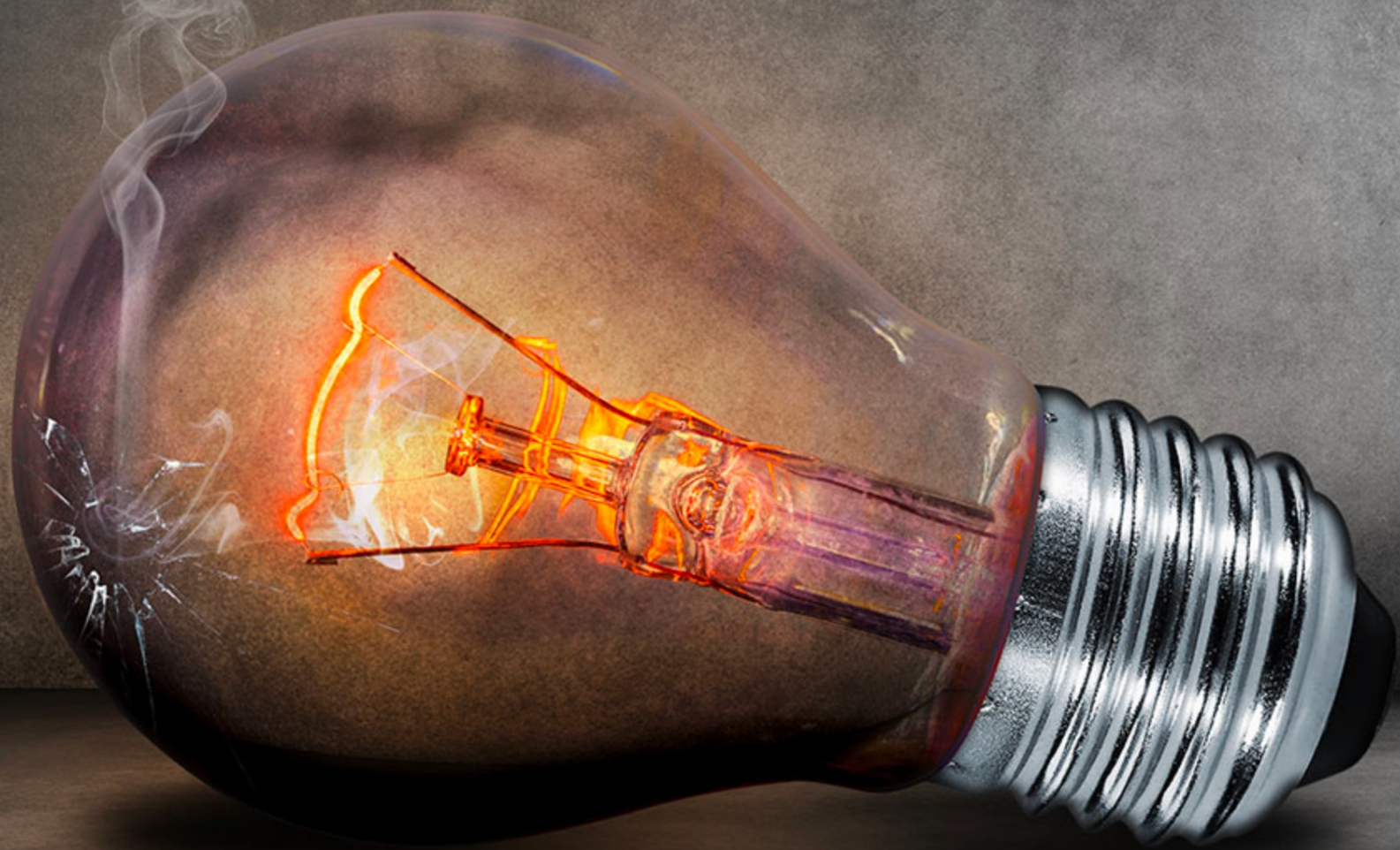




# Fundamentals of FRACAS

Fred Schenkelberg

Failure Happens





Lot's of Failures





You need a  
way to deal  
with them.

Who deals with  
failures?

