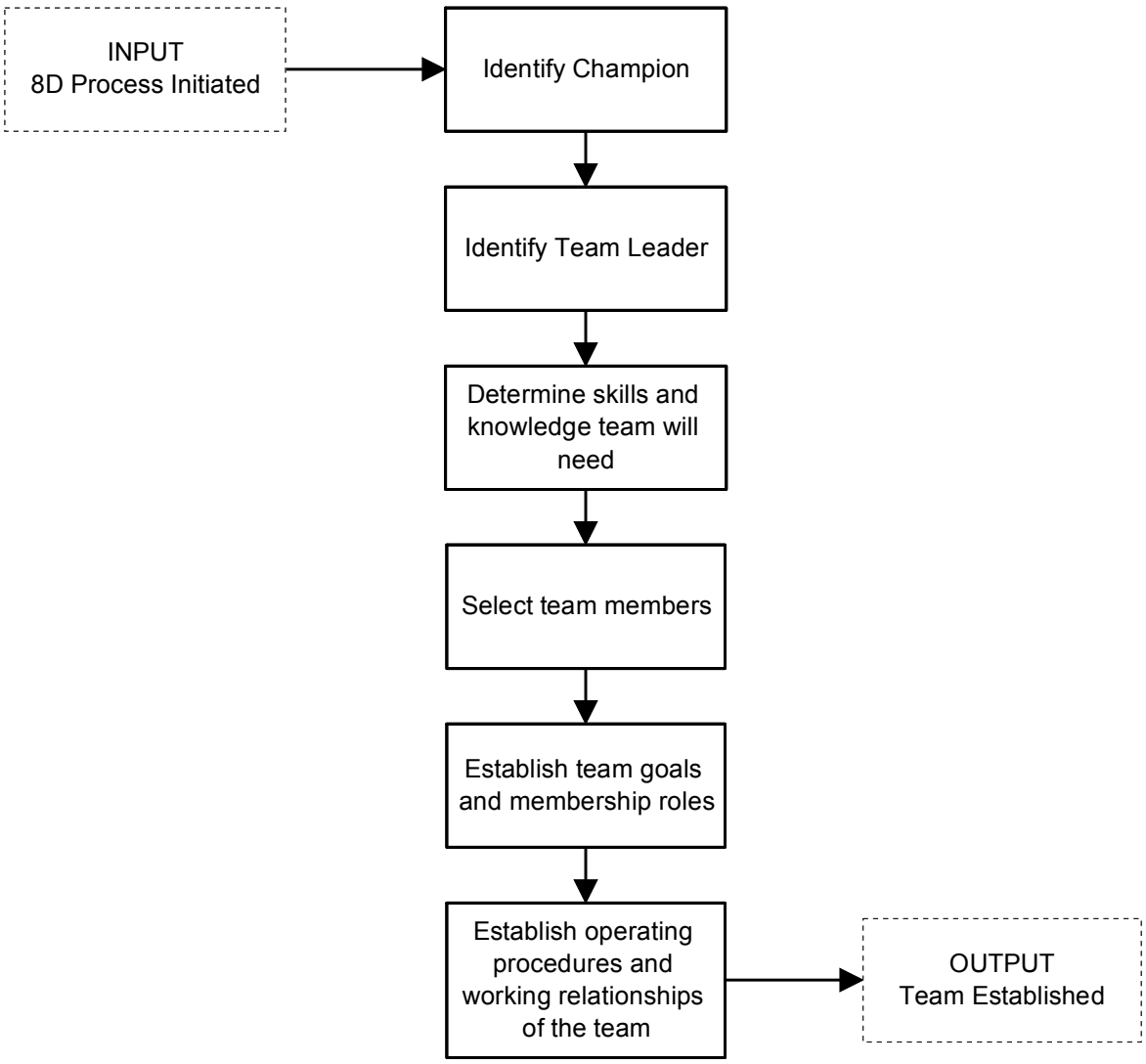
The assessing questions at the end of D0 include:

- Are Emergency Response Actions necessary?
- Is a Service Action required as part of the emergency response?
- How well does the proposed G8D meet the Application Criteria?
    - Is there a definition of the symptom(s)?
    - Has (have) the G8D customer(s) who experienced the symptom(s) and, when appropriate, the affected parties, been identified?
    - Have measurements taken to quantify the symptom(s) demonstrated that a performance gap exists **AND/OR** has the priority (severity, urgency, growth) of the symptom warranted initiation of the process?
    - Is the cause unknown?
    - Is management committed to dedicating the necessary resources to fix the problem at the root-cause level and to prevent recurrence?
    - Does the symptom complexity exceed the ability of one person to resolve the problem?
- Will the new G8D duplicate an existing G8D?
- How was the Emergency Response Action verified?
- How was the Emergency Response Action validated?

Service Action:

A service action is described as any action necessary on product in the field to minimise the effect of the problem for the customer.

D1 - Establish the Team – Process Flow



D1 - Establish the G8D Team

In **D0** you will have established that the symptom is too complex for one person to resolve. Having an effective team is crucial to the success of the G8D problem solving effort.

G8D requires a multidiscipline and experienced team to be able to provide the effort and knowledge needed in getting to the root cause of the problem. This is the goal of all problem solving methodologies.

In this step of the G8D process we need to consider:

- Team skills
- Team roles
- Team responsibilities

Having established management support for the G8D process it is important that the right people are released at the right time.

> ***A definition of a team:*** "A team is a ***small number*** of people with ***complementary skills*** who are committed to a ***common purpose,*** performance goal and approach for which they hold themselves ***mutually responsible".***

……..in other words a cohesive team.

Team Skills (and knowledge)

The skills that the team members require will include, but are not restricted to: -

- Knowledge of the process where the problem has manifested itself
- Knowledge of the item (part, sub-assembly, outcome)
- Technical knowledge of the item under analysis
- Customer usage and application knowledge (internal or external customers)
- Decision making
- Conflict resolution
- Communication skills
- Data analysis skills

The makeup of the team will depend upon the initial perception of the problem. However, the team composition may need to change during the G8D process. This is because the team's understanding of the problem will grow and as it does may need additional or different skills to help resolve the process.

Team Roles

There are a number of roles in effective teamwork, that when applied in the spirit of supporting the team, ensure that the team has the very best chance of success.

The required team roles are: -

Champion: the champion will normally be the responsible internal person that is feeling the pain of the problem. The champion will not normally attend the meetings but will support the team, in particular gaining access to the resources required for the problem solving effort.

Team Leader: the team leader's role is to manage the business of the team for the team. The activities will include setting the agenda, arranging the meeting venue, managing the activities and communicating with the champion.

Time Manager: this is not a time keeper. The time manger takes on the responsibility on behalf of the team to manage the allotted team meeting time. Working with the team leader, they will issue a timed agenda, allocating fixed times for each topic on the agenda.

During the meeting, the time manager will advise the team of remaining time for each subject and, with the team, agree amendments on a running basis if a topic is running over and considered important enough to do so.

Scribe: is the person that captures the outcomes of the meeting as agreed by the team and publishes on behalf of the team.

Facilitator: the facilitator looks after the team process and ensures that everyone is involved in the process steps and captures what went well for the team members.

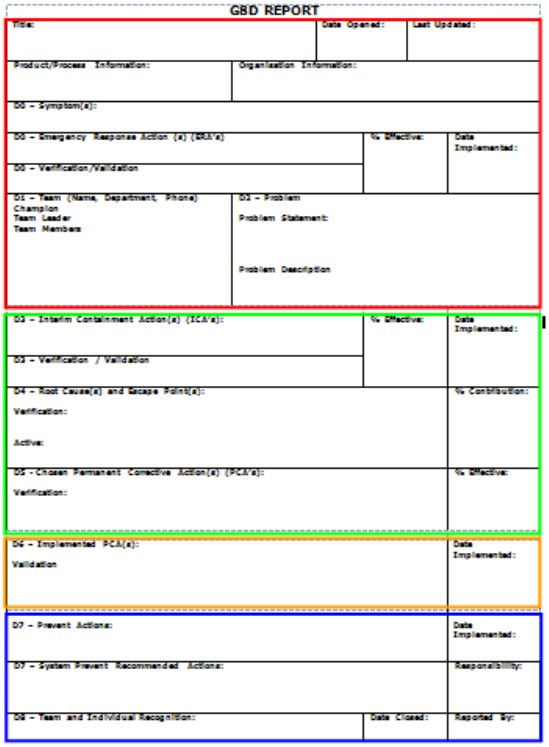
G8D Coach – this is optional, but recommended where some or all of the team members have little or no experience of the G8D process application. This should be an internal resource where ever possible to maximise the problem solving effort.

Team Responsibilities

The responsibilities of the individual team members will be allocated by the team and will involve some or all of the following: -

- Data collection
- Data analysis
- Decision making processes
- Experimentation
- Solution verification and validation
- Modelling Managing resources
- Planning and implementation of solution (Plan-Do-Check-Act)
- Communication

These are the common skills which are required in addition to the general problem solving and technical skills needed to contribute to the problem solving effort.



Complete the G8D report (Template)

At this stage the G8D Report is completed by the team and circulated to all interested parties.

Circulation of the G8D report will vary at different stages of the G8D process and will normally be agreed with the Champion before circulation.

Consider establishing the ***core circulation list*** (those individuals that need to be aware of progress) and a ***specific circulation list*** (those individuals that need to be informed or involved at certain stages)

At this stage the team membership and roles are recorded.

