



Root Cause Analysis Tool (RCAT): An Old Tool with a Critical New Twist for Better Prevention AND Safety Culture

Cathy A. Hansell, SMS, CSM, CCSR, MS, JD

www.breakthroughresults.org; chansell@breakthroughresults.org

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RCAT: Old Tool with a New Twist

Agenda:

- Assumptions
- Root Cause Analysis Tool (RCAT)
 - Definitions
 - Process
 - Considering the “Influencers”: What People Know, See and Feel
 - Root Cause Chart
- Tips and Traps
- Practical Application



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Assumptions

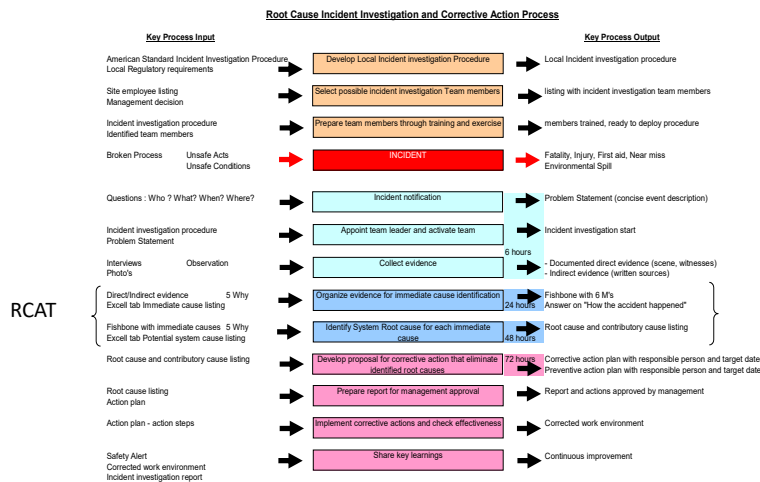
- An underlying root cause and other contributory causes
- People react to their current work design, people and systems
- First seek the underlying work, safety management system and cultural defects, not placing blame.
- A tool easy to use and effective for future prevention



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Incident Investigation Process Map



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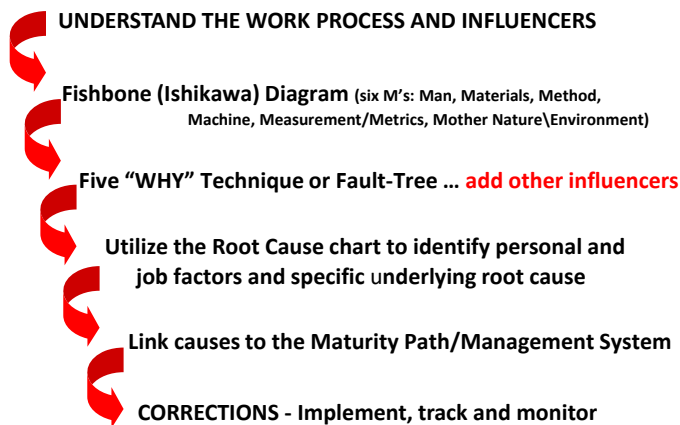
Definitions

- Problem – Obstacle to safety. The “effect” of an incident
- Root Cause – Basic, underlying reason for an undesirable condition or problem which, if eliminated or corrected, would have prevented the problem from existing or occurring. Systemic, process, long-term
- Causes:
 - Immediate – “seen” ; short-term
 - Contributory - worsens effect, severity and frequency of problem; short-term
- Solution - Permanent elimination of the problem and root cause.
- Implementation – Action plan: documentation; introduction; training, tracking and auditing.



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Process



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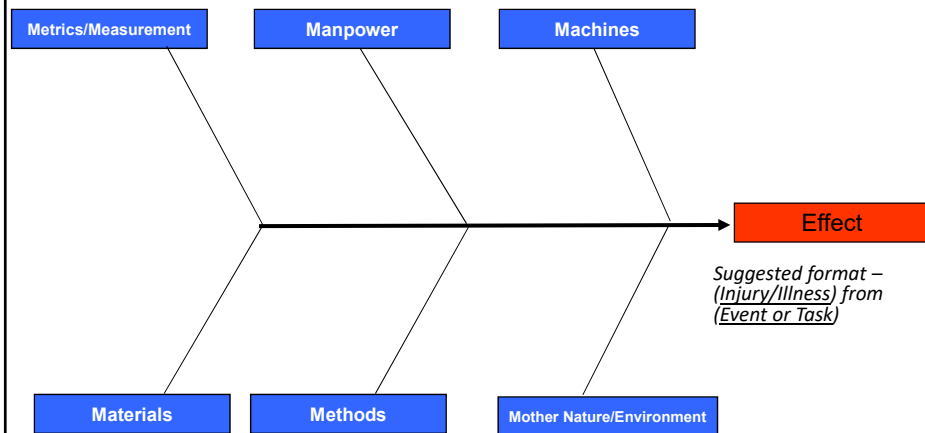
Process and Influencers