# Fundamentals of FRACAS



FRACAS



Basic Process



Ways to get it Wrong



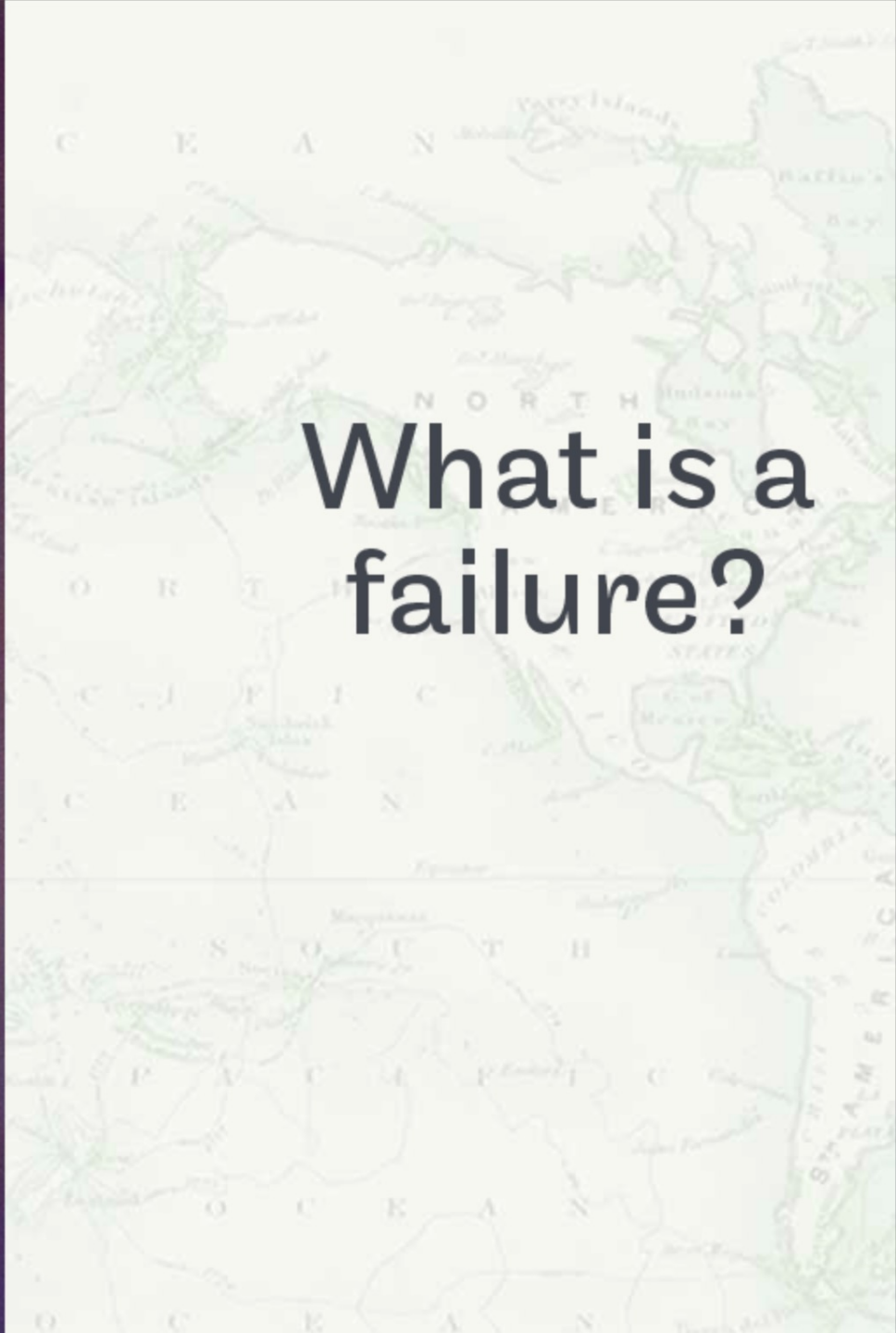
# FRACAS



Staying organized and  
solving the right problems

Failure Reporting, Analysis, and  
Corrective Action System

An effective, closed-loop system to  
identify, prioritize, and resolve  
problems quickly in engineering,  
manufacturing (including supply  
chain), and in the field.