Assessing Questions

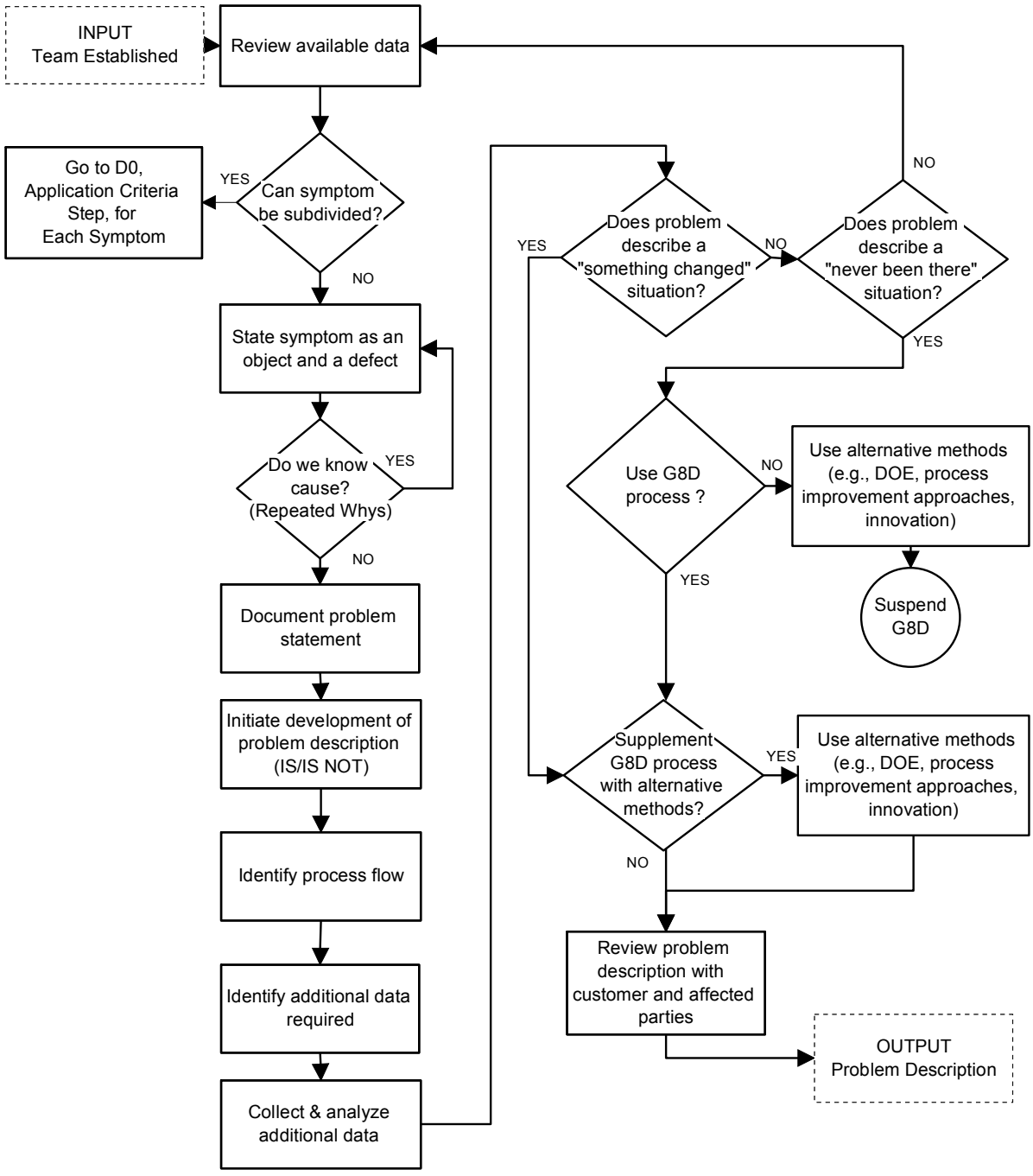
- Are the people affected by the problem represented?
- Is the team large enough to include all necessary input, but small enough to act effectively?
- Does the team membership reflect the problem's current status?
- What special skills or experience will the team require in order to function correctly?
- Is the team composition correct to proceed to the next step?
- How will the team's information be communicated internally and externally?
- Do all members agree with and understand the team's goals?
- Has the designated Champion of the team been identified?
- Has the Team Leader been identified?
- Are team members' roles and responsibilities clear?
- Is a G8D Coach needed to coach the process and manage team consensus?
- Have all the measurables been established?

Question Log

A simple but effective aid for the team is a question log. This is used to identify any gaps in current knowledge and includes who has agreed to get the question closed (answered) for the team. The following is an example of a question log.

Date Raised	Raised By	Question/Information Required	Action owner	Due Date	Date Closed

D2 - Describe the Problem – Process Flow



D2 – Describe the Problem

Problem description is a process for "digging down" into the problem and getting a more detailed and refined understanding of the problem.

At this stage of the problem solving process we are looking to provide concise data about the problem and determine the exact nature of the problem.

A common issue in any problem solving activity is distinguishing between the problem and the symptom of the problem.

Describing the problem is carried out in two stages: -

Problem Statement - A concise statement that identifies the object experiencing the defect and the nature of the defect (the defect will typically be a symptom for which the cause is unknown). The problem statement described clearly what is wrong (the symptom) with what (the object).

Problem Description - Established by determining what, where, when, how big and uses the ***Is/Is Not*** form to drive this part of the process.

Problem Statement

At this stage it is important to note that problem solving is about taking all of the data and information around the problem (or symptom) and drilling down using a structured process and a multi-disciplined team. However, if assumptions are made without gathering the data, too often the symptom may well become the focus of the effort rather than the problem itself.

Using a couple of simple examples to explain how assumptions are made,

Example 1:

Scenario: "Every time I put the wall mounted heater on in the kitchen it trips the circuit breaker".

Assumption: Obviously the heater and the symptom (or effect) being tripped circuit breaker, isn't it?

Rationale: There is not enough information at this stage. For instance:

- It may be an issue with the outlet socket
- It might be that the ring main is overloaded
- It might be that the trip is faulty
- It might be an earth fault in the circuit
- And so on……..

Example 2:

Scenario: "the press shop has been reporting problems with components not being ejected properly on one of four presses. We have changed the release agent and all the tools have been through tool maintenance over the weekend. We will have to change back to the old release agent".

Assumption: the release agent is causing the problem

Rationale: It could be any one of several things that could cause this to happen:

- The tools have been in maintenance……..?
- Material supply variations (hardness/spring-back)
- Operator or setter error

These are both simple examples of how easy it is to jump to conclusions without having all of the facts.

If we are to get to the bottom of the problem and fix it for good then we must be driven by facts and not assumptions (data).

Starting with the ***problem statement***, we must ensure we keep focused on what we know. So using the above example 1, what we actually know at this point, using the sentencing technique of "what is wrong (the problem) with what (the object), our problem statement becomes "the circuit breaker trips".

So, if we assumed that the heater was faulty, scrapped it and bought a new one, would this necessarily solve the problem? At this point we don't actually know. However, think about a problem in the workplace and how expensive replacing an item could end up!

Having established the ***problem statement***, we now need to look at developing this to a full ***problem description***.

Problem Description

G8D Worksheet – Is/Is Not Problem Analysis				
Problem Statement :				
	Problem Descriptio	IS	but IS NOT	Information or data
WHAT	What Object			
	What Defect			
WHERE	Where on object			
	Where first observed			
	Where seen since			
WHEN	When first observed			
	What pattern since			
HOW BIG	How many affected			
	What size			
	Defects per object			
	Trend			

A Problem Description is the output of a process that utilises the **IS/IS NOT** form to amplify the Problem Statement. This is the next step in better understanding the problem.

This techniques looks at "what the problem ***is*** and what the problem ***is not*** but logically could have been" and looks to provide information on: -

what the defect is/is not but could be

where it does/does not occur but could

when it does/does not occur but could

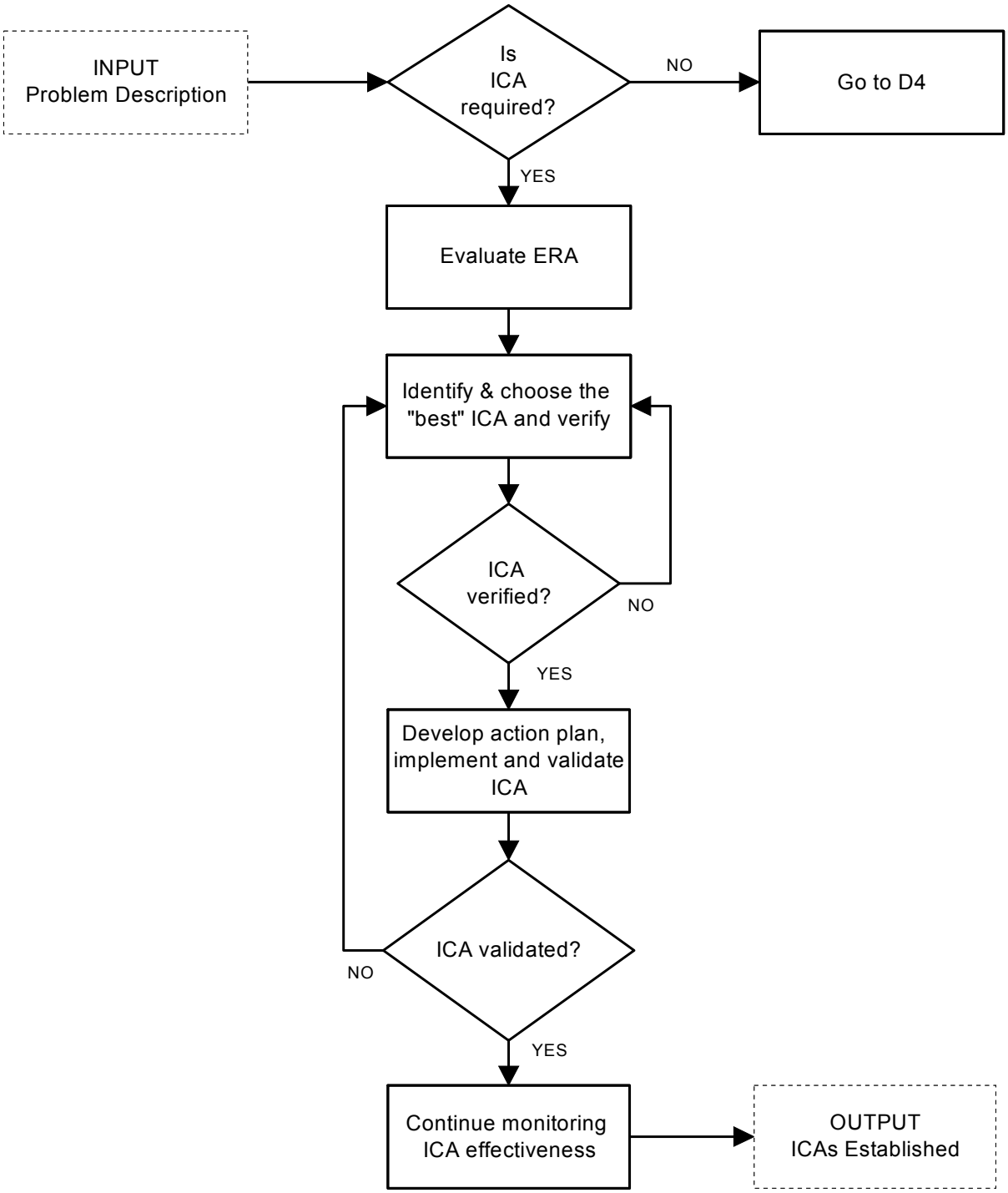
how big it is/is not but could be

The **IS/IS NOT** process also identifies data that needs to be gathered where necessary to better understand the problem.

