

# **Rapid Problem Solving Process**

**VPP Region IX Conference**

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**May 20<sup>th</sup>, 2009**

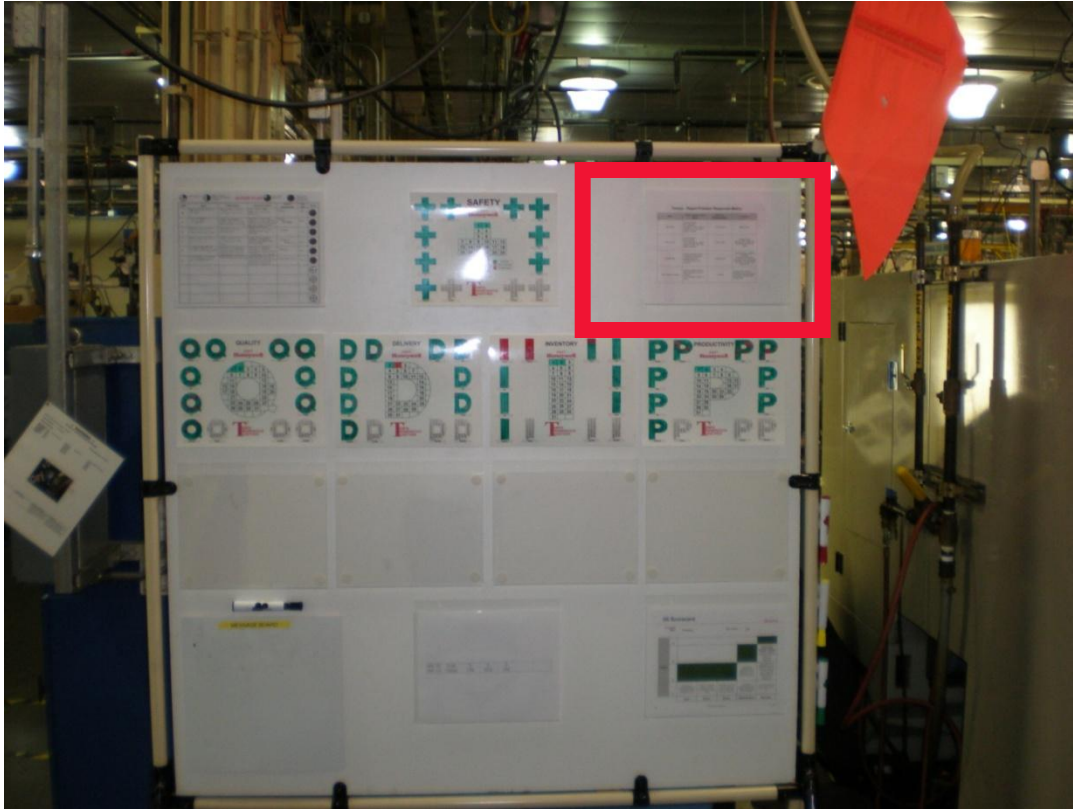
**Honeywell**

- **Aerospace Industry**
- **Assemble and test valve and actuator bodies for commercial and defense contracts**
- **1600 employees**
  - ~600 ISC Manufacturing
  - ~400 ETS Engineering / Design Application
  - ~600 Administrative / Support Functions (IT, Finance, Corporate)

Tempe Campus



# Location of RPS Process Matrix

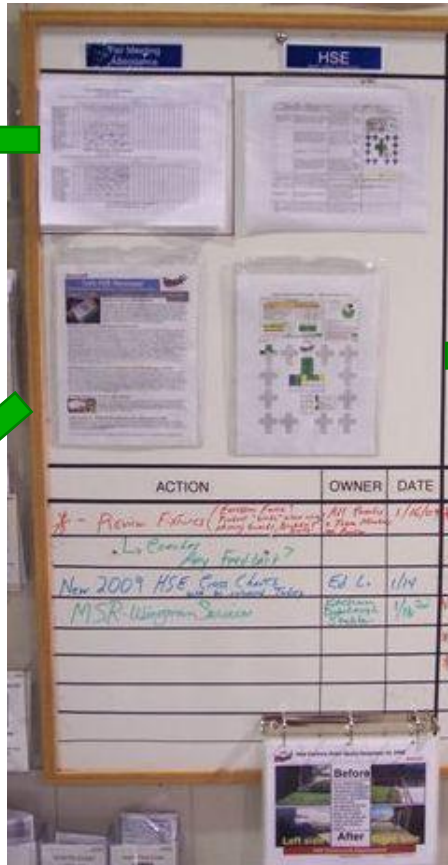
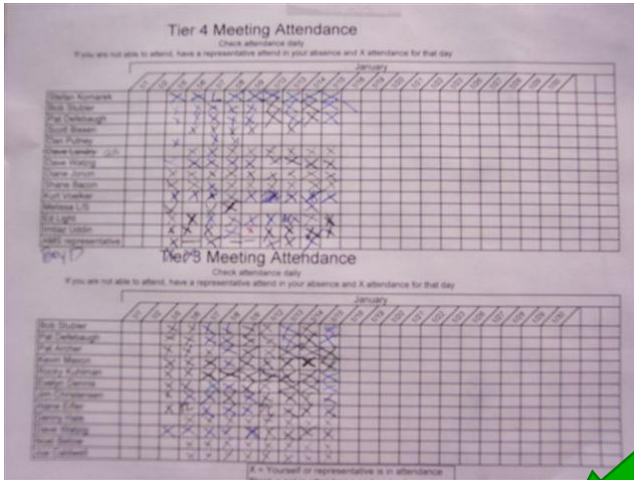