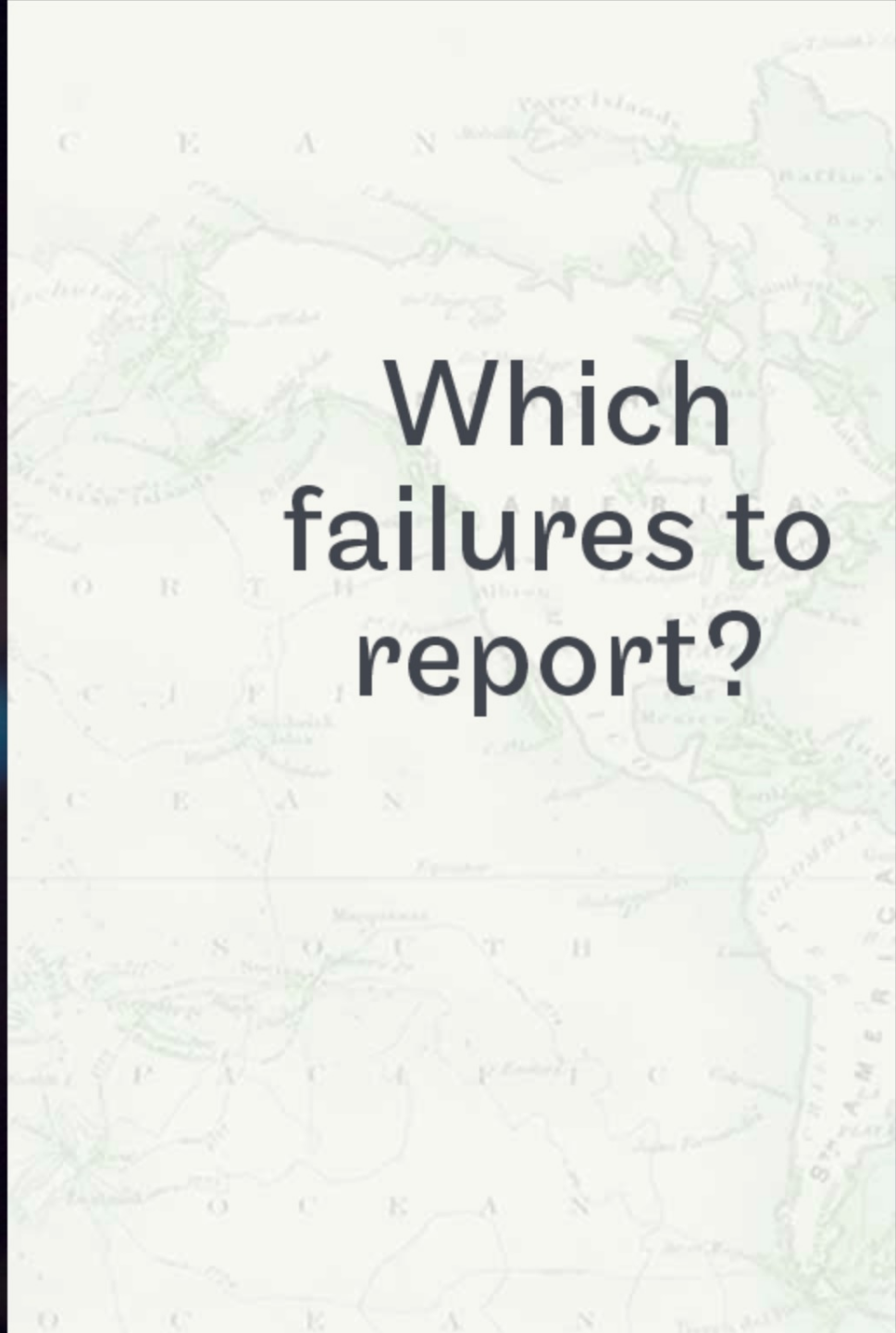


**What is a  
failure?**





**Which  
failures to  
report?**

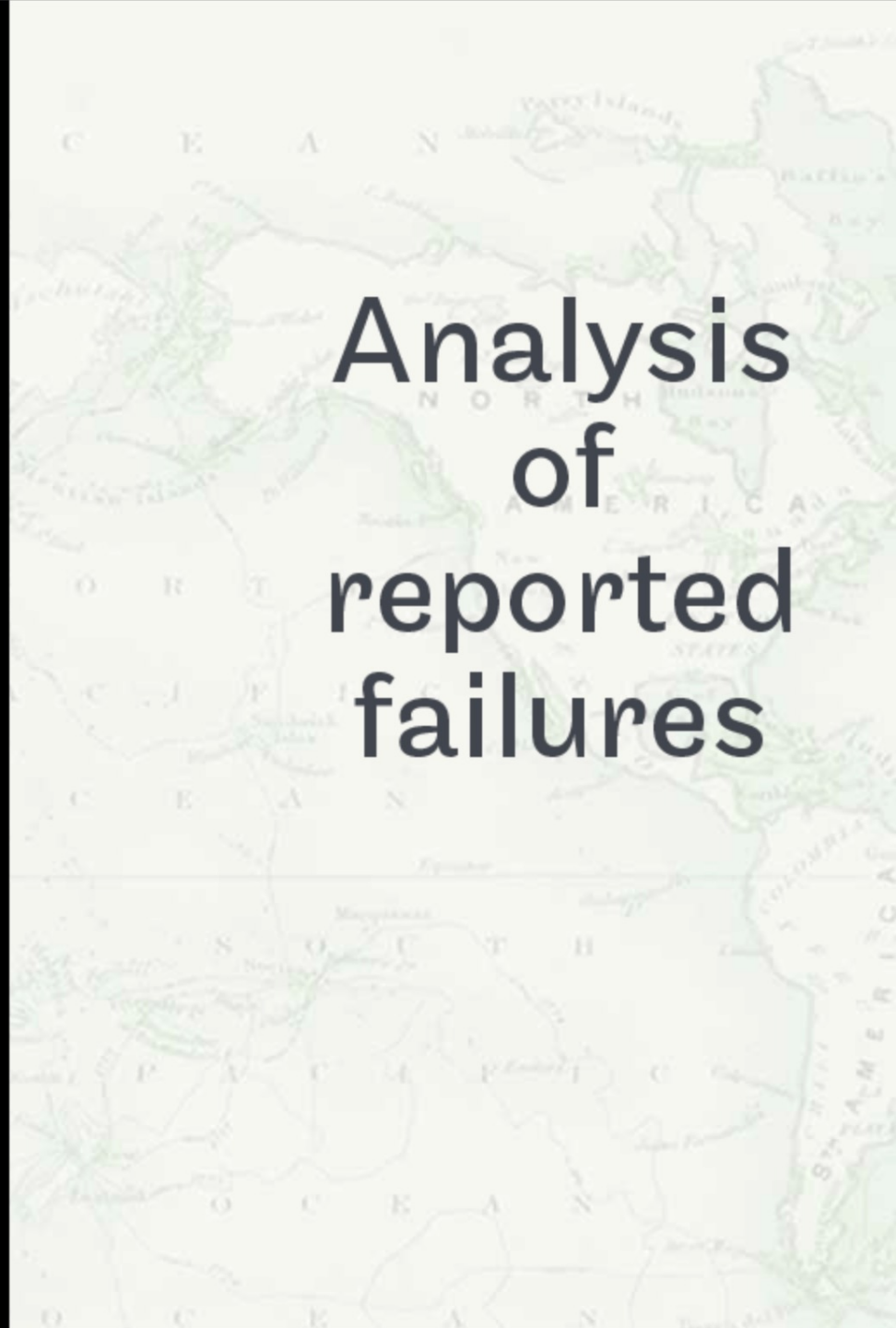