1. Work process steps, equipment, support processes
2. Working environment
3. Influencers
 - People Know
 - People See
 - People Feel
4. Personal Factors
 - Work history, physical condition



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The Fishbone Diagram:



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5 Why Example

1. Why did the shipment arrive late?
 - The driver did not get to work on time ← blame the driver
2. Why did the driver not get to work on time?
 - He over slept ← blame the driver
3. Why did he oversleep?
 - He was working too much overtime ← blame the driver
4. Why was he working too much overtime?
 - There weren't enough drivers available ← System problem
5. Why weren't there enough drivers available?
 - Because three drivers quit last week ← System problem



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"5 Why's" - TIPS AND STEPS

1. Use a fishbone chart to identify immediate causes. Consider these the 1st why of "5 whys"
2. Brainstorm possible causes from these first immediate causes. These will be the 2nd why of the "5 whys".
3. Select a target for deeper root cause evaluation: Look for reoccurring pattern of causes; or an issue, which if solved, would remove all others causes.
4. Brainstorm possible deeper causes...3rd, 4th and 5th whys
5. Selecting the root cause – by definition: Basic reason for an undesirable condition or problem which, if eliminated or corrected, would have prevented the problem from existing or occurring.

A good root cause is one where we can change or influence a process or system to remove the reason or influence for an unsafe act or condition...for good.



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“5th RCAT SELECTION ” - TIPS AND STEPS

Look at the:

- ✓ work process
- ✓ work systems
- ✓ the influencers...what people know, see and feel as possible root cause, and contributing causes

- ✓ RCAT: Personal or Job factor
- ✓ Check Chart for specific cause



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ROOT CAUSE CHART

KEY: Personal or Job Factor	Personal Factors										Job Factors																
	1. Personal Health	2. Personal Attitude	3. Personal Knowledge	4. Personal Skills	5. Personal Experience	6. Personal Resources	7. Personal Motivation	8. Personal Ability	9. Personal Capacity	10. Personal Control	11. Personal Responsibility	12. Personal Accountability	13. Personal Authority	14. Personal Influence	15. Personal Power	16. Personal Knowledge	17. Personal Skills	18. Personal Experience	19. Personal Resources	20. Personal Motivation	21. Personal Ability	22. Personal Capacity	23. Personal Control	24. Personal Responsibility	25. Personal Accountability	26. Personal Authority	27. Personal Influence
Personal Health	Personal Attitude	Personal Knowledge	Personal Skills	Personal Experience	Personal Resources	Personal Motivation	Personal Ability	Personal Capacity	Personal Control	Personal Responsibility	Personal Accountability	Personal Authority	Personal Influence	Personal Power	Personal Knowledge	Personal Skills	Personal Experience	Personal Resources	Personal Motivation	Personal Ability	Personal Capacity	Personal Control	Personal Responsibility	Personal Accountability	Personal Authority	Personal Influence	Personal Power


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Root Cause Analysis Tool – Chart (partial detail view)

