



Essential Reliability Engineering Concepts

Fred Schenkelberg

The image features a large, spherical celestial body, possibly a planet or a star, with a dark, textured surface. It is surrounded by a turbulent, swirling atmosphere of orange and yellow flames or plasma. Numerous bright, glowing points of light are scattered across the surface, resembling stars or active regions. A prominent, bright blue and white vortex or energy source is visible in the lower right quadrant. The overall scene conveys a sense of intense heat, chaos, and cosmic destruction.

Everything Fails

Avoid and Delay





Understanding & Value

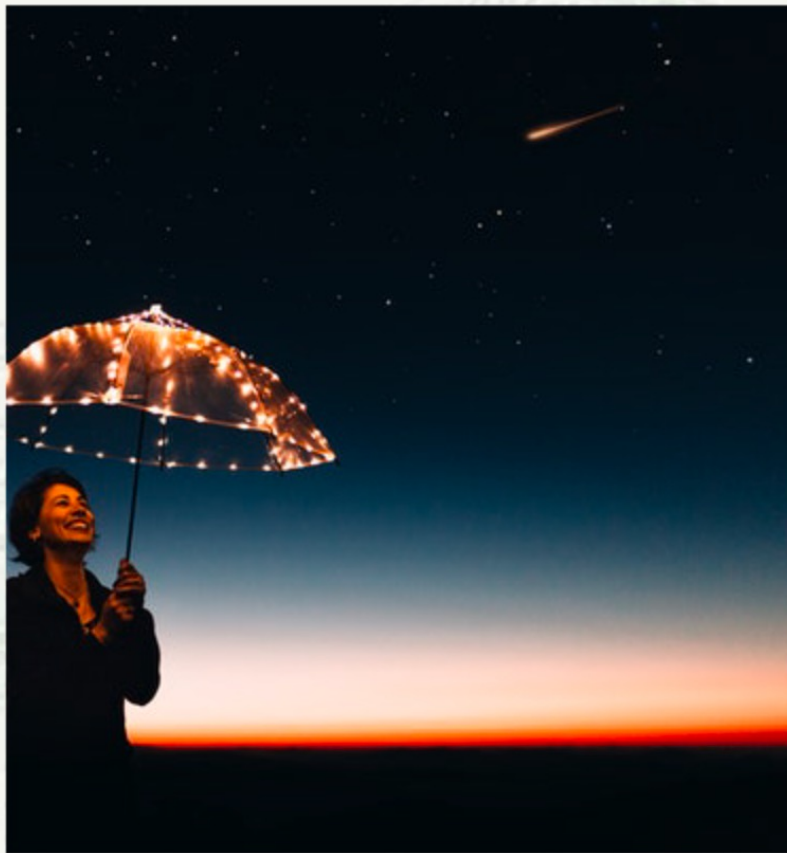
Are Failures
Good

or Bad?