Assessing Questions

- Has a specific Problem Statement been defined (object and defect)?
- Do you know for certain why that is occurring?
- Has IS/IS-NOT Analysis been performed (what, where, when, how big)?
- Are similar components and/or parts showing the same problem?
- Has the current process flow been identified? Does this process flow represent a change?
- Have all required data been collected and analysed?
- How does the ERA affect the data?
- Is there enough information to evaluate for potential root cause?
- Do you have physical evidence of the problem?
- Has the Problem Description been reviewed for completeness with the G8D customer and affected parties?(Has concurrence been obtained from the G8D customer and the affected parties?)
- Have all changes been documented (e. g., FMEA, control plan, process flow)?
- Do you have the right team composition to proceed to the next step?
- Have you reviewed the measurable(s)?
- Have you determined if a Service Action is required?

D3 - Develop the Interim Containment Action (ICA) – Process Flow



D3 – Develop an Interim Containment Action (ICA)

An ICA is as it states, interim. The Global 8D process drives learning about the problem to enable a fuller understanding of the problem so that, in some cases, a more cost effective containment action can be derived.

Having clearly described the problem, the G8D team are now in a position to review the ERA (emergency response action) to determine if a more suitable and cost efficient containment action can be put in place. As with the ERA the ICA is used to: -

- To ensure the customer has minimal or no impact felt as a result of the problem symptom
- To buy time for the problem to be investigated and solved

By its nature, an ICA will also be expensive to implement as it will probably involve an additional process. It is therefore important to establish specific criteria for selection of the ICA. The ICA being introduced could include: -

- 100% Inspection
- Introducing a substitute process
- Rework
- Field service action

As can be seen, any one of these actions would add considerable cost, however they are necessary to protect the customer. Remember that some of the above actions are not 100% effective, even 100% inspection is subject to variation.

Example: An automotive manufacturer was experiencing water leaks between the inner and outer front wing of a vehicle under water test at the factory. The ERA was to add a thin bead of mastic sealant the whole length of the inner wing before welding the inner and outer together. Once the problem was better understood the length of the mastic sealant applied was reduced to one smaller area, the ICA. When making several hundred a day, these few seconds and material savings were significant.

The choosing and implementation of the ICA uses the Deming Cycle of Plan Do Check Act.

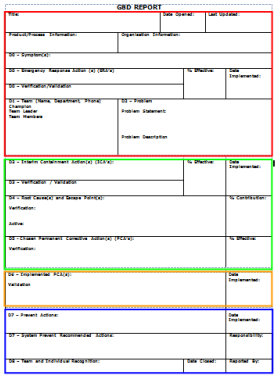
PLAN – Choose the most effective ICA and plan its implementation. This will involve verifying that the ICA is effective and that all the necessary work instructions, resources and equipment are made available, on time. It is important to ensure that the ICA is made "official" for accounting and operational purposes. The plan must also include the phased withdrawal of the ERA

DO - Implement the ICA as per the plan, ensuring that the action is clearly communicated at operational and management levels. At this stage the ERA is also removed.

CHECK - Check that the ICA has been implemented exactly according to the plan (including the withdrawal of the ERA) and that it continues to be effective. It is also important to validate that there are no other side effects introduced as a result of the ICA.

ACT – Take action to ensure ICA remains effective and sustained within daily operations as necessary. In some cases the feedback after implementation of the ICA may require further action to rectify other issues.

Complete the G8D Form (Template)



Complete the Global 8D form and circulate. Remember to update team composition for any changes that are made at the end of this stage.

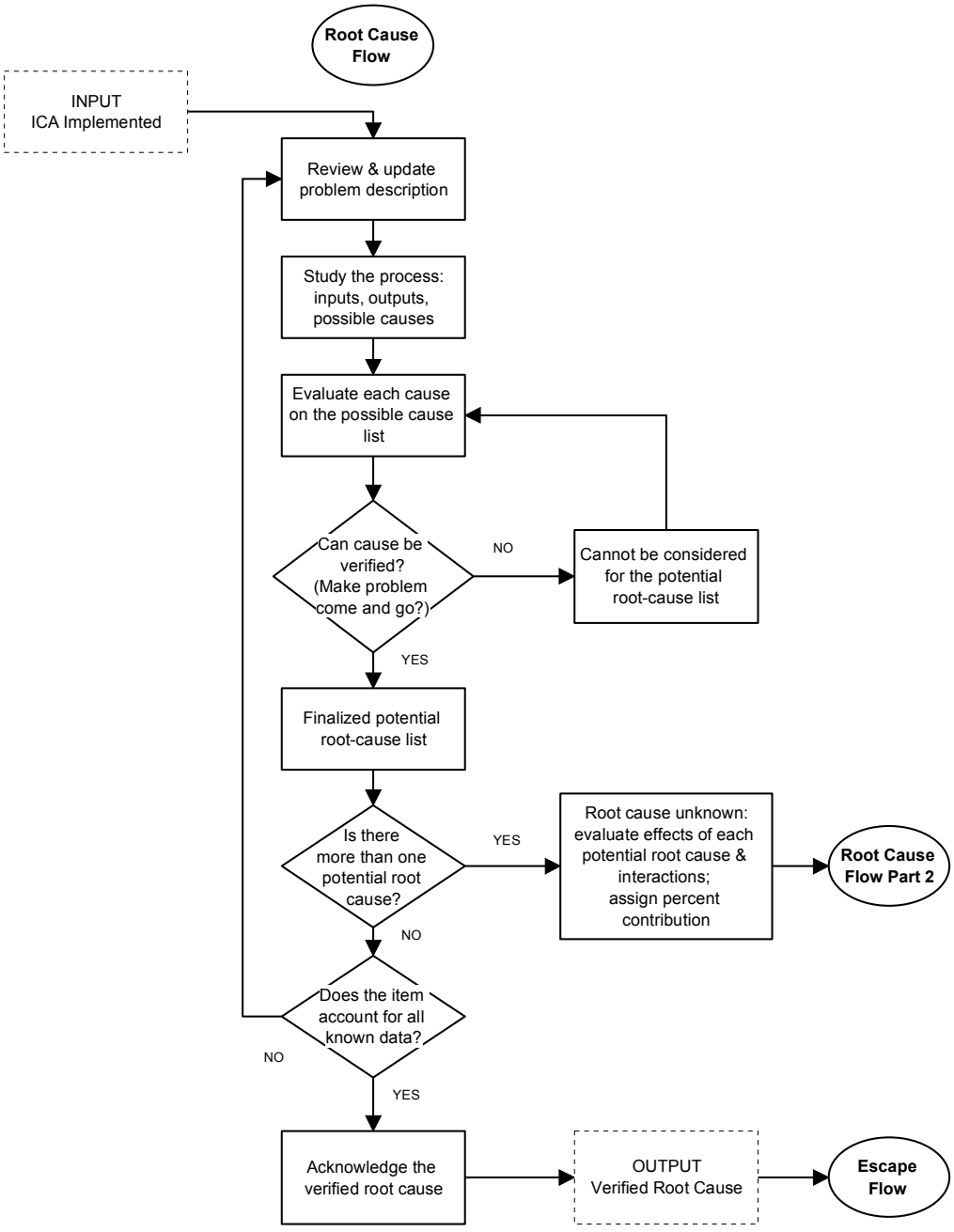
The G8D form is a summary of the problem solving activity and is supported by all of the other worksheets, data and supporting information that is generated as a result of the problem solving activity.

Ensure that a a full account of the ICA and supporting documents are alailable to support this summary.