**Report to  
whom and  
how?**



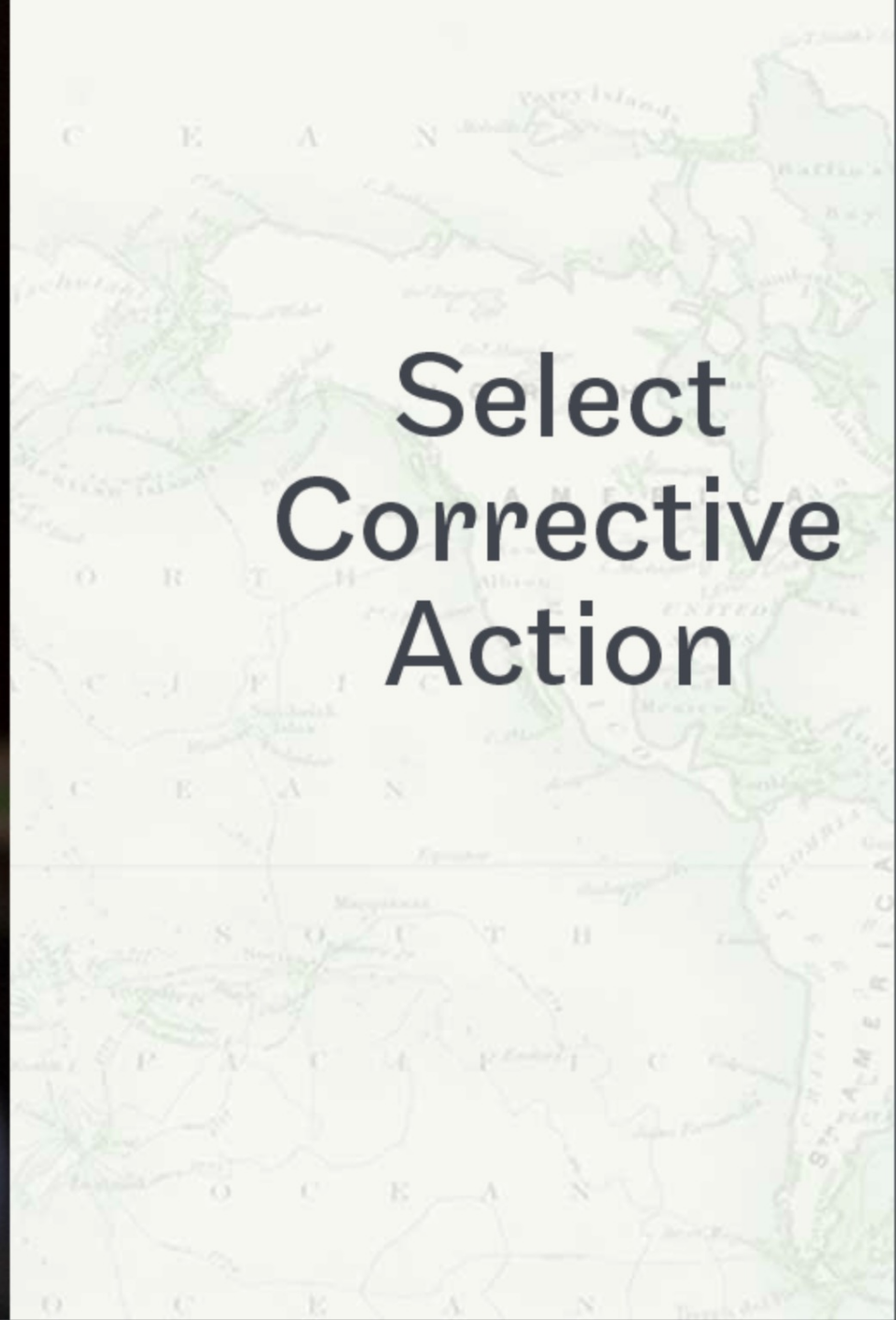
# Analysis of reported failures