## Information Cubes

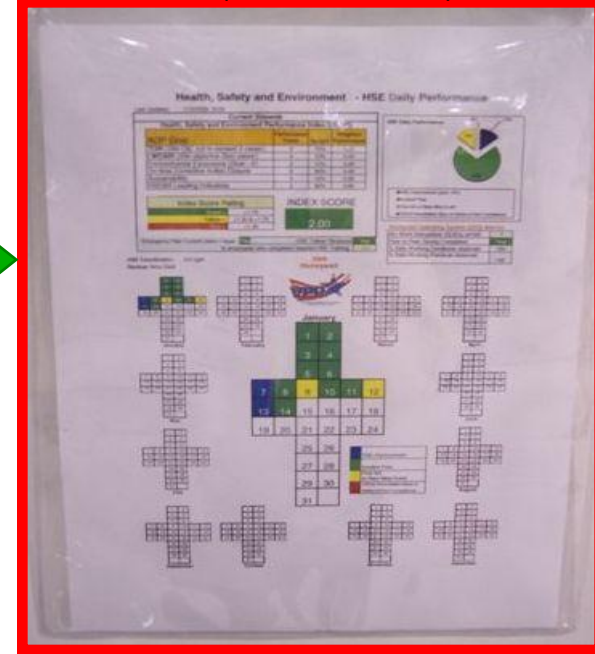


# HSE/HOS Discussion Points

## Accountability – Meeting Attendance



## HSE Performance – Tied to HSEPI (Measureable)



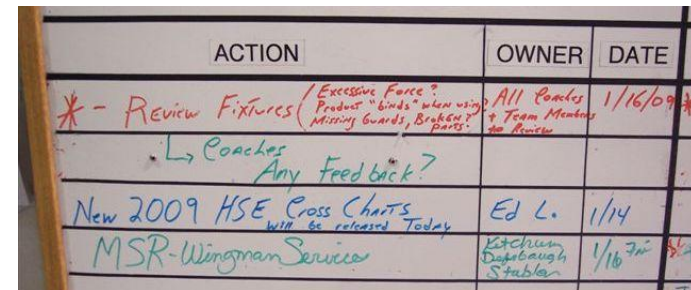
## HSE Daily Messages



## Sharing HSE Improvements



## Action Rail



# Linkage to Performance Cross

- Monitor and Measure Team Performance by
  - HSE Improvements
  - Incident Free Performance
  - First Aid or Near Miss Events
  - OSHA Recordable or Environment Excursion

## Health, Safety and Environment - HSE

Last Updated 4/4/2009 8:28

### Current Sitewide

### Health, Safety and Environment Performance Index (HSEPI)

AOP Goal	Performance Points	Weight	Weighted Performance
TCIR (Site Obj. not to exceed 3 cases)	2	10%	0.20
LWCAIR (Site objective Zero cases)	2	10%	0.20
Environmental Excursions (Goal - 0)	2	15%	0.30
On-time Corrective Action Closure	2	20%	0.40
Sustainability	2	15%	0.30
HSEMS Leading Indicators	2	30%	0.60

### Index Score Rating

Green =	>1.70
Yellow =	>1.30 & <1.70
Red =	<1.30

### INDEX SCORE

2.00

Emergency Plan Current (within 7 days)	Yes	HSE Trainer Reviewed	Yes
% employees who completed required HSE Training		91.798	

Health, Safety and Environment - HSE Daily Performance

Last Updated: 4/4/2009 8:28

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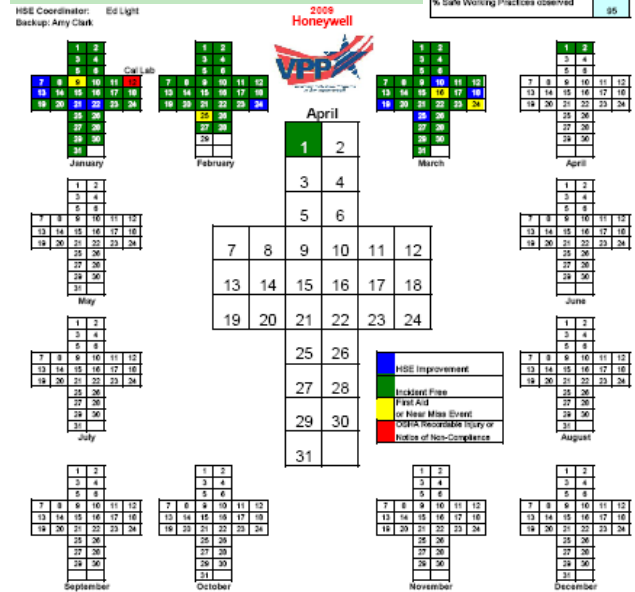
Emergency Plan Current (within 7 days): Yes | HSE Trainer Reviewed: Yes

% employees who completed required HSE Training: 91.798

HSE Daily Performance Pie Chart: 100% Green, 0% Yellow, 0% Red

Honeywell Operating System (HOS) Metrics:

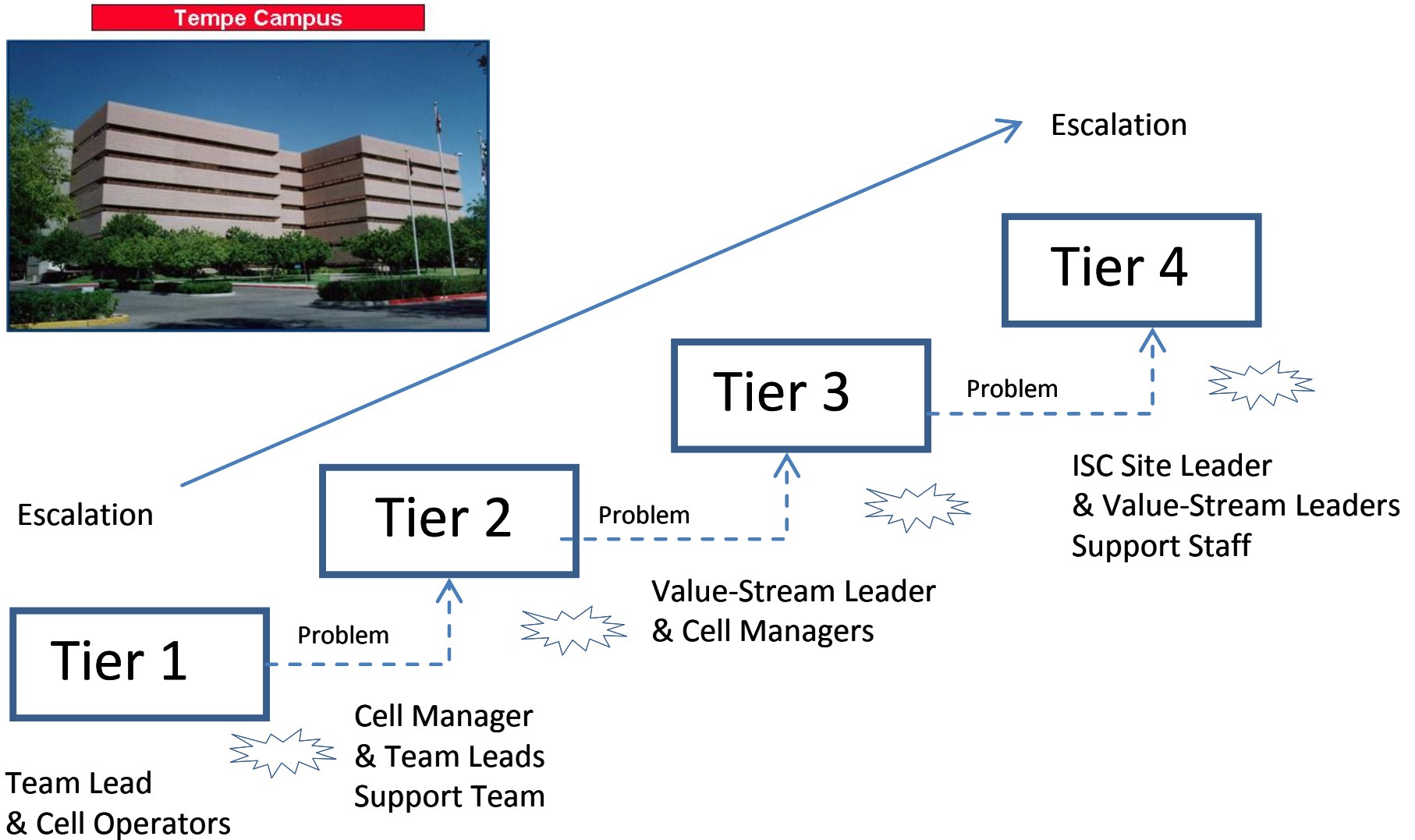
HOS Work Instructions (OS/OS) Review	60
Pre-Shift Survey Completed	Yes
% Safe Working Conditions observed	97
% Safe Working Practices observed	95