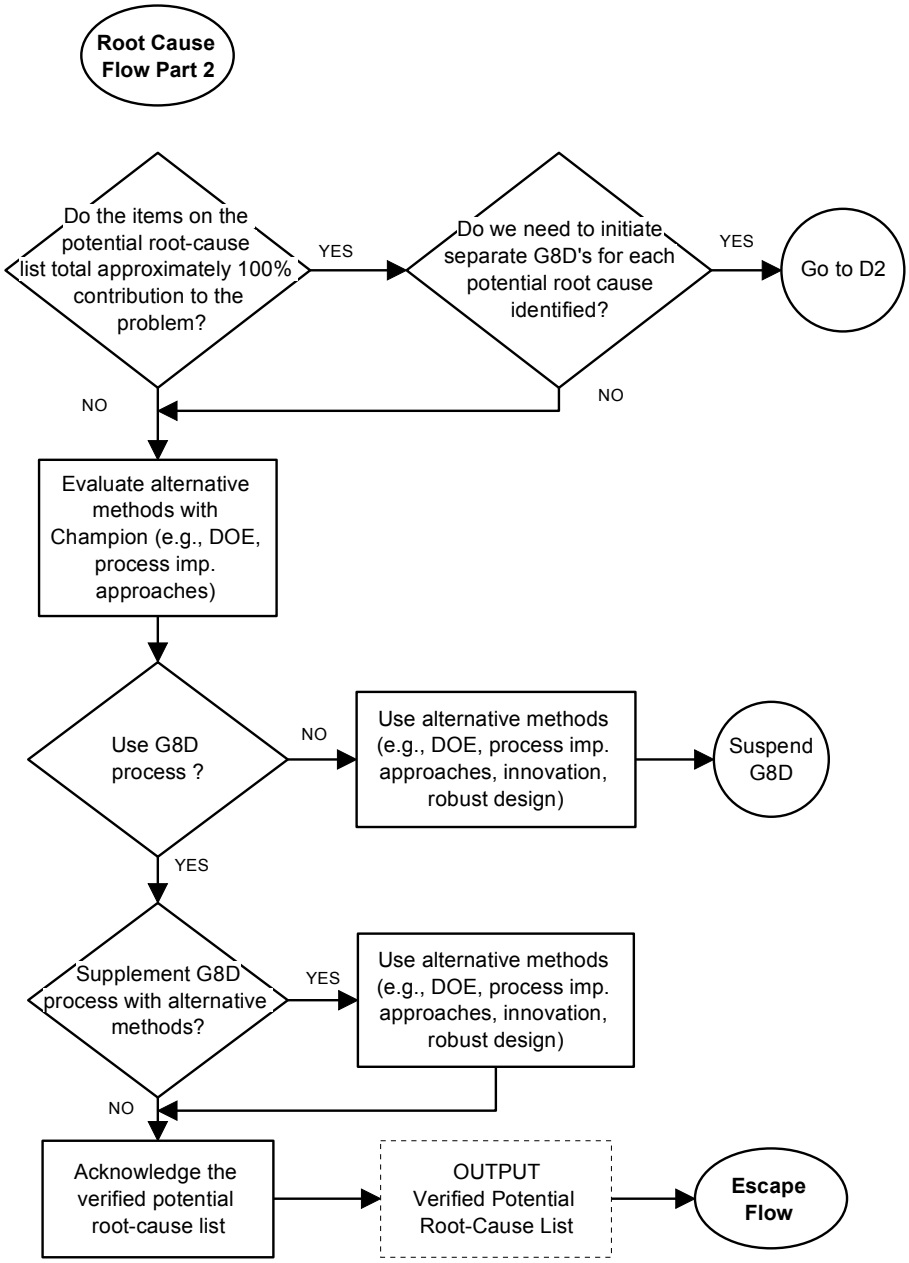
Assessing Questions

- Are ICAs required?
- What can you learn from the ERA that will help in the selection of the 'best' ICA?
- Has the question log been updated?
- Have the appropriate departments been involved in the planning of this decision?
- Based on the criteria established, does the ICA provide the best balance of benefits and risks?
- How does this choice satisfy the following conditions?
    - The ICA protects the customer from the effect.
    - The ICA is verified.
    - The ICA is cost-effective and easy to implement.

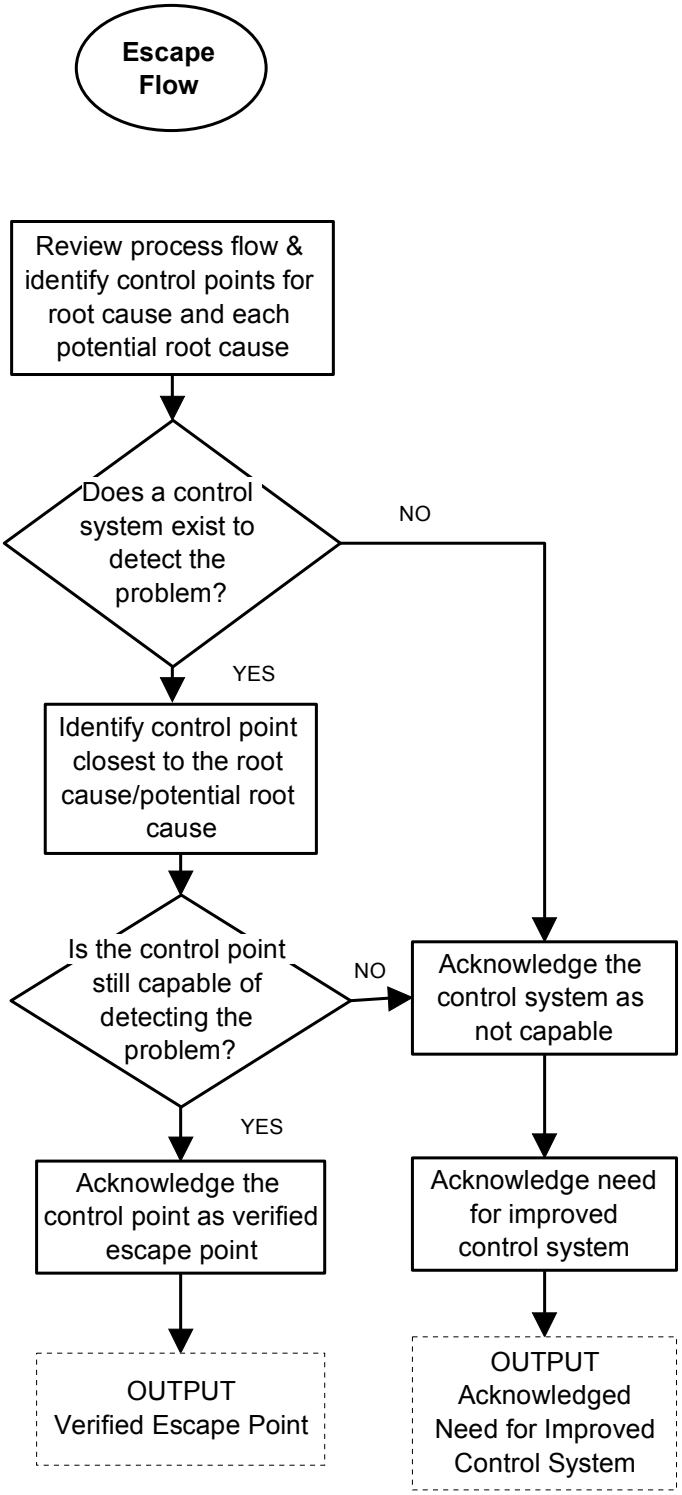
D4 - Define and Verify Root Cause and Escape Point (Part 1 of 3) – Process Flow



D4 - Define and Verify Root Cause and Escape Point (Part 2 of 3) – Process Flow



D4 - Define and Verify Root Cause and Escape Point (Part 3 of 3) – Process Flow



D4 – Define and Verify Root Cause and Escape Point

At this stage in the G8D problem solving process you have now established the Interim Containment Action (ICA) thus buying some valuable time to concentrate on solving the problem permanently. Also you will have reviewed the team composition to ensure that all the right skills and experience is available for the next step in the problem solving effort.

There are two key definitions that need to be fully understood as corner stones of this part of the G8D process step.

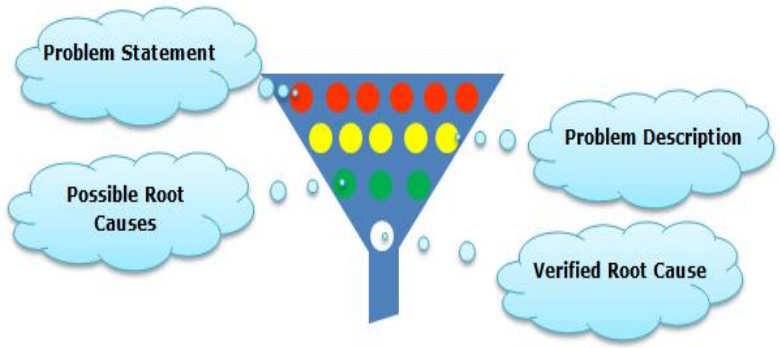
Root Cause: - the lowest level event that can be attributed and proven as that which caused the problem to occur

Escape Point: - the place in the process where the root cause of the problem went undetected allowing the problem to occur

The Global 8D process uses a number of forms to help drive this process and are as follows: -

- Differences and changes worksheet
- Possible causes worksheet
- Possible root causes worksheet

These sheets are used to drive the discussions and problem solving efforts and form part of the process for narrowing down causal theories to the root cause.



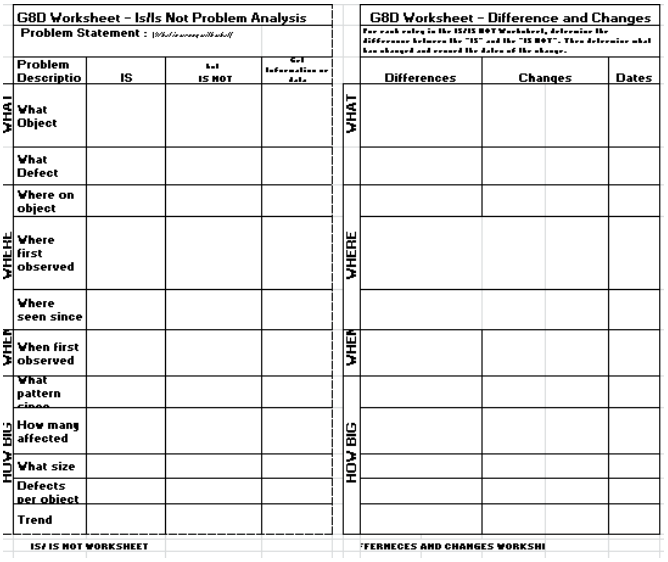
As already mentioned, the G8D process is structured in a way that drives down from the effect or symptom, to the problem and then the root cause. Like a funnel, the process is about filtering out all the theories and ideas using facts (data driven) to be able to find and verify the root cause.

The object of all problem solving is to get to root cause and then take action to correct and sustain the improvement.

Define Root Cause

To explain the process we recommend the use of the worksheets to aid understanding. In this section we have used sections of the worksheets to demonstrate how they are used.