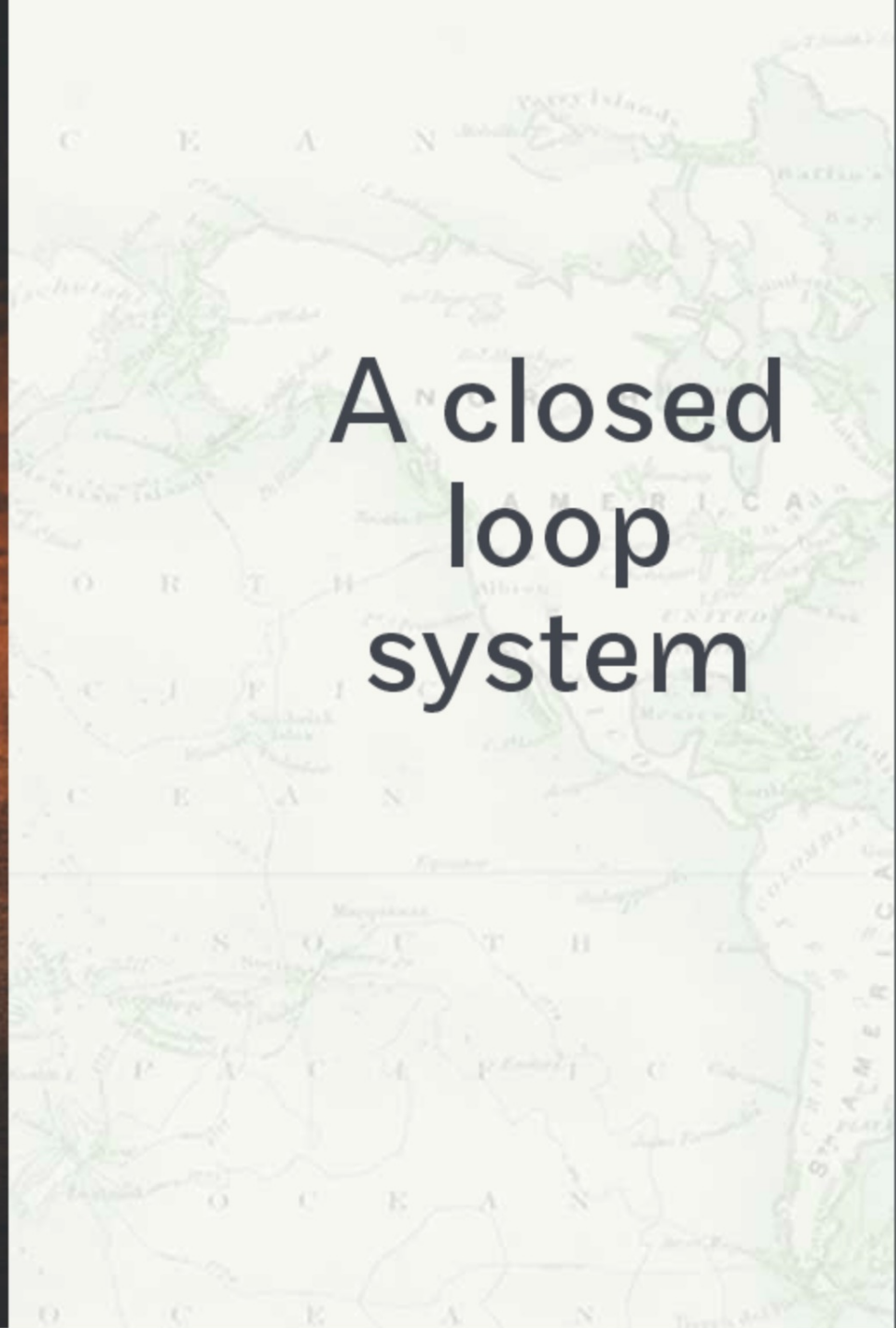


# Select Corrective Action





**A closed  
loop  
system**



How do you set the  
threshold?