KEY:	Maturity Path	8. Management / Employee Leadership	9. Contractor Selection and Oversight	10. Engineering Design	11. Work Planning
		Leadership and Management Commitment (A)	8.01 (A) Conflicting roles/responsibilities	9.01 (C) Lack of contractor pre-qualifications	10.01 (C) Inadequate technical design
Associate Involvement (B)	8.02 (A) Inadequate leadership	9.02 (C) Inadequate contractor pre-qualification	10.01.01 (C) Inadequate technical design: design input obsolete	11.02 (E) Inadequate Preventive maintenance	
S&H Business Integration (C)	8.03 (E) Inadequate correction of worksite/job hazards	9.03 (C) Inadequate contractor selection	10.01.02 (C) Inadequate technical design: design input not correct	11.02.01 (D) Inadequate Preventive maintenance: assessment of needs	
S&H Risk Identification and Exposure Assessment (D)	8.04 (D) Inadequate identification of worksite/job hazards	9.04 (A) Use of non-approved contractor	10.01.03 (C) Inadequate technical design: design input not available	11.02.02 (E) Inadequate Preventive maintenance: lubrication/servicing	
S&H Risk Reduction and Management (E)	8.05 (C) Inadequate management of change system	9.05 (D) Lack of job oversight	10.01.04 (C) Inadequate technical design: design input infeasible	11.02.03 (E) Inadequate Preventive maintenance: adjustment/assembly	
S&H Procedures (F)	8.06 (E) Inadequate incident reporting/investigation system	9.06 (D) Inadequate oversight	10.01.05 (C) Inadequate technical design: design output inadequate	11.02.04 (E) Inadequate Preventive maintenance: cleaning/resurfacing	
S&H Training (G)	8.07 (A) Inadequate or lack of safety meetings		10.01.06 (C) Inadequate technical design: design output unclear	11.03 (E) Inadequate repair maintenance	
S&H Resources (H)	8.08 (C) Inadequate performance measurement and assessment		10.01.07 (C) Inadequate technical design: design output not correct	11.03.01 (E) Inadequate repair maintenance: communication of needed repair	
S&H Metrics and Data Analysis (I)					

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Sample Portion of a Maturity Path

Target Areas	1-BEGINNING	2- MEETING MINIMUM STANDARD	4- SUCCEEDING	5-LEADING
ESSH Integration into all ISC Processes (ops, engineering, maintenance, procurement, etc...)	<ul style="list-style-type: none"> Safety impacts are considered in the management of change process, but not on a routine basis and not always early enough in the process. Safety issues are not incorporated at all or timely enough into other ISC operational, planning, or decision processes. Operational work practices and procedures are documented for all significant work done on the site. 	<ul style="list-style-type: none"> MOC process, including noting and addressing safety impacts, is understood and documented in all regulated change management events Other ISC processes and Commercial decisions incorporate ESSH issues timely in the process Most operational work practices and procedures include a description of the safety hazards, and precautions of doing the prescribed work. 	<ul style="list-style-type: none"> The MOC process, including noting and addressing safety impacts, is common at all sites with identical terminology. A safety review is documented for all projects & major maintenance events (overhauls, turnarounds) Commercial planning (new product development, etc...) includes a documented safety review early in the decision-making process. All ISC and Commercial processes facilitate safety risk reduction strategies in all decisions made. Operational work practices and procedures are periodically reviewed for changes from actual practice, procedures are updated as needed, and "gap" training is completed to ensure all employees know the best, current procedures, safety risks and safeguards. . 	<ul style="list-style-type: none"> MOC process best practices are shared across all sites. Leadership ensures that safety considerations are properly integrated into all business processes, tools and decisions. Leadership ensures that environmental, security and health (ESH) considerations are also properly integrated into all business processes, tools and decisions. Safety and ESH are considered a strategic component of business and workforce planning. Business processes effectively work together to reduce risks and exposure to hazards and make sound safety and ESH decisions, as early as possible. A process is in place to benchmark operational work practices and procedures with all five plants and with best in class companies from safety and ESH perspectives.

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“Corrective Action” - TIPS AND STEPS

- ✓ Corrective action-refer to maturity path or management system
 - Short term corrections for immediate causes
 - Long term preventative corrections for root cause

Good corrective actions will change a process or accepted way of working or behaving.

- ✓ Track, monitor, audit
- ✓ Continue the improvement process
 - Select immediate causes and contributing factors to solve other immediate problems: short-term solutions.



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Now what?... Think pro-actively

- Uses of RCAT
 - Accident
 - Incidents
 - Risk Analysis—hazards and exposures
 - Current Safety Programs

RCAT is a structured way to analyze...

- why did this happen ? or better...
- why do we do things this way now ? Can it be changed to be safer?



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Tips

Preparation :

1. Maturity path or management system
2. Education...bust old myths
3. Templates...make it easy
4. Review and monitor the process
5. Track closure of corrective actions
6. Track effectiveness of corrective actions



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Tips

Usually a Culture-Business integration root cause ...