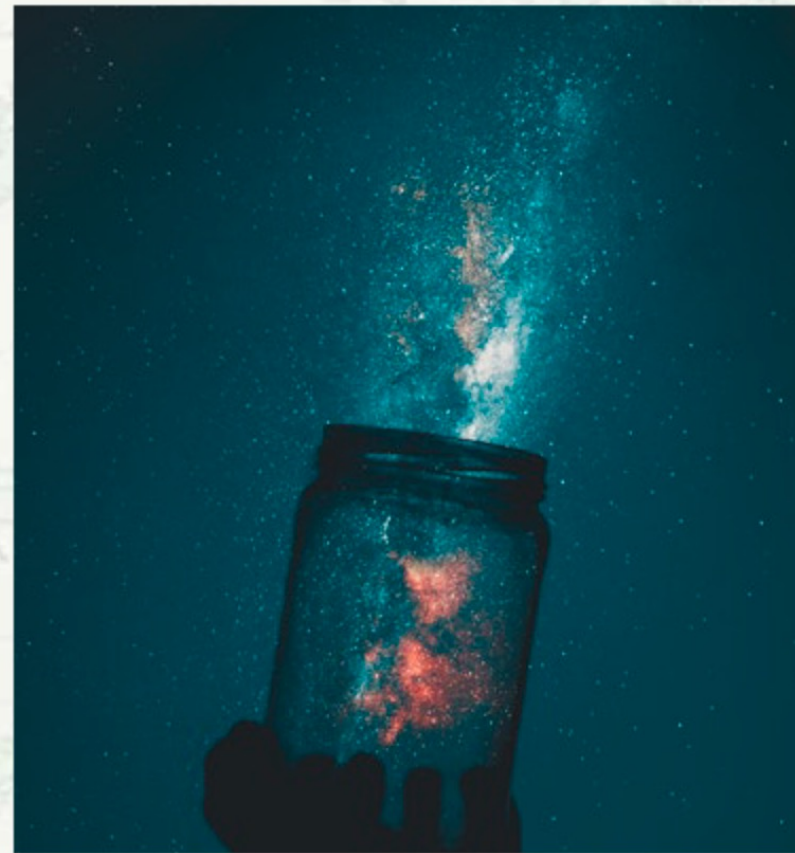
Failure Happens



Mechanisms



Understanding



Culture

Failure Mechanisms



Root Causes Analysis done well
reveals the underlying mechanisms

Everything, every system, everyone, will fail

Define what it means to fail

Causes may be physical, chemical, logical, design, assembly, use, abuse, etc.

Responding to a field failure or setting up an accelerated test, we need to know the mechanisms.

Understanding to Move Forward



Let's solve the real problem
the first time

The Ready, Shoot, Aim approach only works sometimes

8D and PDCA imply we first understand the problem
then move toward a solution

Understanding at a fundamental level of the related
mechanism is the goal

Culture around Failures



There is gold in every failure

We learn more from a few failures than dozens of tests that all 'pass'

Do you look for or ignore potential or actual failures?

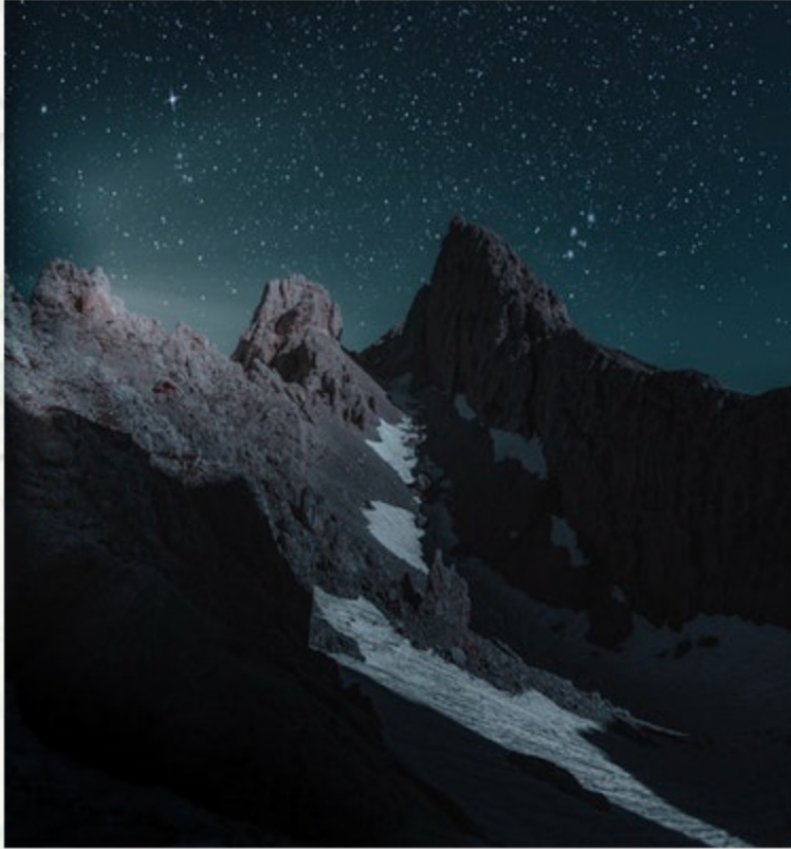
Does your organization celebrate failures?