# Basic FRACAS Process



Flexible and consistent  
system

Failures occur

Reporting and prioritization

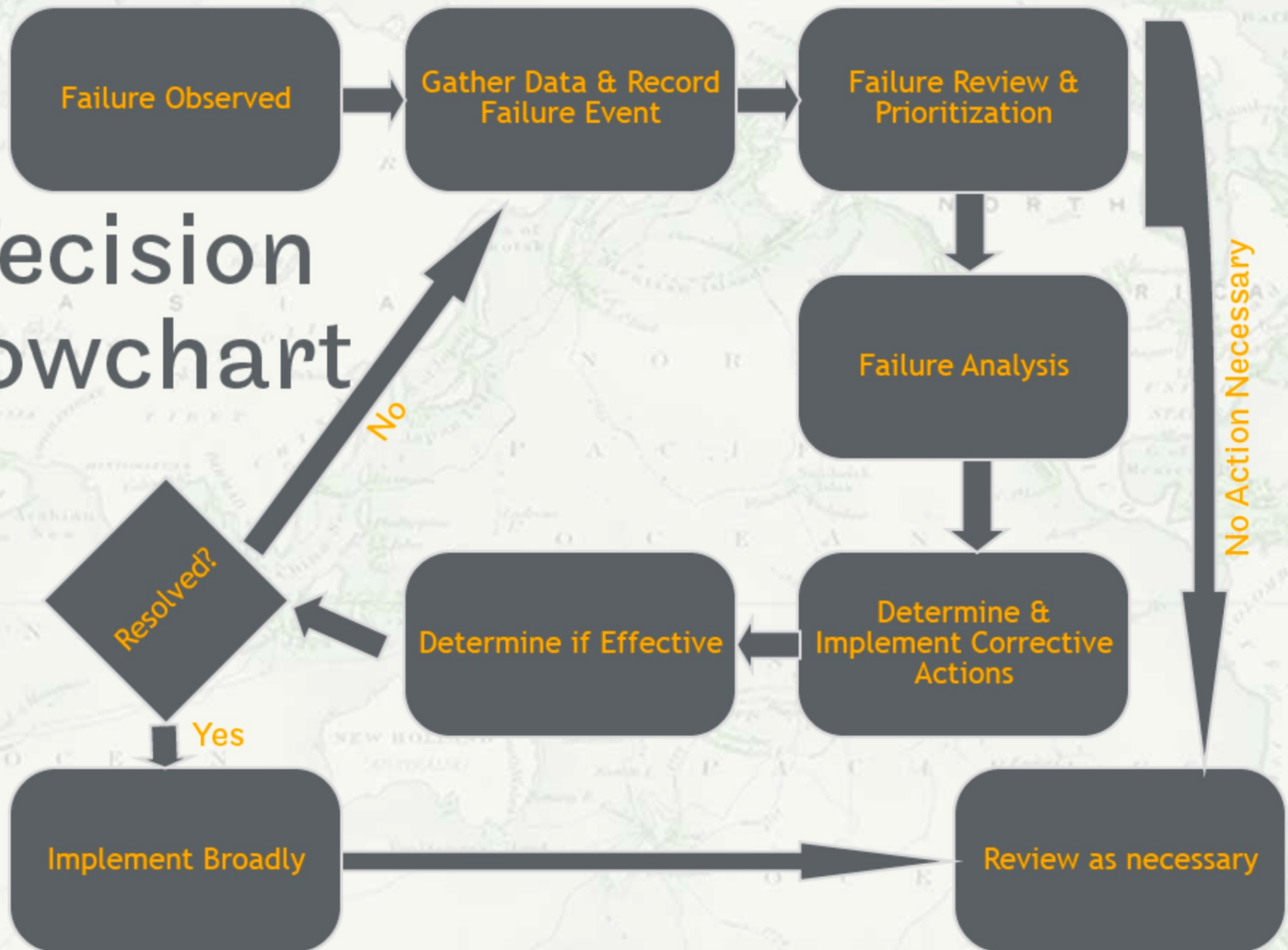
Initiate root cause analysis

Determine and implement corrective  
actions

Check if actions are effective

Implement broadly

# Decision Flowchart



# Triage of Reported Failures

Failure Observed

Safety Risk?

Yes

Make Safe

No

Field Failure?

No

Nonrelevant Failure

Yes

System Down?

Yes

Critical Failure

No

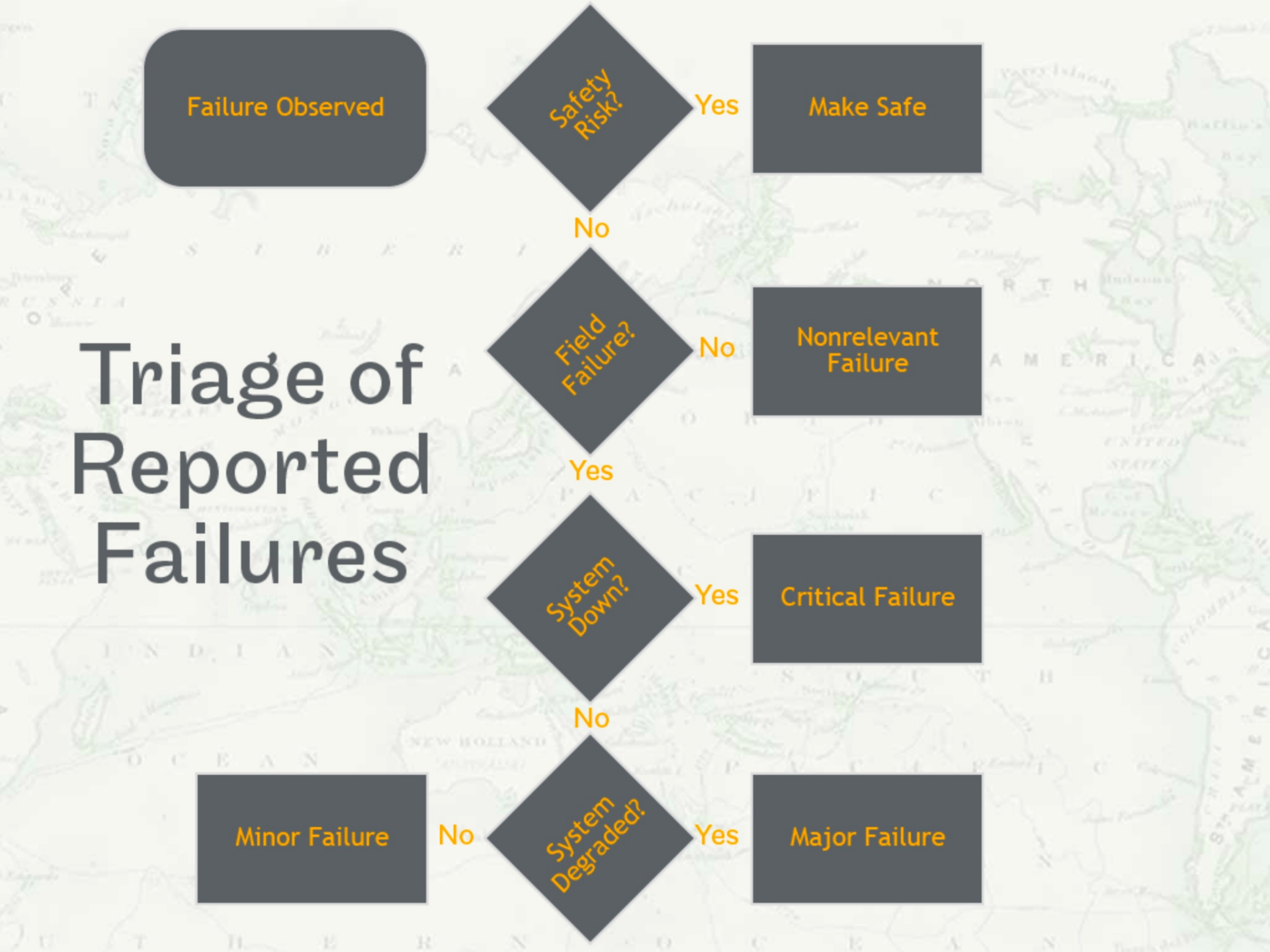
System Degraded?