STEP 1 – Define what is different about the "IS" compared to the "IS NOT"



G8D Worksheet – Is/Is Not Problem Analysis

Problem Statement :

	Problem Descriptio	IS	IS NOT	Get Information or data
WHAT	What Object			
	What Defect			
WHERE	Where on object			
	Where first observed			
	Where seen since			
WHEN	When first observed			
	What pattern since			
HOW BIG	How many affected			
	What size			
	Defects per object			
	Trend			

IS/ IS NOT WORKSHEET

G8D Worksheet – Difference and Changes

	Differences	Changes	Dates
WHAT			
WHERE			
WHEN			
HOW BIG			

FERNECES AND CHANGES WORKSHI

For this step we use the differences and changes worksheet to help drive the process.

This model shows the ***Is/Is Not worksheet*** and ***the Differences and Changes Worksheet*** side by side.

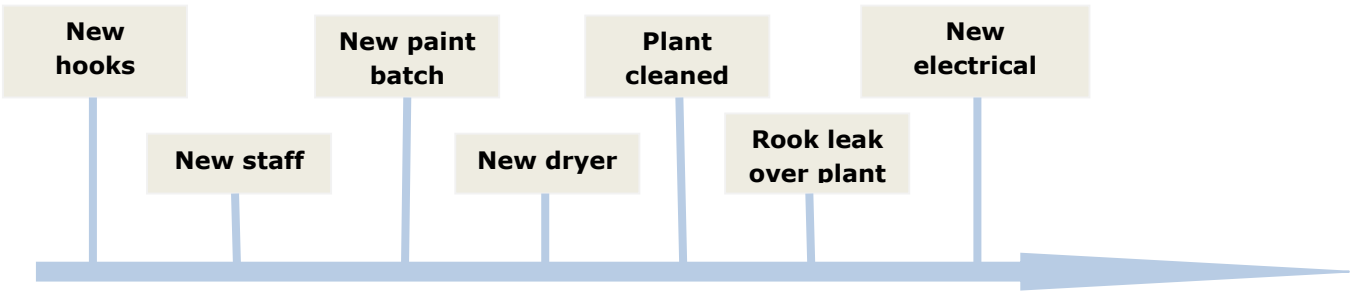
You will notice that the Is/Is Not and the Differences and Changes worksheets align. The reason for this is that the question is asked for each entry on the Is/Is Not form "what is different in, on or around the "IS" when compared with the "IS NOT" is for each entry on the IS/IS NOT worksheet.

Fundamentally there must be differences between the "IS" and the "IS NOT" or both would have the problem.

Then we need to ask the question "what has changed in, on or around the "IS". Something must have changed or the problem would have always been there. This must be factual so it's OK to generate a question log or ask a team member to go and find out.

A useful tool that can be used to record this information is a ***time line***. A time line is used to record all events in and around the problem.

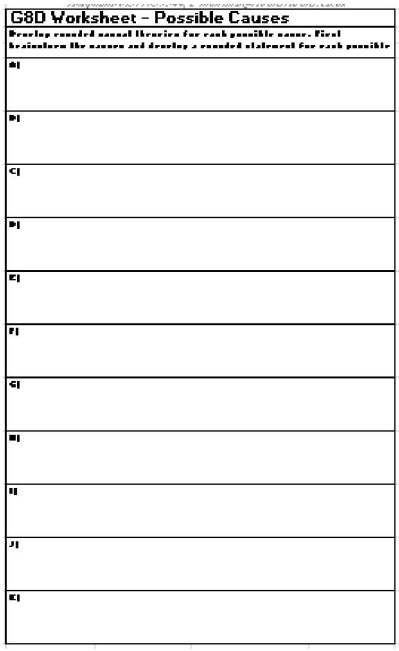
Example: A company making lamp shades is experiencing a paint problem. The significant events are recorded on a time line: -



The time line would be drawn up from the data already known (date problem first seen etc.) and would reflect all the changes or "significant events" that had occurred around that time.

This is used to filter out possible causal theories later in the process by identifying what could possibly have caused the problem and (by virtue of the time line) what could not have caused the problem.

STEP 2 – Develop possible causal theories


G8D Worksheet – Possible Causes

The ***Possible Cause Worksheet*** is used to record each root cause theory.

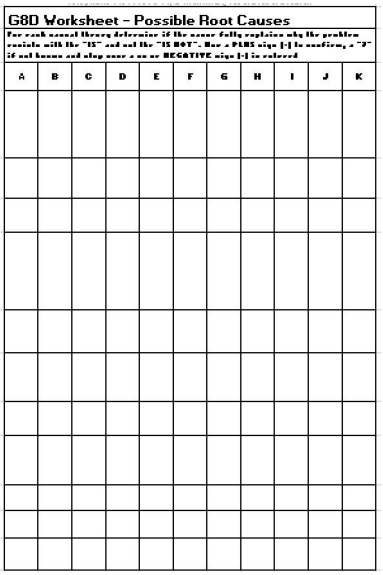
First brainstorm the possible causes and record on a separate media.

For each of the causes develop a causal theory that explains how that possible cause would result in the problem being experienced.

A causal theory is developed for each of the brainstormed ideas and written up onto the worksheet.

NOTE: again this worksheet aligns with the previous 2 as the process is driven by the differences and changes around the "IS" when compared to the "IS NOT". Therefore the causal theories are developed in line also.

STEP 3 – Establish Possible Root Causes


G8D Worksheet – Possible Root Causes

Using the Possible Root Causes Worksheet (which is again aligned to the "Is/Is Not" worksheet), ask for each causal theory the question for each entry on the "Is/Is Not" worksheet, does this explain the reason why the problem exists on the "IS" and not on the "IS NOT".

For each time the answer is "yes" put a plus (+) sign. If you do not know or need to find out put a question mark (?). If the answer is no, put a minus sign (-).

When a "no" is established then this possible cause cannot be a possible root cause. Move onto the next causal theory. Complete this for all causal theories. The results you will be left with are all of the ***possible*** route causes.

This is where the time line can be used to great effect. If, when looking at developing the possible root causes we find that the time line shows that this could not be the case, then we can move onto the next causal theory.

This is a complex step in the problem solving process and needs diligence on the part of the G8D Team members to ensure assumptions are not made. If in doubt, go and find out!

STEP 4 – Verify Possible Root Causes

For each of the possible root causes, there now needs to be a practical activity to verify the possible root cause. This should be carried out in practical terms wherever possible. However, in some instances modelling may be required.

If the possible root cause is introduced then this should "switch the problem on". Once the possible root cause has been removed, this should "switch the problem off".

This should be a planned activity in that the resources needed for the verification exercise. Again the Deming Cycle of Plan Do Check Act (PDCA) should be used for this activity.

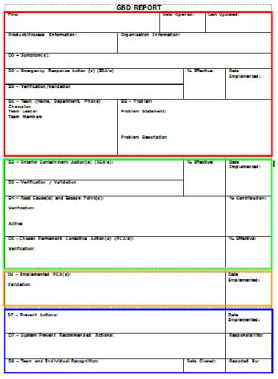
The plan should include the removal of the ICA during this verification process to ensure that the effect of the introduction and removal of the possible root cause is not masked by the ICA.

Define and Verify Escape Point

Having now identified and verified the root cause, we now need to determine where in the process the problem was allowed to escape from (this is a review of the control processes).

- Review the process flow and identify control points for the root cause and the possible root causes – *ensure that the reason for the root cause escape is corrected and to prevent any of the possible root causes escaping in the future*.
- Identify control point closest to root cause and potential root causes – *what controls currently exist that are close to the point that the cause escaped.*
- Acknowledge the control point as the escape point – *confirm that this is the point at which the problem escaped.*
- Record the verified escape point and identify opportunities for improvement of the control system/s

Complete the G8D Form (Template)