HSE Coordinator: Ed Light  
Backup: Amy Clark

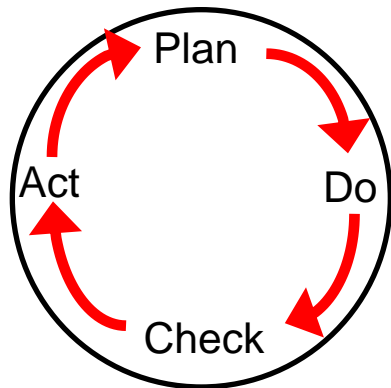
2009 Honeywell

# Tempe Tiered Accountability Meeting Process



# Tier 1 example

- **Team Leader / Supervisor meets with team members within cell.**
- **Location: Shop floor and functional areas in the manufacturing area.**
- **Time: 5 – 15 minutes**



Every meeting needs to be managed with the PDCA cycle to arrive to root cause and solve the problems.



# Tier 2 example

- Cell Manager and Team Leads
- Location: Shop floor and functional areas in the manufacturing area.
- Time: 5 – 15 minutes

The group decides on the duration of each meeting (5 -20 min recommended) and the time between them but as soon as possible to shorten the cycle



# Tier 3 example

- **Value Stream Leaders, Cell Managers, Functional Groups (HSE, HR, Planning, Facilities, etc).**
- **Location: Shop floor and functional areas in the manufacturing area.**
- **Time: 5 – 15 minutes**

The leader of each tier meeting makes assignments directly to those attending the meeting, and holds them responsible for getting their assignments completed on time



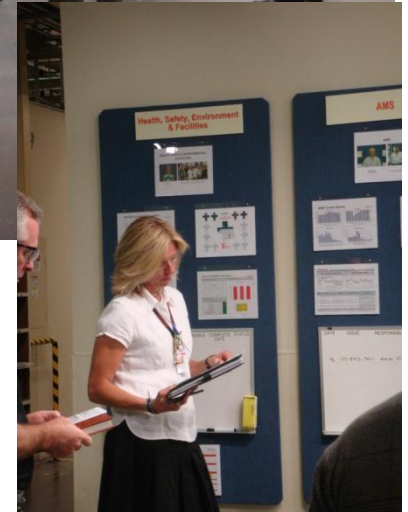
# Tier 4 example

- **ISC Site Leader, Value Stream Leaders and support staff (HSE, HR, Planning, Facilities, etc).**
- **Location: Shop floor**
- **Time: 5 – 30 minutes**



## Purpose:

To have a series of Four brief meetings to review previous day results, work day plan, improvement activities and problem solving at all levels of the plant organization.

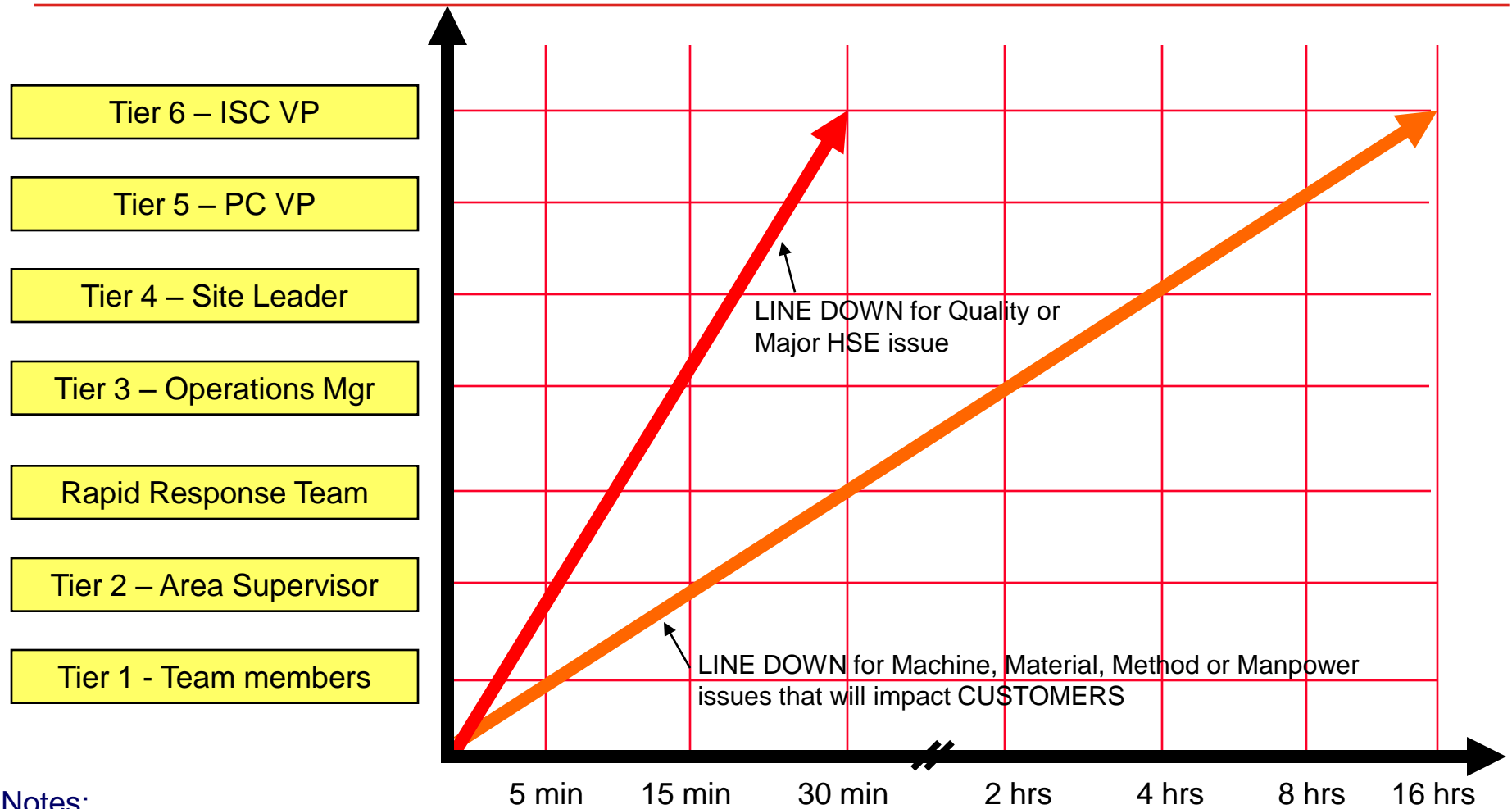


# Standard Work

- Defines expectation
- A standard way to review and communicate shop floor and functional metrics across the site.
- Set agenda
- Drives consistency
- Effectively communicate and drive results to meet company objectives.