Yes

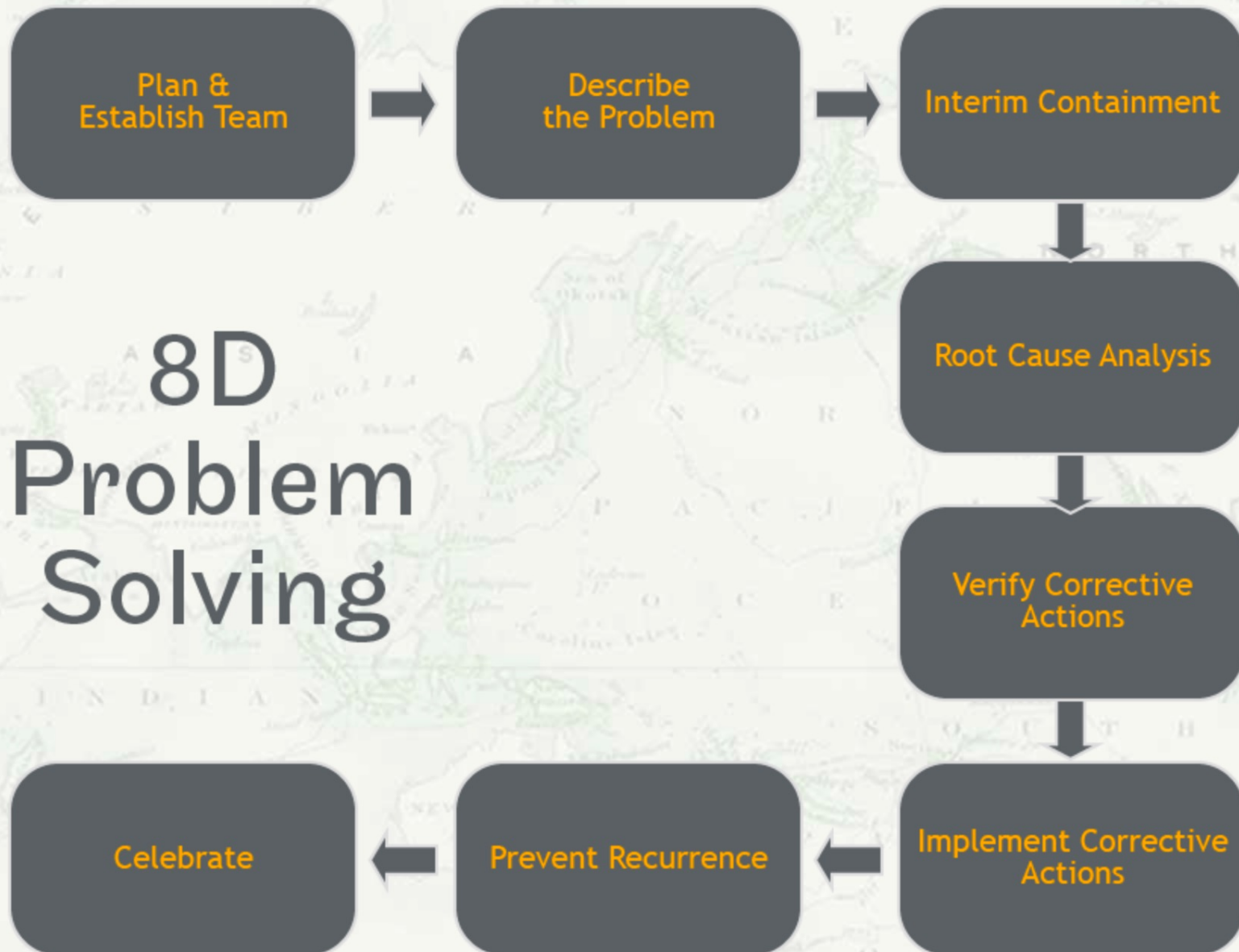
Major Failure

Minor Failure

No







# 8D Problem Solving

How do you deal with  
intermittent failures?