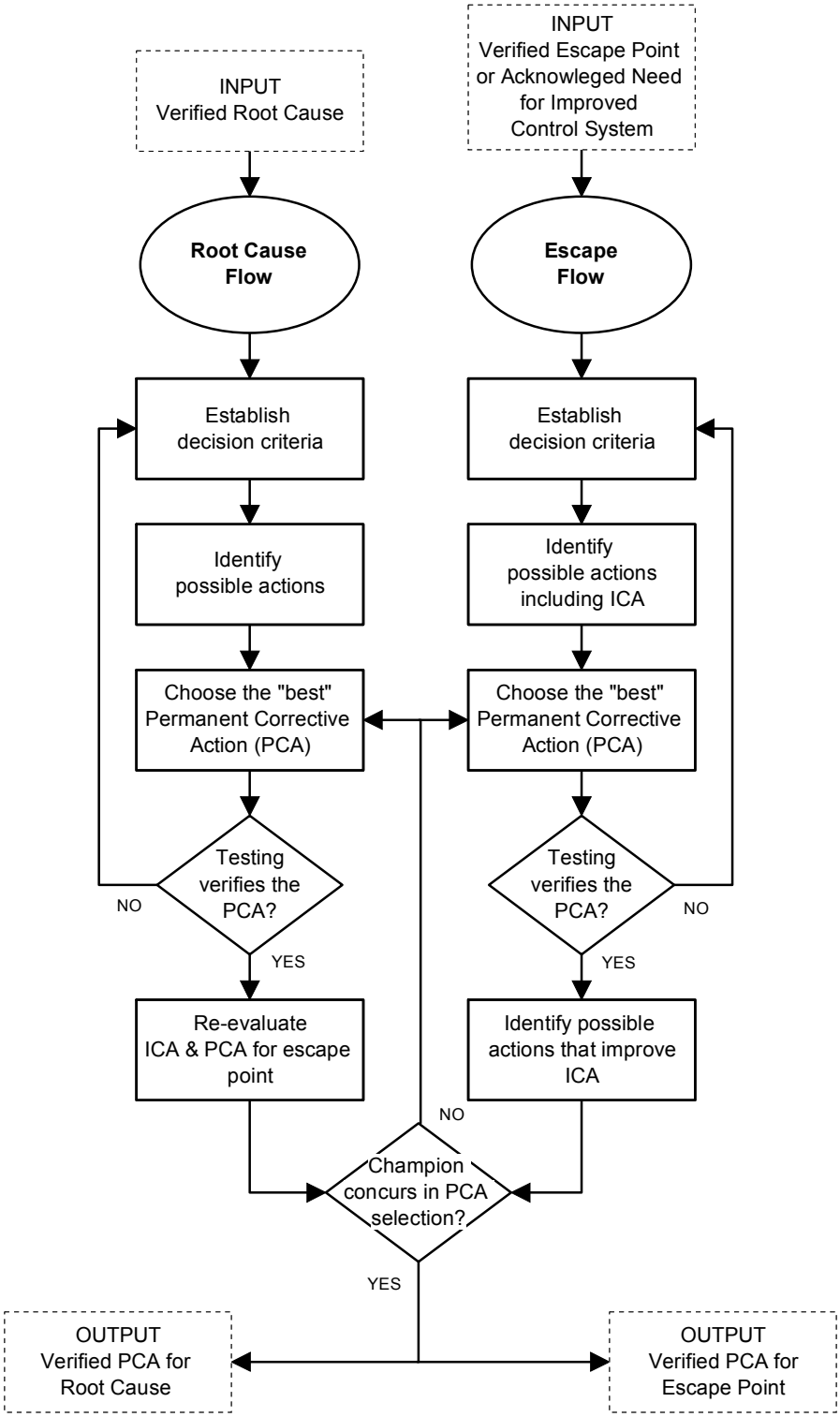


Complete the Global 8D form and circulate. Remember to update team composition for any changes that are made at the end of this stage.
The G8D form is a summary of the problem solving activity and is suppoirted by all of the other worksheets, data and supporting information (including the root cause analysis worksheets above) that is generated as a result of the Global 8D problem solving activity.

Assessing Questions

- Is there a root cause (a single verified reason that accounts for the problem)?
- How did you verify this root cause?
- Is there more than one potential root cause?
- Has each item been verified (used to make the effect come and go)?
- Does a control system exist to detect the problem?
- Has the current control system been identified?
- Has it been verified that the control system is capable of detecting the problem?
- Is there a need to improve the control system?
- Have all changes been documented (e. g., FMEA, control plan, process flow)?
- Do you have the right team composition to proceed to the next step?
- Have you reviewed the measurable(s)?
- Have you determined if a Service Action is required?

D5 - Choose and Verify Permanent Corrective Actions (PCAs) for Root Cause and Escape Point – Process Flow



D5 – Chose and Verify Permanent Corrective Actions (PCA's)

Having determined the root cause/s of the problem and the escape point you are now in a position to determine and choose the most appropriate Permanent Corrective Action (PCA).

PCA's need to be considered for both the ***root cause*** and the ***escape point.***

The PCA needs to meet several requirements that satisfy both customer and business needs. Given that there may be a number of possible permanent corrective actions that may be applied, the most appropriate PCA must be arrived at. With this in mind you will need a process for making this decision

Define Permanent Corrective Actions

Having identified the root cause of the problem under investigation, the team will have the data and information on hand to determine what corrective action options might be available to implement. These are all considered and articulated in such a ways as to ensure that all the necessary steps needed to remove and protect against the root cause have been considered.

Choose the Permanent Corrective Action

For this activity we will consider two levels of needs: -

- **Givens** – those criterion that must be met (mandatory) and that are measureable and realistic to achieve

- **Wants** – those criterion that are nice to have but not necessarily critical

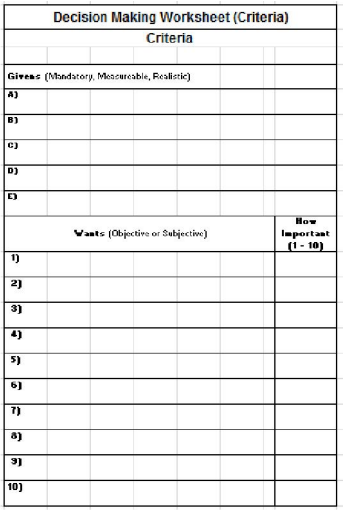
Examples

Givens could be: -
- Must be implemented within three months
- Must not cost more than £25,000 to set up
- Must be able to continue delivering product during implementation
- Must solve the root cause of the problem permanently

Wants could be: -
- To be cost effective in the first year of operation (Set up costs plus running costs within the first year)
- To be introduced as soon as possible
- To be implemented without overtime
- To have zero impact on energy consumption
- To work on both lines simultaneously

For this activity we use the ***decision making worksheets*** (there are two worksheets in the series, one is for recording the criterion and the second is for assessing how well each option meets these criterion).

The Givens and Wants are normally established at management level because budgets will need to be set for the improvement activity which will require management approval. Other business requirements will also need to be considered at management level.



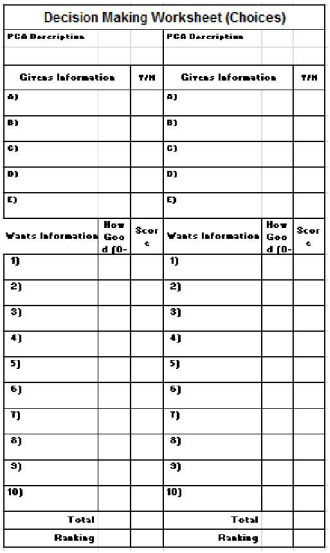
Decision Making Worksheet (Criteria)	
Criteria	
Givens (Mandatory, Measureable, Realistic)	
A)	
B)	
C)	
D)	
E)	
Wants (Objective or Subjective)	How Important (1 - 10)
1)	
2)	
3)	
4)	
5)	
6)	
7)	
8)	
9)	
10)	

Using the ***Criteria Worksheet*** opposite, the **Wants** are scored in terms of relative importance, 10 being the highest. This score will be used as part of the choosing process.

The **Givens** are not scored as they are conditions that must be met for the corrective action to be acceptable to the business.

This worksheet is used for recording and ranking the **Givens** and recording the **Wants** (These are normally populated by the business management team).

Having been provided with the **Givens** and **Wants**, you can now rank each PCA against these criteria. To help this process we use the ***Decision Making Worksheet***.



Decision Making Worksheet (Choices)					
PCA Description			PCA Description		
Givens Information		T/N	Givens Information		T/N
A)			A)		
B)			B)		
C)			C)		
D)			D)		
E)			E)		
Wants Information	How Good (0-	Score	Wants Information	How Good (0-	Score
1)			1)		
2)			2)		
3)			3)		
4)			4)		
5)			5)		
6)			6)		
7)			7)		
8)			8)		
9)			9)		
10)			10)		
Total			Total		
Ranking			Ranking		

The Decision Making Worksheets are used to rank each of the PCA's by first determining if the PCA meets all of the givens.

If the PCA does not meet all of the givens, then it cannot be progressed in its current form.

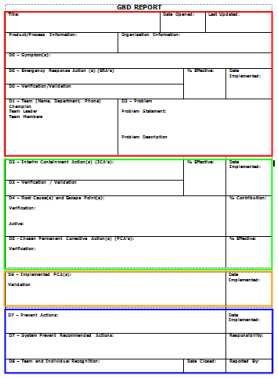
Then for those possible PCA's that meet the Givens, the Wants are scored as to how well the PCA achieves each criteria.10 is completely and 0 is not at all.
The scores are added up and this summative score is used to rank the PCA's.

The highest scoring PCA option is normally the one chosen to move forward with.

Verify the PCA

Finally the G8D Team must verify that the PCA will eliminate the root cause permanently.

Complete the G8D Form (Template)

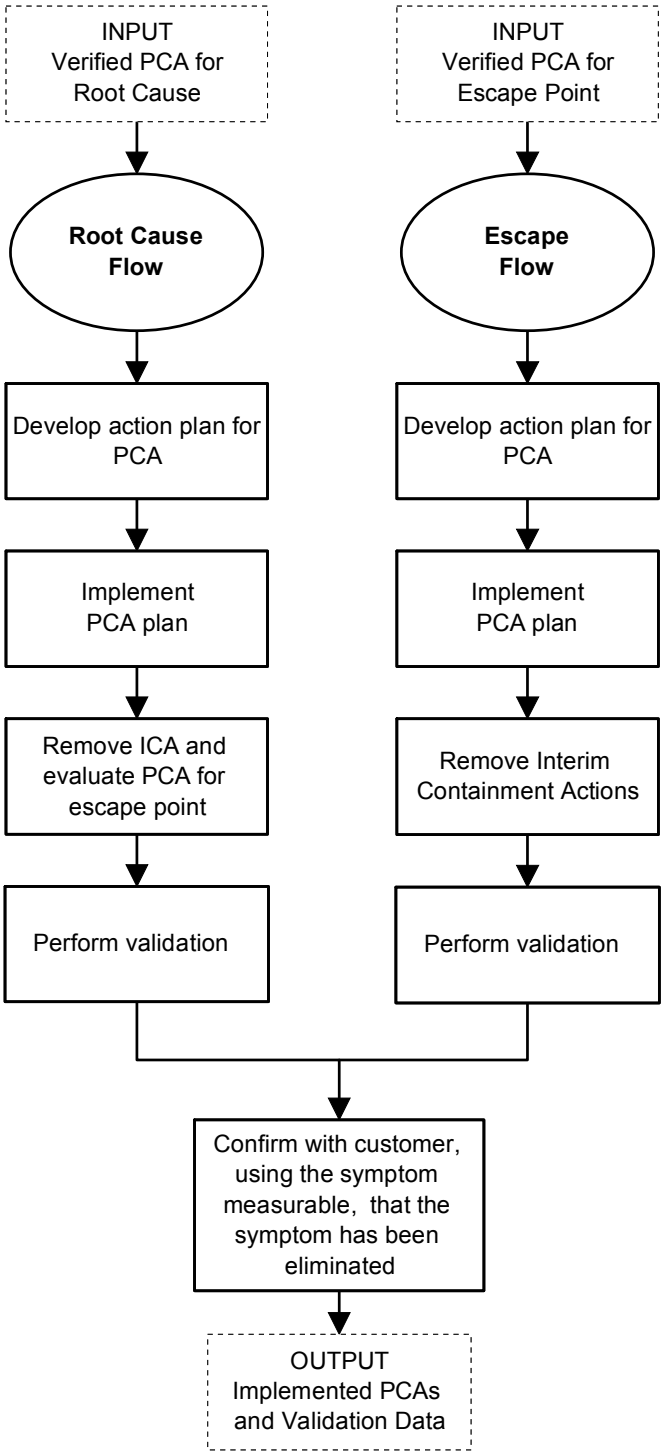


Complete the Global 8D form and circulate. Remember to update team composition for any changes that are made at the end of this stage. The G8D form is a summary of the problem solving activity and is suppoirted by all of the other worksheets, data and supporting information (including the givens and wants worksheets) that is generated as a results of the problem solving activity.