1. Unplanned events or tasks
2. Not do a pre-job or pre-task review
3. Insufficient manning, equipment, time,
4. Job design with inherent hazards or risks not removed or not mitigated
5. Routine job turns non-routine and no MOC done
6. Unit or plant does not see the risk---work is routine, usual way...this leads to no procedures, no training, no enforced pre-job reviews, undefined ppe, different ways to do the job

Cultural Leadership

1. Unsafe acts condoned
2. Unsafe tools, equipment and processes condoned



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Tips

Motivations...strong influences, as contributing factors, but are usually not root causes:

1. Not ask for help
2. Rushed
3. New-reluctant to ask for help
4. Seasoned vet-complacent with long-standing work tasks and inherent risks; established work-arounds
5. Unsafe Peers actions or coaching
6. Unsafe Supervisor actions



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Traps

1. Not digging deep enough...stopping too soon
2. Blaming the injured person, instead of examining work done and contributing factors
3. Focusing on immediate causes, like ppe or training
4. Consider the influencers (contributing factors)
 - Usually not the root cause
 - Must be addressed—they increase probability, frequency and worsen effects
5. Leadership Skills need improvement to engage and coach others
6. Technical Skills needed to reduce hazards or risks of exposures
7. Needed people are not involved



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Case Study



Machine was recently moved from one building to another

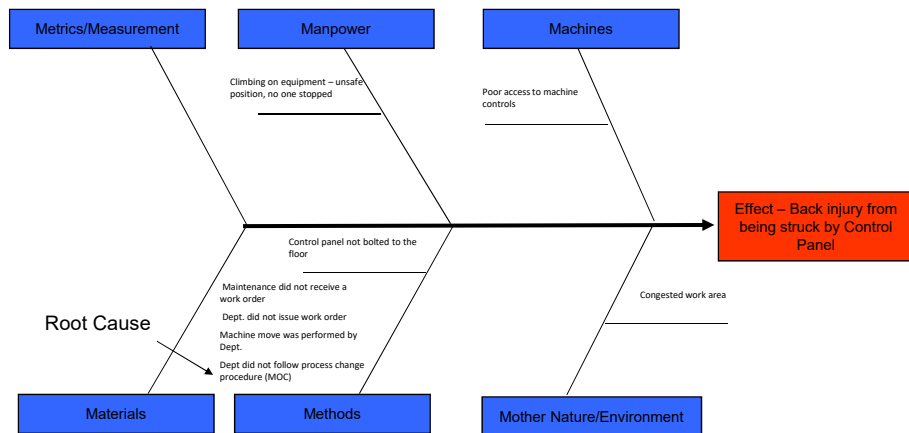
On completion of her work, the employee intended to shut down the machine. For this purpose she climbed on the rear side of the system. In the process she placed her foot on a bundle of cables that was fastened to the middle of the control cabinet. After a short moment, the control cabinet tilted toward the system's access staircase and hit the employee in the back.

Now define the "Effect"



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Referring to the RCAT - Chart.....



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Use the selected root cause to identify the “System” cause:

1. Target the possible underlying cause for further analysis.
2. Refer to the Root Cause Analysis Tool (RCAT) Chart
 - Is the identified root cause a personal or job factor?
 - Look across the Root Cause Chart Columns for the one that best describes the possible root cause.
 - Look down the column for the best description of the underlying root cause... a system issue.
 - Link to a maturity path/management system



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Root Cause Analysis Tool (RCAT) - Chart, How does that work?

Under “Job Factors” categories:

7. Training / Knowledge transfer
8. Management/Employee Leadership
9. Contractor selection and oversight
10. Engineering design
11. Work planning
12. Purchasing, Material handling and Control
13. Tools and equipment (ergonomics)
14. Procedures, policies, rules,
15. Communication

8.05 Management of Change (C)



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Job Factor: 8. Management/Employee Leadership

- Under “Management/Employee Leadership” we find:
 - “Inadequate Management of Change System (C)”
 - 1. This is linked by color code and letter (C) to the Maturity Path/Management System element – S&H Business Integration.
 - 2. We’ve now linked the root cause to the Maturity Path element that needs improvement to prevent this root cause from negatively influencing the original process.
 - 3. Further analysis of the affected Maturity Path/Management System element must occur to identify systemic corrective action(s).



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Sample Data Analysis

Injury Root Causes - All Employees 2017



NOTE: ESSH Integration (56%) combines ESSH included in work tasks and design, AND work support, like planning, pre-job reviews, scheduling and manning



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