

# Fundamentals of Root Cause Analysis

Fred Schenkelberg



A high-angle photograph of a young woman with brown hair, wearing a black long-sleeved shirt and a dark floral dress, crouching on a dark asphalt surface. She has a distressed expression, with her mouth open as if crying or shouting. Her hands are clasped together in her lap. In the lower right foreground, there is a white liquid spill, likely from a cup, with a brown paper cup rim visible in the center of the spill. The text "When something fails..." is overlaid in yellow on the right side of the image.

When  
something  
fails...





We need to  
understand...

...to do the fix once.





What counts as a  
failure?

# RCA Challenges



Fix it now pressure



Lack of equipment



Jumping to a solution



# Fix it now pressure



What is taking so long?

Failures happen

When they happen

Stops production

Interrupts service

Delays the start



**What can you  
do to  
minimize the  
'fix it now'  
pressure?**



# Lack of FA equipment



Scopes  
IR camera

SEM  
C-SAM

SQUID  
...etc

If only we could see what  
we need to see

Do you really  
need a lab  
full of capital  
equipment?





# Jumping to 'the' solution



We don't have time to find the best solution.

There is always someone that 'knows'  
Combined with time pressure...

**What should  
you do when  
someone  
jumps to a  
solution?**





What other challenges  
do you encounter?

# Structure Approaches to RCA



Hypothesis



Fault Tree Analysis



8 Disciplines



# Create & Test Hypothesis



Asking the right question  
is half the battle

A blend of theory and testing

Challenge assumptions

Get the data

# Fault Tree Analysis Approach



Best done prior to any  
actual failures

Start with top level failure mode  
– won't power up

What could cause this failure mode?

What could cause, contribute, etc?



# 8D Problem Solving Approach



Now with 9 steps

Detailed team-based problem solving

Find root cause of the problem

Implement containment actions

Execute corrective action

**D0: Prepare  
and Plan**

**Symptoms  
Emergency?**





# D1: Form a Team

Core Team  
SME Team  
Ground Rules





# D2: Describe the Problem

is/is not  
5 whys  
affinity diagram  
fishbone diagram





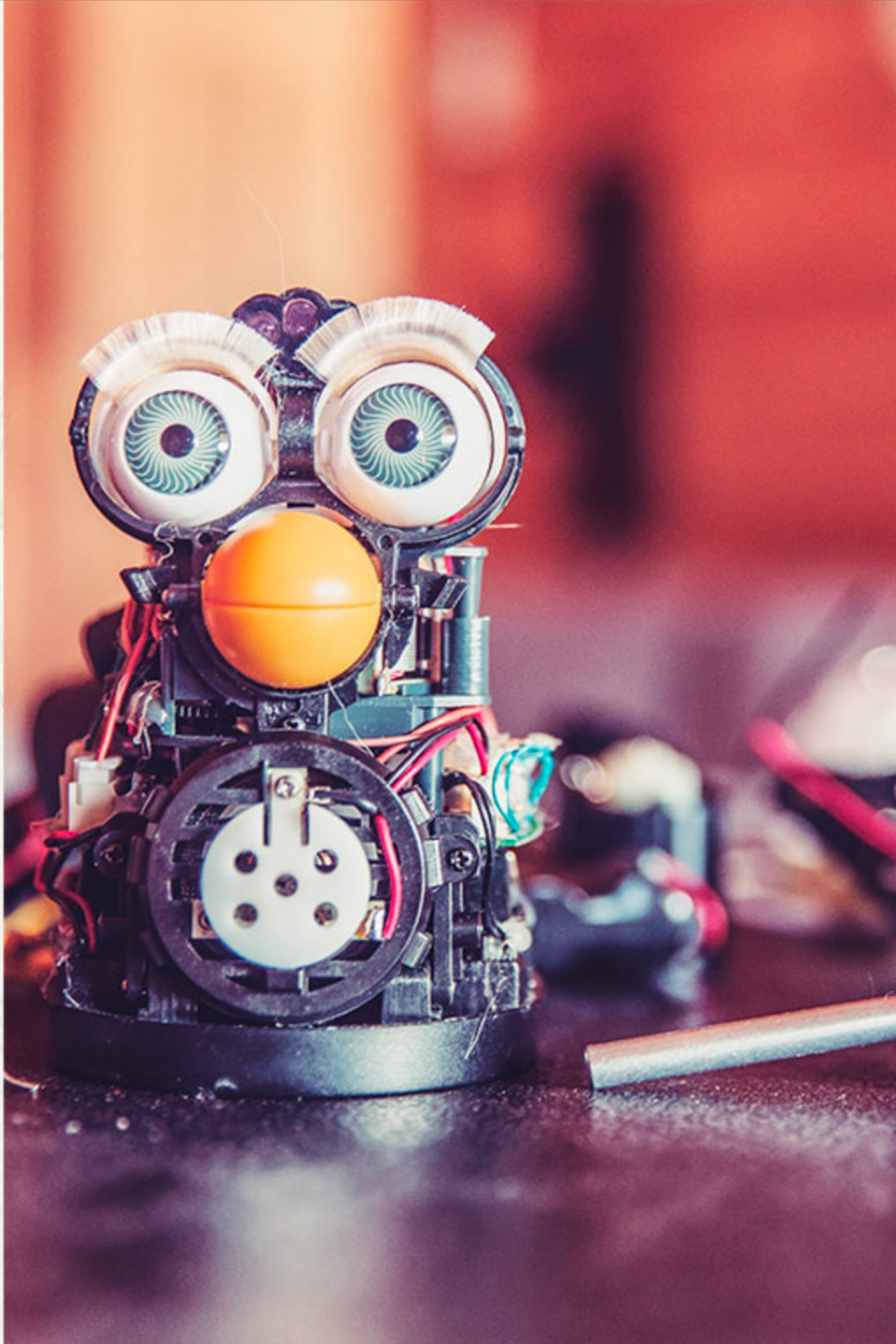
# D3: Interim Containment Action

the quick fix  
verify it works



# D4: Root Cause Analysis

turn on/off  
failure at will





# D5: Permanent Correction Action

acceptance  
criteria  
FMEA  
verify





**D6:  
Implment &  
Validate  
Permanant  
Corrective  
Action**





# D7: Prevent Recurrence

lesson learned  
improve processes  
control plans





# D8: Closure & Team Celebration





Does your  
organization  
celebrate failures?

# In Summary

## RCA Challenges

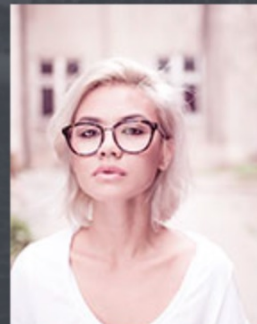
### 8D Approach



### Hypothesis Approach



### FTA Approach





# More Information

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