#	DETAILED PROCEDURE	RESPONSIBLE	Appt. Time (min)	#	DETAILED PROCEDURE	RESPONSIBLE	Appt. Time (min)
1	<b>Fill out Attendance Sheet</b>	Functional Manager (s)	1	7	<b>Fluid Power Value Streams Escalations:</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Specific Value Stream Metric Trends.	Value Stream Leaders	2
2	<b>HSE &amp; F Escalations:</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Specific HSE&F Metric Trends.	H.S.E. Leader	2	8	<b>R&amp;O Value Streams Escalations:</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Specific Value Stream Metric Trends.	Value Stream Leaders	2
3	<b>Sourcing Escalations:</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Specific Sourcing Metric Trends	Sourcing Manager	2	9	<b>HOS :</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Specific HOS Metric Trends.	HOS Site Leader	2
4	<b>Materials:</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Specific Materials Metric Trends.	Materials Manager	2	10	<b>Human Resources:</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Specific Human Resource Metric Trends.	Human Resource Manager	2
5	<b>Quality:</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Specific Quality / Engineering Metric Trends.	Quality / Engineering Manager	2	11	<b>Op Ex Escalations:</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Site Specific Metric Trends.	Op Ex Leader	2
6	<b>Pneumatic Controls Value Streams Escalations:</b> Review the daily escalations from previous 24 hrs and if they were properly reported. Review Specific Value Stream Metric Trends.	Value Stream Leader	2	12	Review recognition board and invite the person to see when the Recognition letter is read and posted. Review daily Kaizen's Escalated to Tier 4 meeting.	ISC Director	2

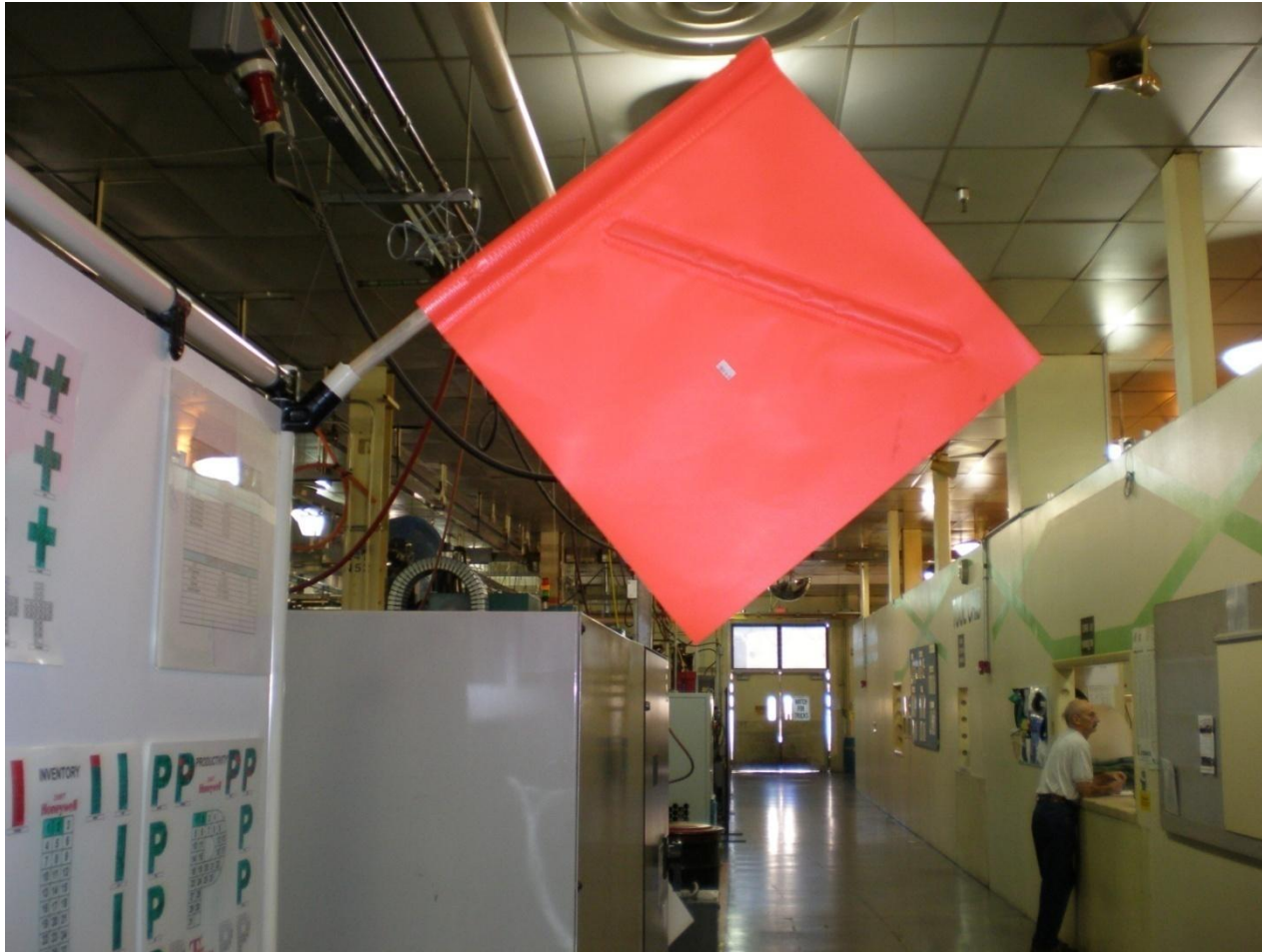
# AALS ESCALATION Response System







## Notes:

- 1) For Planned Line Downs, update Tier 5 during staff or SQP meeting
- 2) After the countermeasure is deployed, complete 5 Whys & RPS investigation to seek permanent fix
- 3) Share Learning at Tier meetings & post results on Tier Boards
- 4) Site Leader Notify issue to Functional Leader before escalation to Tier 5
- 5) Major HSE Issues include any type of Evacuation and Natural Disasters