D5 - Assessing Questions

- Have the criteria been established for choosing a PCA for the root cause and escape point?
- What risks are associated with this decision and how should they be managed?
- Does the Champion concur with the PCA selections?
- What evidence (proof) do you have that this will resolve the problem at the root-cause level?
- Did our verification methods make allowances for variations in the frequency (or patterns) created by the cause?
- What are the possibilities that this choice, once implemented, will create other problems?
- Have all changes been documented (e. g., FMEA, control plan, process flow)?
- Do you have the right team composition to proceed to the next step?
- Have you reviewed the measurable(s)?
- Have you determined if a Service Action is required?

D6 - Implement and Validate Permanent Corrective Actions (PCAs) – Process Flow



D6 - Implement and Validate the Permanent Corrective Action

Having now established and verified the best PCA's for the root cause and escape point, the next step is the implementation of the PCA's.

To do this we employ the Deming Cycle of Plan Do Check Act to ensure successful implementation.

The Global 8D problem solving process is a structured approach to getting to the root cause and the escape point and taking actions to ensure that these are eradicated permanently through effective controls and actions that are embedded in the operations of the business.

Implement and Validate the PCA's

The Deming Cycle has been used at various stages throughout the Global 8D process. It starts with the G8D form and is used at various steps through the process.

In this current step the cycle is used to: -

PLAN – The implementation of the Permanent Corrective Action (PCA) giving particular attention to:-

- Plan for validation of the PCA
- Plan to remove the Interim Containment Action (ICA) as part of implementation of the PCA
- Integrate check for side effects
- Plan for continued monitoring of effectiveness of the PCA's
- Plan for all the necessary resources
- Plan for all documentation, process instructions, training and communication for the implementation of the PCA's
- Define clearly the what, when, how, who and where (team roles and responsibilities)

DO – Initiate the implementation plan for both the root cause and escape point, ensuring that all the necessary steps have been managed and adhered to.

CHECK – Check that the PCA's have been fully implemented and integrated into the operational and business processes. Validate the PVA's for both the root cause and escape points (see item below on validation). Validation will be carried out at this stage and on an on-going basis.

The measures for effectiveness of the PCA's should use the same measurables that we used to describe the problem. In other words comparing like for like data.

ACT – Take actions on any variation from the plan or expected outcomes.

Validation

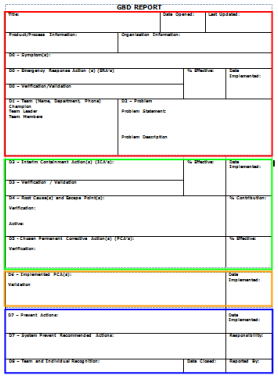
Validation is proof that is developed after implementation has taken place, over a period of time. Validation must: -

- Follow successful verification
- Provide a data driven comparison before and after implementation
- Check that the implementation does not introduce a new problem or side effects

Validation: -

- Is normally performed under defined operating conditions on the final product or process
- May be necessary in earlier stages prior to product completion
- Uses the same indicators that demonstrated the problem and must be easy to track.

Complete the G8D Report (Template)

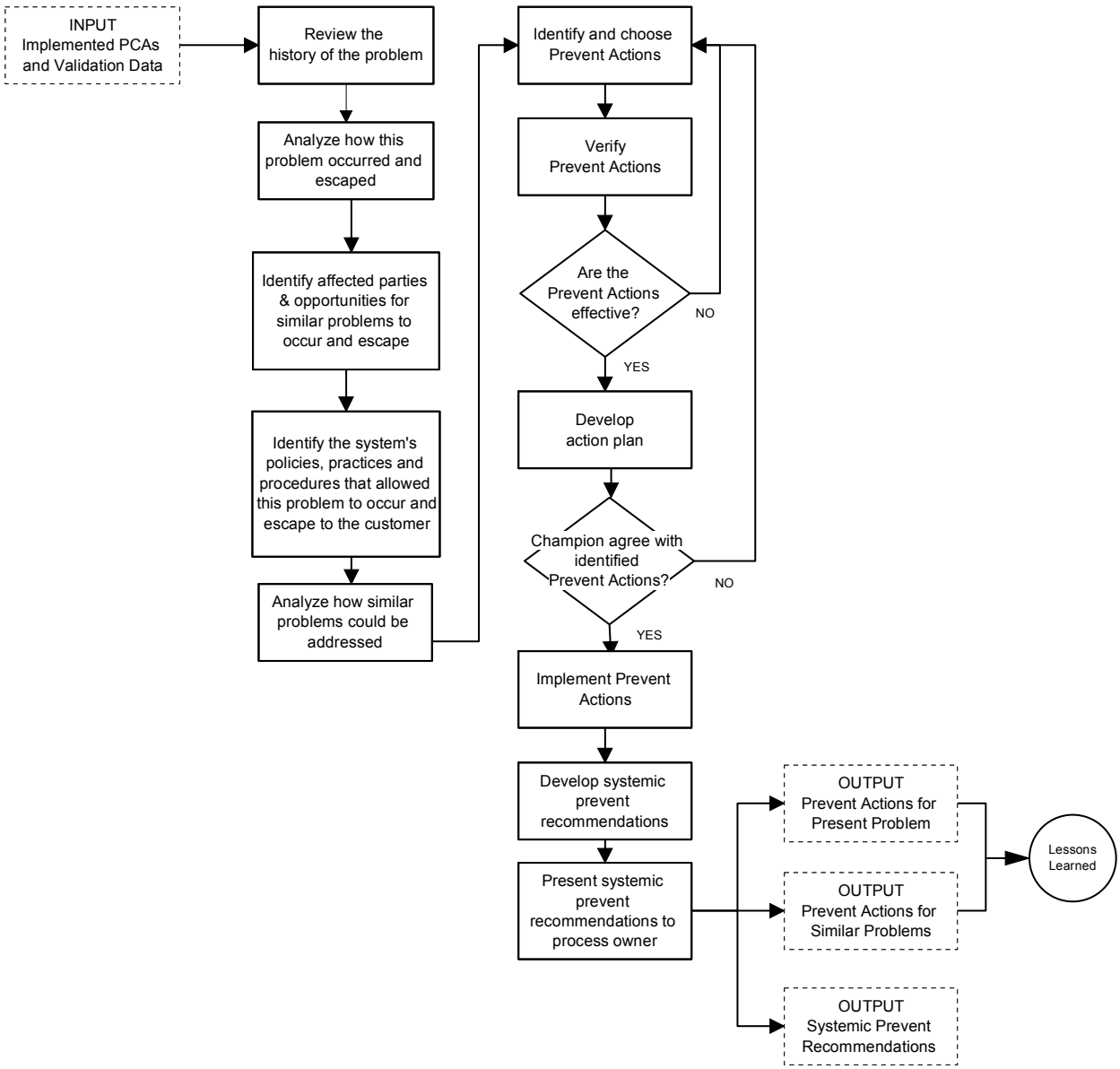


Complete the Global 8D form and circulate. Remember to update team composition for any changes that are made at the end of this stage. The G8D form is a summary of the problem solving activity and is supported by all of the other worksheets, data and supporting information including the validation results that are generated as a result of the problem solving activity.

Assessing Questions

- Are representatives of those departments necessary to implement the ICA on your team to plan and implement their parts?
- What customer and/or supplier involvement is needed?
- Has an action plan been clearly defined and communicated (responsibilities assigned, timing established, required support determined)?
- Do you have the necessary resources to implement this plan?
- What are appropriate contingency actions?
- What will trigger our contingency actions?
- How are you monitoring completion of the plan?
- What training will be required?
- What measurable(s) will be used to validate the outcome of the PCAs (both short-term and long-term)?
- Have all systems, practices, procedures, documents, etc. been updated?
- Have all changes been documented (e. g., FMEA, control plan, process flow)?
- Do you have the right team composition to proceed to the next step?

D7 - Prevent Recurrence – Process Flow



D7 - Prevent Recurrence

Astute problem solvers know that whenever a problem occurs there is normally a procedure, policy or practice (systemic) that has allowed it to happen. We call this the "root cause of the root cause". This needs to be established and resolved.

Just as important is recognition of the problem solving effort that has been afforded by the G8D Team and other individuals in the business.

Prevent Recurrence

As stated above, the next step is to examine the evidence established during the problem solving process and establish the policies, procedures and practices that led to this particular problem. For this we use a problem solving tool called 5 Why's (sometimes called stair stepping).

In essence this involves asking the question "why" of the root cause until the root cause of the root cause is established. The question may be asked more or less than 5 times, it does not have to be 5!

Example: *A small engineering company had problems with hole positions being out of tolerance in some instances. Having "masked the problem" for some time with constant drill changes, the problem solving team discovered the root cause as being a worn spindle bearing. The 5Y's exercise went something like this: -*

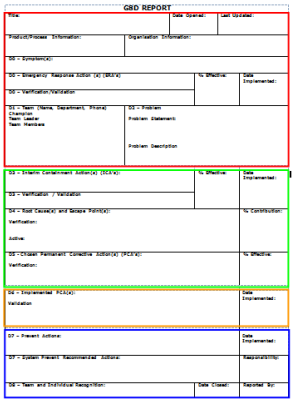
- *WHY – was the bearing worn?*
- *BECAUSE – it had become dry*
- *WHY – did the bearing become dry?*
- *BECAUSE – the operator did not carry out shift autonomous maintenance routines fully*
- *WHY – didn't the operator follow maintenance routine fully?*
- *BECAUSE – he was not properly trained during induction*
- *WHY – was he not trained on induction?*
- *BECAUSE – his induction programme missed this off the sheet*
- *WHY – was this missing from the sheet?*
- *BECAUSE – the induction plan was not signed off by Engineering (Root Cause)*

In fact, the induction process allowed for <u>any</u> manager to sign the induction plan (the systemic issue). The induction planning was changed to require function based sign off.