# Ways to get it Wrong



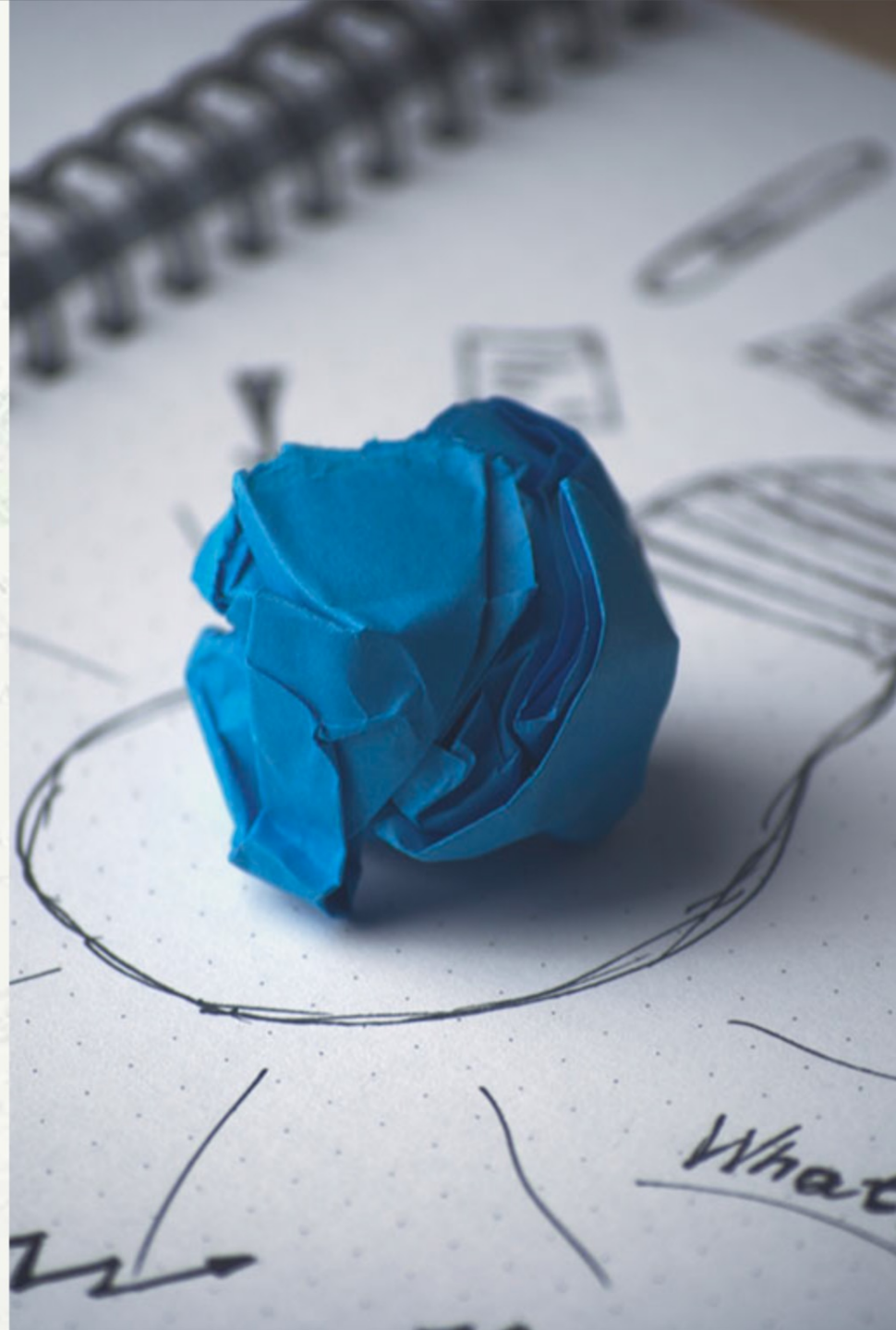
The objective is to understand and prevent failures - thus improving the product.

What could wrong?

Think though your system,  
adjust as necessary



**Make the  
system  
annoying or  
adversarial**





# Incentives for activity count







**Use multiple  
systems**





How else could a  
FRACAS go bad?

# Connections to Reliability



Failures have information



We Understand Failures



We can project impact of a failure

# Failures have Information



Connect symptoms to  
causes to solutions

There is gold in those failures.

What is the estimated field failure rate  
if 1 of 10 prototypes fail?



# We Understand Failures



Characterize the failures  
to inform the decision

Work from an understanding  
of failure mechanisms

Maybe use elements from  
FMEA and FTA

Ask the right questions and  
sort out ways to answer them

# Project Failure Impact



Not all failures are the same

Understanding the failure mechanism

Understanding the use environment

Estimate the risk of failure during use

Articulate the consequence of failure

How well is your  
FRACAS working?



# Every failure has golden information

The default is to report all failures



Sort, prioritize, determine root cause and find solutions



Implement and check, check, check if the solution works.

# More Information

Visit [AccendoReliability.com](https://AccendoReliability.com)

Let me know if you have any questions.

Check out the reliability engineering podcast network at [Reliability.FM](https://Reliability.FM)

Continue to explore your testing and make improvements.