# Location of flag on cell board



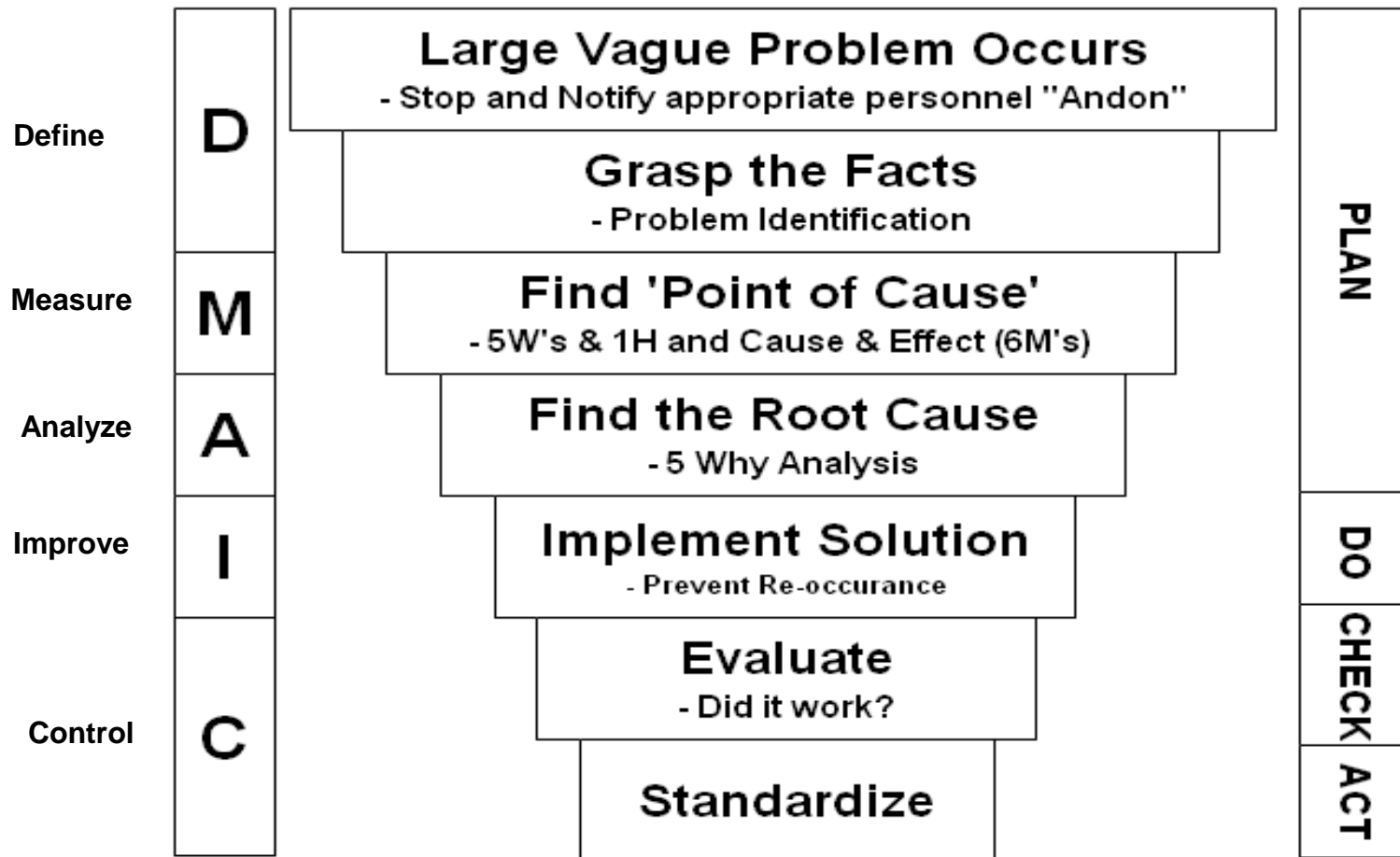
# Workstation Andon Visual Control Legend

<u>COLOR</u>	<u>DESCRIPTION</u>		<u>1<sup>st</sup> Level Response</u>
<b>RED</b>	Line Stop		Cell Lead Cell Manager
<b>YELLOW</b>	Material Issue (s)		Material Handler Cell Planner Cell Lead
<b>GREEN</b>	Normal Condition		None Required
<b>BLUE</b>	Technical Support Required (TST)		Manufacturing/ Quality/ Production Engineer Cell Lead Cell Manager

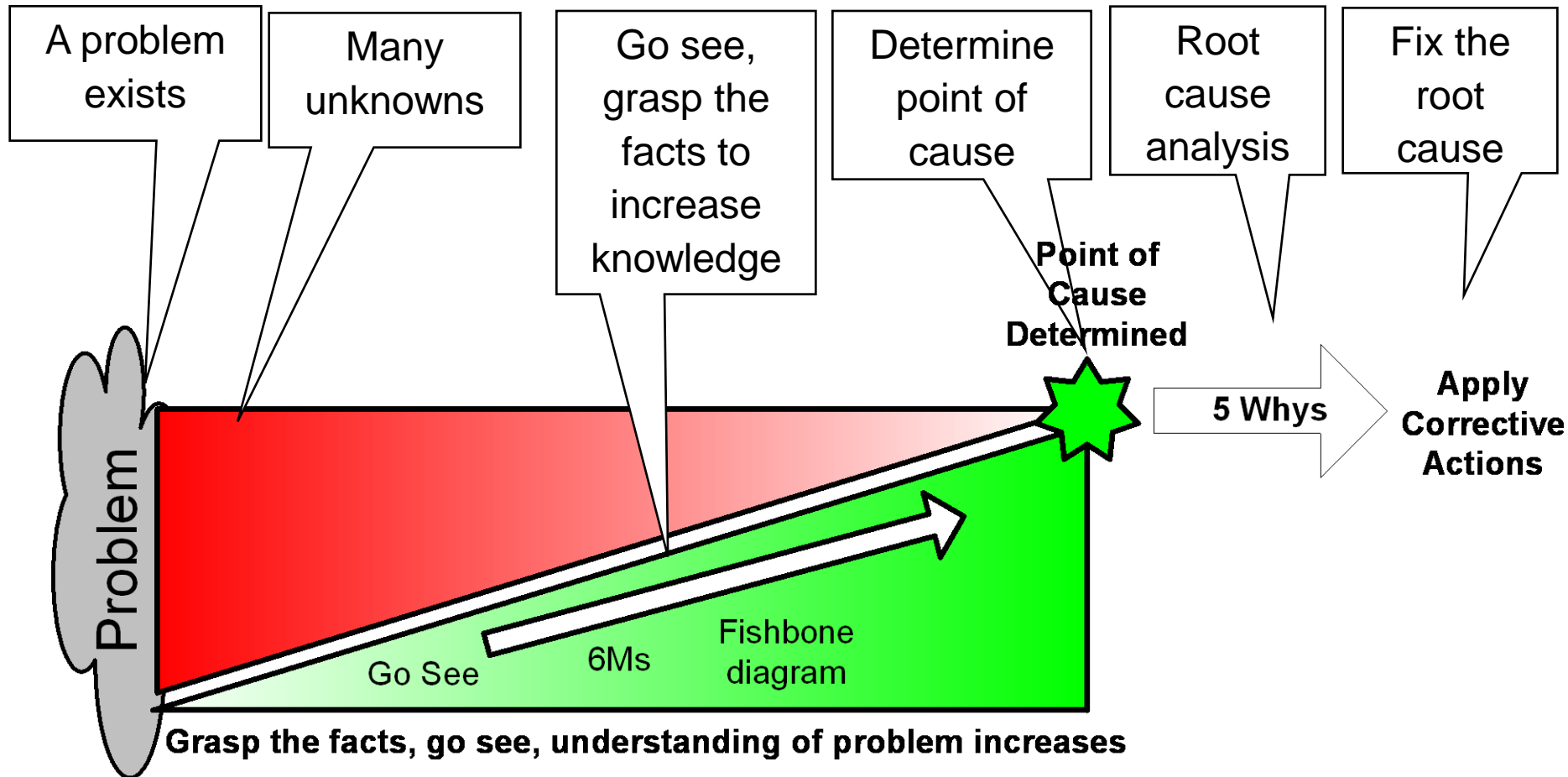
# Rapid Problem Solving/5 Why?