These systemic issues need to be fixed. The goal is to change the system that allowed the problem to occur in the first place and to prevent similar problems from happening.

Because these systemic issues are normally beyond the brief of the G8D team, these changes are made at management level. However the team does have the opportunity to offer recommendations for systemic improvements.

Complete the G8D Report Form

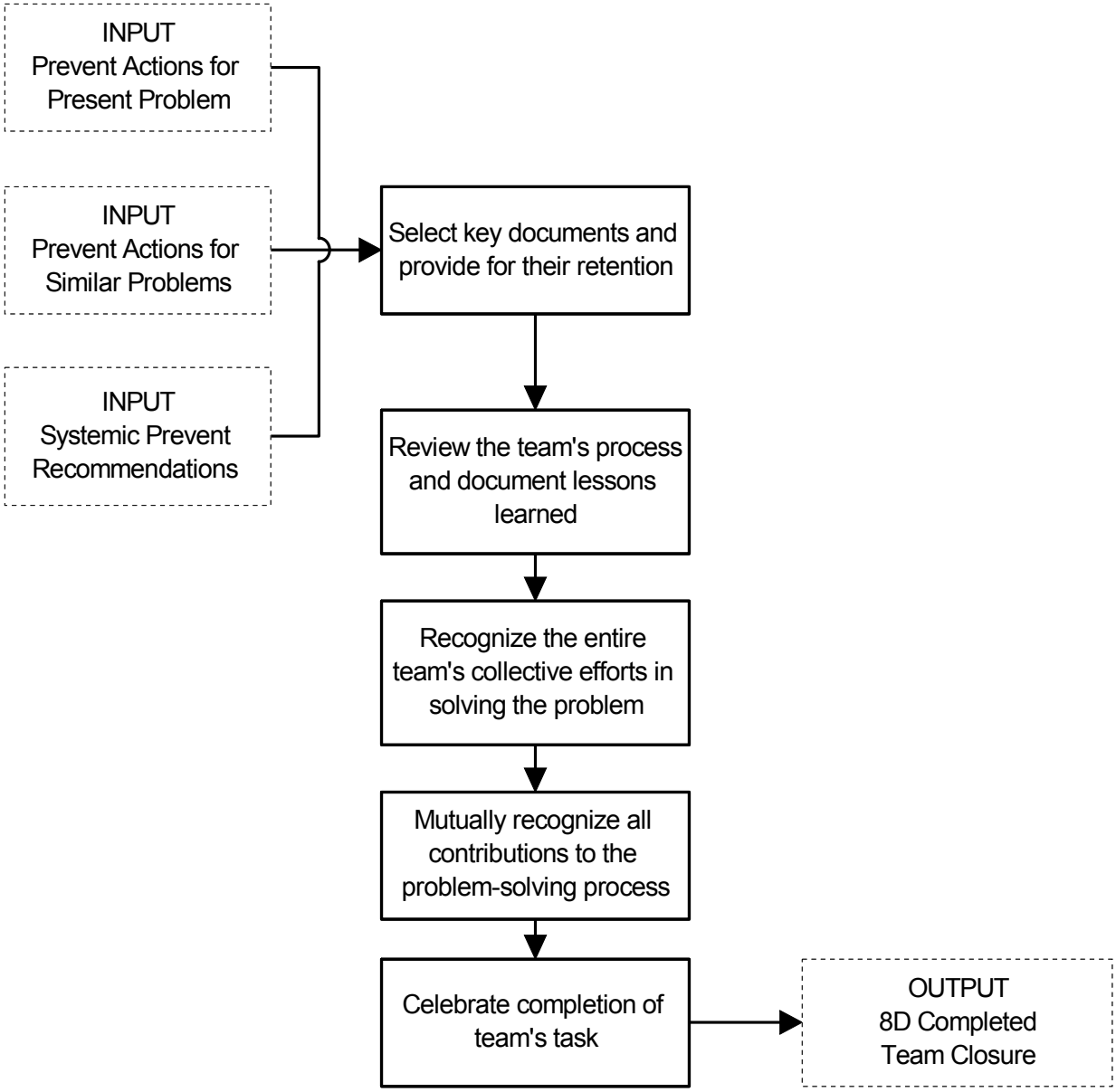


In this activity the team ensures that the completed 8D report is circulated to all concerned detailing all the above activities including the recommendations for systemic changes.

Assessing Questions

- What needs to be done differently to prevent recurrence of the root cause?
- What needs to be done differently to prevent recurrence of the escape?
- What evidence exists that indicates the need for a process improvement approach?
- What progress check points have been defined to assess system improvements?
- What management policy, system or procedure allowed this problem to occur or escape?
- Who has responsibility for these practices?
- Does the current Champion agree with the systemic prevent recommendations of the team?
- Have all changes been documented (e. g., FMEA, control plan, process flow)?
- Have you determined if a Service Action is required?

D8 - Recognise Individual and Group Contributions – Process Flow



Recognise Individual and Group Contributions

The application of the process requires skills and experience of the business to be able to make progress towards a satisfactory problem resolution. These skills and experiences are the reason the team members are selected.

The problem solving process drives improved data-driven understanding of the problem at each step of the process. As more is understood about the problem, root cause and resolution, different skills and experiences will need to be "drafted in" at various stages throughout the process.

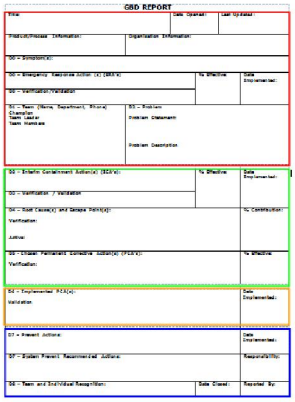
Recognising the effort of the team and other individuals involved is important as it tends to reinforce behaviour and self-esteem.

Completing unfinished business

Making sure all the problem solving activities have been completed and includes

- Finalising and archiving documentation
- Recognising technical lessons learned
- Making final presentation to the Champion
- Expressing experiences from team member to team members (Cooperative Learning)
- Archiving all the lessons learnt from the problem solving effort
- Ensuring all other related documentation is revisited and up to date (e.g. FMEA's, Control Plans, etc.)

Closure Process



In this final activity the team ensures that the completed 8D report is circulated to all concerned detailing all the above activities including the recommendations for systemic changes.

Assessing Questions

- Has the G8D report been updated and published?
- Is the G8D paperwork completed and have other members of the organisation (who have a need to know), and the customer, been informed of the status of this 8D?

- Is the G8D report and its attachments retained in your historical file system?
- Is there a complete list of all team members, current and past?
- Were there significant contributions by individual team members? What were they?
- Have all current and past team members being recognised?
- Do the results achieved by the team warrant some publicity (e. g., company newsletter)?
- What have you learned as individuals and as a team?
- How did the organisation benefit by the completion of this G8D process?
- What was done well?
- Are there changes to the business practices that should be considered, based on the learning in this G8D?

Summary

Global 8D should become a business process, like any other, and be integrated with design, operations and all other business and quality control activities. G8D is not a standalone methodology as it has inputs from other business processes and outputs beyond just solving the problem. As already stated, G8D needs to be fully integrated into the business to fully experience the benefits that a comprehensive problem solving methodology can bring to the business.

Having read this workbook, take a look at the G8D case study to see how it is applied.

See "Global 8D – Case Study – Creative Lighting Company"

Glossary

Control Plan	A control plan is a process management document that identifies all of the critical characteristics of a process, the process management tools and controls to be used. A good control plan will also identify reaction plans necessary when the process is out of control.
Customer	Any Person (internal or external) that receives the product or process. This includes the next process owner/operator, end user of the product or service or, other user/interface.
DOE	Design of Experiments – A statistically reliable method of determining the effects of more than one change at a time whilst minimising the number of experimental runs required to establish sufficient reliable data upon which to base decisions.
ERA	Emergency Response Action. Ana action taken to protect the customer (internal or external) form the symptom (or effects) of the problem.
Escape Point	The point in the process where the problem escaped, the point at which it should have been detected or prevented but was not.
Fish Bone Diagram	A structured method for organising potential causes established in a brainstorming session. The structure is typically around the interaction categories e.g. Man, Environment, Process, Equipment, Materials.
FMEA	Failure Modes and Effects Analysis – the analysis of potential failures within a design, process, system or machine. Establishes the priority of actions required to minimise the likelihood of failure. The analysis of the effects of failure.
ICA	Interim Containment Action. A considered and planned action to protect the customer. The ICA has the advantage of further /advance knowledge of the problem.
Modelling	A statistical process for the testing of ideas to determine probability of outcome.
Noise	Noise, is the total internal, external, environmental and customer usage variations that product will operate under during it's intended life cycle.

PCA	Permanent Corrective Action. The action that has been verified and validated to address the root cause of the problem.
Process Flow	The sequential transformation steps to progress a product or process outcome to the intended end product.
Process Flow Diagram	A graphical method for recording each stage of a process including inputs , outputs and measurables.
Robust Design	A design that has taken into consideration all the "noise" that it will encounter under usage conditions
Service Action	An action necessary on product or services in the field that are needed to protect the customer from the effects (or symptoms) of a problem.
Stair Stepping	Also known as 5 Y's, a process for drilling down to discover more about a problem and to move towards establishing root cause. The process involves asking repeated "why's" until no answer is forthcoming. See example on page 42.
Symptom	A quantifiable unwanted or unexpected outcome from a process or product.

Index

Notes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