- **What is it? (7 steps)**
  - A standard, structured method for finding the source of a problem
- **Why do we use it?**
  - To identify the Root Cause of a problem so we can eliminate it
- **What is the Root Cause?**
  - It is the initiating cause for an outcome or effect that occurs during a sequence of events
- **How do we know if we identified the Root Cause?**
  - Ask yourself: Can I duplicate the problem 100% of the time?
  - If countermeasures are in place and the problem reoccurs then the Root Cause was not correctly identified

# Problem Solving Method



# Visual of Problem Solving Approach



- **Step 1 – Understand Current Situation**
- **Step 2 – Grasp the Facts**
- **Step 3 – Establish Point of Cause**
- **Step 4 – Find Root Cause & 5 Why Analysis**
- **Step 5 – Develop and Apply Corrective Actions**
- **Step 6 – Measure Corrective Actions**
- **Step 7 - Standardize**

# Step 1a: Describe the Current Situation

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- **Describe the current situation**
  - **Clarify details, determine severity, check consistency of information, specifics, what happened?**
  - **Validate there is an abnormal or out of standard condition**
  - **Learn all about the activity as much as possible**

# Step 1b – Understand the Current Situation **Honeywell**

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- **Use 6M analysis to better understand the problem:**
  - **Machine – machine warm-up, shutdown, settings, tooling**
  - **Material – age of material, dimensions, type**
  - **Method – standard work, work instructions, process steps**
  - **Man – human variation: person to person, shift to shift**
  - **Mother Nature – environmental factors, humidity, etc.**
  - **Measurement System – are we measuring it correctly?**

# 6M Analysis (Fishbone Diagram)

If applicable evaluate machine warm-up, shutdown, settings, maintenance, tooling, on/off, etc.

Understand standard work, work instructions, process, command media, planning

## • Machine

## • Material

## • Method

Evaluate material specifics, age, type metal, quality, dimensions, cost, where?

Liquid is always on the floor in the hallway?

Related to natural cause, weather, environment, noise, humidity, unknown or control of influence

## • Man

## • Mother Nature

## • Measurement

Factor of human variation, person to person, shift to shift, errors, experience

Realistic measurement, apples to apples, non-standard Inspection, certified scales, correctly measured?

# Step 2: Grasp the Facts

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- **Go where the problem was found and collect data**
  - Go and see
  - Ask 5W's, (Who, What, Where, When, Why) & 1H (How) questions.
- **Understand the process where the problem occurred**
  - What are the inputs and outputs of the process or situation?
  - Which inputs could have contributed to the problem?

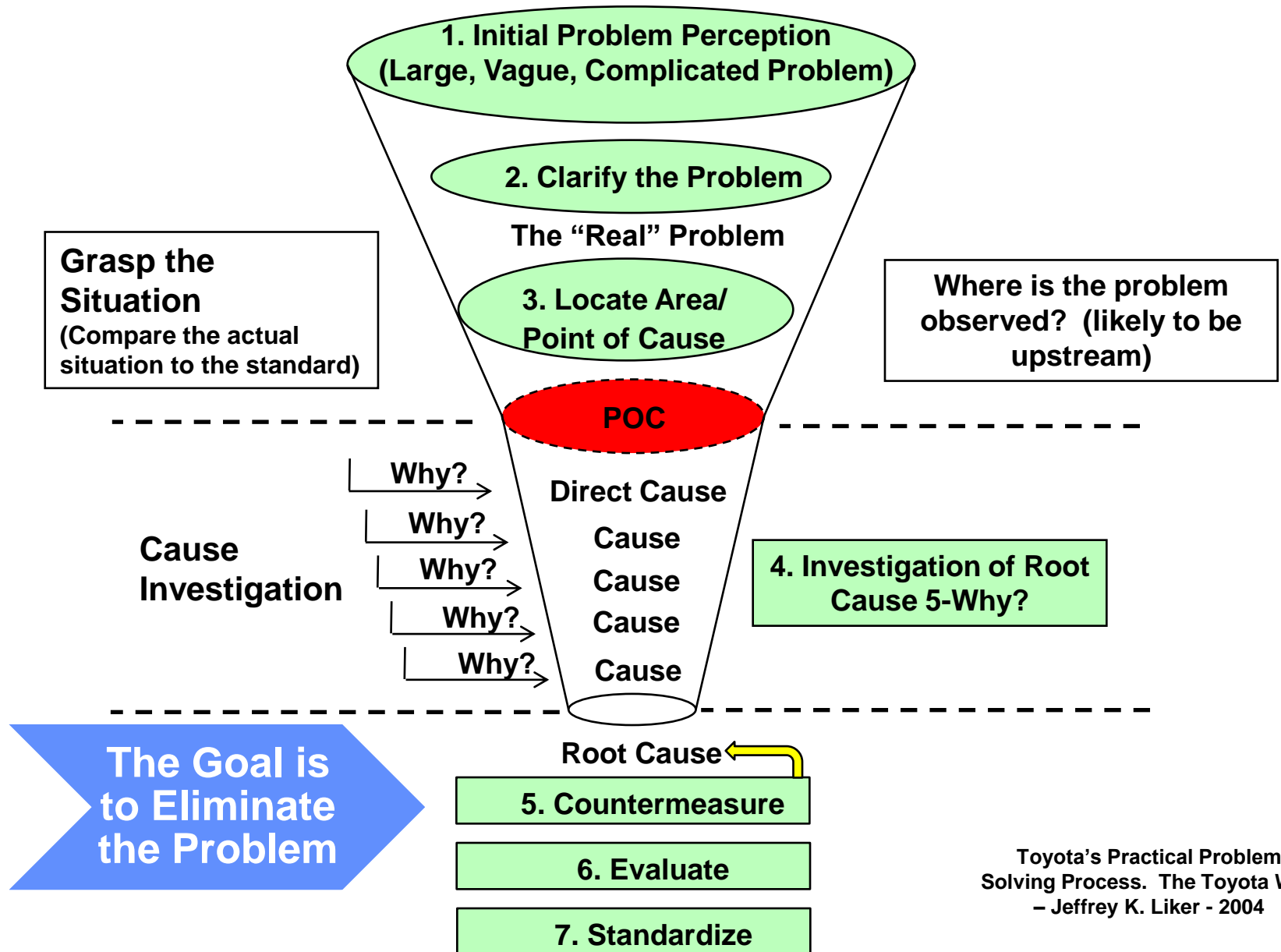


# Step 3: Establish Point of Cause

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- **Find the point of cause of a problem, THEN conduct root cause analysis**
  - Real problem exist based on facts
  - 6M analysis & 5Why
  - Understanding the process
  - Clarity of problem narrowed
  
- **Note - there could be more than one point of cause. If so, continue with the following steps on each point of cause.**

# Step 4: Find Root Cause – 5 Why Analysis Honeywell



# Factory Example

	Level of problem.	Related countermeasure.	
Why?	• <b>There is a puddle of oil on the shop floor.</b>	• Clean up the oil.	} Root Cause not solved
Why?	• Because the machine is leaking oil.	• Fix the machine.	
Why?	• Because the gasket has deteriorated.	• Replace the gasket.	
Why?	• Because we bought gaskets made of inferior material.	• Change the gasket specifications.	
Why?	• Because we got a good price on those gaskets.	• Change the purchasing policy.	
Why?	• Because the buyer is evaluated on short-term cost savings.	• <b>Change the evaluation process of the buyer.</b>	

Source: Jeffrey Liker, *The Toyota Way*, McGraw-Hill, 2004 Initial source: Peter Scholtes, *The Leader's Handbook*, McGraw-Hill, 1998.

# Step 5: Develop and Apply Corrective Actions

- Use problem solving form as a guide to the process

T

## 5 Why? - Root Cause Analysis Report

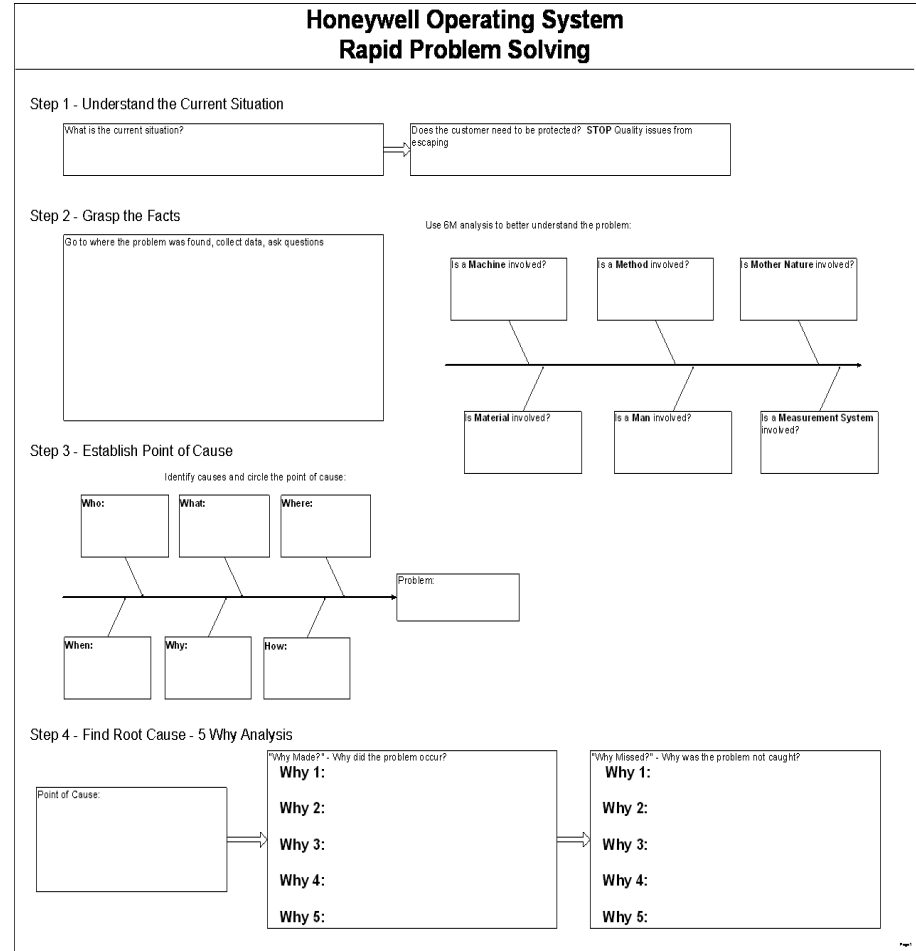
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Check Boxes that Apply:  SS/HSE  Delivery  Productivity  Quality  Inventory  Cost

Approvals: Cell Manager  VSL  Mfg Engr  Quality  HSE (as Req'd)

Root Cause Identified  RCCA Completed

Originator's Name	Report Date	Customer Affected?	Cell	<b>Root Cause Analysis and Corrective Actions - "Why Made?"</b> Why did the problem occur?
				Why?
				Why?
				Why?
				Why?
<b>Problem Description-Current Abnormal Condition</b>				<b>Root Cause Analysis and Corrective Actions - "Why Missed?"</b> Why was this problem not caught by normal system?
				Why?
				Why?
				Why?
				Why?
<b>Rapid Problem Solving Team Members</b>				<b>Corrective Actions</b>
				Person Responsible
				Due Date
				Completion Date
<b>Containment Action to protect the Customer</b>				<b>Evaluate Corrective Actions Follow-up</b>
				30 day
				60 day
				90 day
<b>Detailed Description of Problem (include details, photos, sketches)</b>				<b>Standardize</b>
(M's - Man, Machine, Material, Method, Mother Nature, Measurement System)				Yes/No?
				Follow-up Action
				Do we have a standard?
				Have we been trained to the standard?
<b>Point of Cause, Where / how did the problem occur?</b>				<b>Knowledge Sharing - Plan to share knowledge to other cells, sites</b>
(Who? What? Where? When? Why? How?)				Do we have a standard?
				Is the standard adequate?
For part/product quality issues: Suspect parts sorted Qty = <input type="text"/> Defects found Qty = <input type="text"/>				Did we follow the standard?



# Problem Solving Form



## 5 Why? - Root Cause Analysis Report



Check Boxes that Apply

<input type="checkbox"/>	5S/HSE	<input type="checkbox"/>	Delivery	<input type="checkbox"/>	Productivity
<input type="checkbox"/>	Quality	<input type="checkbox"/>	Inventory	<input type="checkbox"/>	Cost

<b>Approvals</b>	Cell Manager	VSL	Mfg Engr	Quality	HSE (as Req'd)
Root Cause Identified					
RCCA Completed					

Originator's Name	Report Date	Customer Affected?	Cell

**Problem Description/Current Abnormal Condition**

**Rapid Problem Solving Team Members**

Containment Action to protect the Customer	Date Completed

**Detailed Description of Problem (include details, photos, sketches)**  
 6M's - Man, Machine, Material, Method, Mother Nature, Measurement System

For part/product quality issues:

Suspect parts sorted		Defects found	
Qty =		Qty =	

**Point of Cause, Where / how did the problem occur?**  
 Who? What? Where? When? Why? How?

**Root Cause Analysis and Corrective Actions - "Why Made?"**  
**Why did the problem occur?**

Why?

Why?

Why?

Why?

**Root Cause Analysis and Corrective Actions - "Why Missed?"**  
**Why was this problem not caught by normal system?**

Why?

Why?

Why?

Why?

Why?

Corrective Actions	Person Responsible	Due Date	Completion Date

Evaluate Corrective Actions Follow-up	30 day	60 day	90 day

Standardize	Yes/No?	Follow-up Action
Do we have a standard?		
Have we been trained to the standard?		
Is the standard adequate?		
Did we follow the standard?		

**Knowledge Sharing - Plan to share knowledge to other cells, sites**

# Problem Solving Form

## Honeywell Operating System Rapid Problem Solving

### Step 1 - Understand the Current Situation

What is the current situation?

Does the customer need to be protected? **STOP** Quality issues from escaping

### Step 2 - Grasp the Facts

Go to where the problem was found, collect data, ask questions

Use 6M analysis to better understand the problem:

Is a **Machine** involved?

Is a **Method** involved?

Is **Mother Nature** involved?

Is **Material** involved?

Is a **Man** involved?

Is a **Measurement System** involved?

### Step 3 - Establish Point of Cause

Identify causes and circle the point of cause:

**Who:**

**What:**

**Where:**

Problem:

**When:**

**Why:**

**How:**

### Step 4 - Find Root Cause - 5 Why Analysis

Point of Cause:

"Why Made?" - Why did the problem occur?

- Why 1:**
- Why 2:**
- Why 3:**
- Why 4:**
- Why 5:**

"Why Missed?" - Why was the problem not caught?

- Why 1:**
- Why 2:**
- Why 3:**
- Why 4:**
- Why 5:**

# FMEA - Example

- FMEA (failure mode effects analysis) may be useful to determine what needs to be corrected and where the corrective actions should be applied

Process/Product Failure Modes and Effects Analysis (FMEA)																
Process or Product Name: Statapult Firing Process						Prepared by: Sir George			Page 1 of 1							
Responsible: I Captain Green						FMEA Date (Orig) Jan 5, 1280 (Rev) A										
Process Step/Item Function	Potential Failure Mode	Potential Failure Effects	SEV	Potential Causes	OCC	Current Controls	DET	RPN	Actions Recommended	Resp.	Actions Taken	PSEV	POCC	PDET	PRPN	
What is the process step/item function under investigation?	In what way could the process step/function potentially fail to meet process requirements or intent?	What is the impact on the Key Output Variables (Customer Requirements) or internal requirements?	How Severe is the effect to the customer?	What are the causes of this Failure Mode? Typical failure cause result from process inputs.	How often does cause or FM occur?	What are the existing controls and procedures (inspection and test) that prevent the cause or the Failure Mode? <b>Should include an SOP number.</b>	How well can you detect cause or FM?	What are the actions for reducing the occurrence of the Cause, or improving detection? <b>Should have actions only on high RPN's or easy fixes.</b>	Whose Responsible for the recommended action?	What are the completed actions taken with the recalculated RPN? <b>Be sure to include completion month/year</b>						
Identify output failures and impacts				Assess inputs			Prioritize		Determine actions and impact							

# Step 6: Evaluate Corrective Actions

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- **Document all that has happened**
- **Monitor output of process**
- **Ensure that corrective actions are implemented**
- **Monitor status of action items or actual work being performed. Once corrected, monitor output to ensure the operation is within the standard.**



# Step 7: Standardize

**Change process documentation to new and/or improve process if applicable:**

- Standardized work updates
- Include any safety instructions
- Provide training if necessary
- Communicate to other shifts if applicable
- Prevent re-occurrence

**Share the improved process as a best practice**

- Communicate to other departments
- Communicate to other sites
- Knowledge transfer
- Lessons learned

STAR WORKSHOPS  
MAP  
Handle Extensions for Metal Scrap Tubs – 1/29/09  
Honeywell



**Before** **After**

New metal scrap tubs, stationed throughout the site, are rolled back to MAS when they become full. The before picture shows how awkward it is to roll them even for a short distance. Kathy Strimple suggests handle extensions be attached, which are shown in the after picture. Rick Hillman, Machine Shop fabricated and installed 15 handle extensions.

**HSE Continuous Improvement**

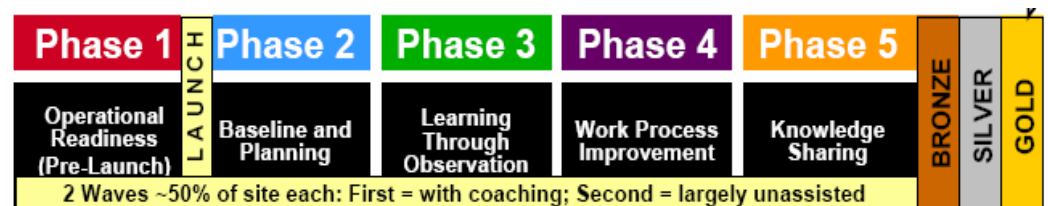
Honeywell Confidential HSEMS A209 - Communications

## Potential failure modes:

- Focusing on filling out a problem solving form rather than on solving a problem
- Jumping to conclusions without data, without going to see
- Not digging deep enough to find the point of cause
- Documenting 5 Why's just because it is called 5 Why
- Brainstorming to get 5 un-related answers to "why"? , not digging deep, just answering why 5 times
- Not allowing more than one root cause

# Rapid Solving Process - Conclusion

- **Identifying the Problem**: The first step in RPS is to identify an abnormal condition. **Good Visual Management** and **Standard Work** make it easy to identify the standard and out of standard conditions.
- **Containment and Escalation of the Problem**: The next step should be containment of the situation. If we are unable to resolve an issue that is impacting safety, quality and/or delivery we should **follow the site escalation timing and process** that is published on every cell board until resolution. Although the goal is to quickly address the problem, we need to drive to the root cause to prevent reoccurrence.
- **Understand the Problem and Establish the Point of Cause**: In order to fully understand the problem we should use the **“Go and See”** approach of going to where the problem occurred. There are numerous tools that can help identify the Point of Cause; including 6Ms, Fishbone diagrams, and 5 W’s & 1H (who, what, why, when, where and How ).



# Rapid Solving Process - Conclusion

- **Identify Root Cause (5 Why Made/5 Why Missed):** We **use repetitive questioning** to insure we get to the root cause of why the issue occurred and why we missed detecting the problem at each why. 5 Whys might not be enough. If eliminating the why does not prevent reoccurrence than you haven't found the true root cause.  
**“Anyone who’s recently talked to a 4 year old should be able to appreciate how you can often drive deeper than you thought”.**
- **Corrective Action:** RPS should **aim to permanently eliminate the reoccurrence of the root cause.** Corrective actions should be escalated as required and tracked on the action plan. Successes should also be celebrated shared across the tiers to promote learning and cross-pollination. Corrective Actions should be monitored to ensure sustainment and reoccurrences should trigger the reevaluation of the Root Cause and Corrective Actions.