Learn from failures

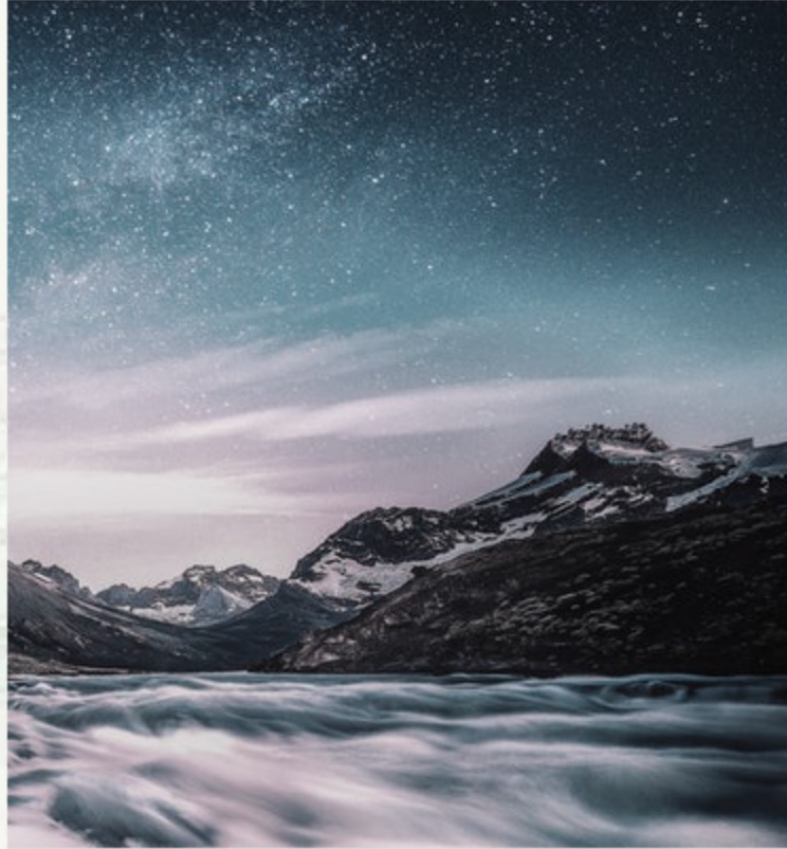
- as success provides little information

How does your organization
reward failure prevention?

Our Support Role



Influence



Failure Space



Decisions

Influence vs Control



We may alter how others think,
we cannot make them do so

We rarely have veto power

You have to be trusted first
then you can influence decisions

Writing a report may or may not be useful

Do your homework

Do the research

Do the math

Failure vs Success Space



We often focus on how something will not work

Two people look at a just arrived prototype:
the design engineer sees the successes
the reliability engineers sees the failures

Others will stop listening to you if you only bring problems to the table

Reliability Occurs with Decisions



How is reliability balanced with time to market or cost or uptime?

Reliability occurs at the point of decision

- which component to use
- which vendor to engage
- which material to use
- which customer feature to build in
- which assembly process to use
- which elements are critical
- which assumptions to check
- which tests to run
- etc

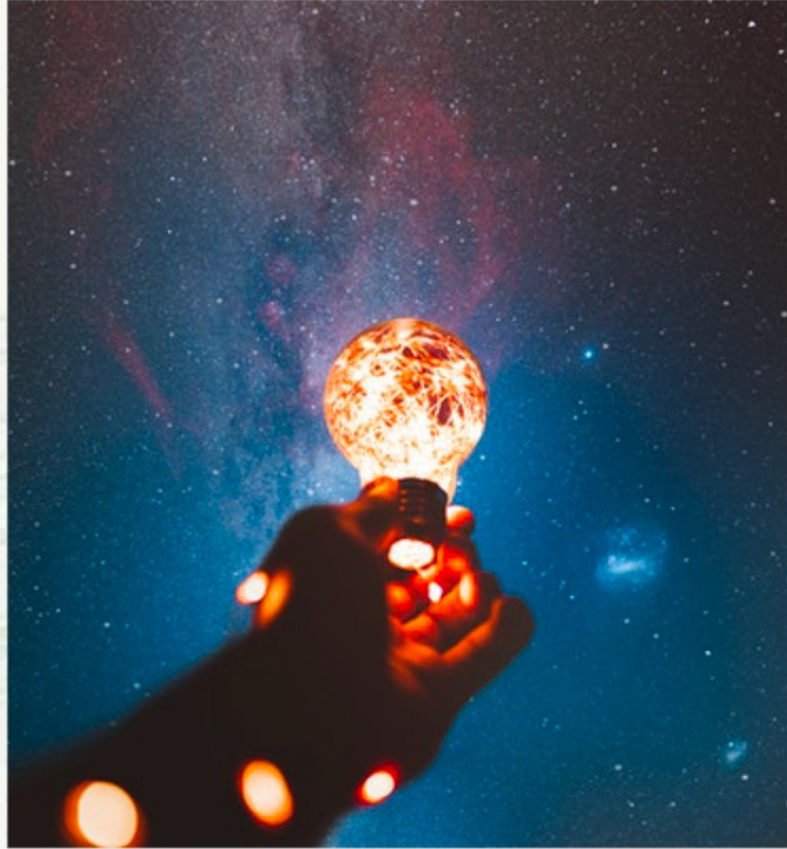
What are the

sources of failure?

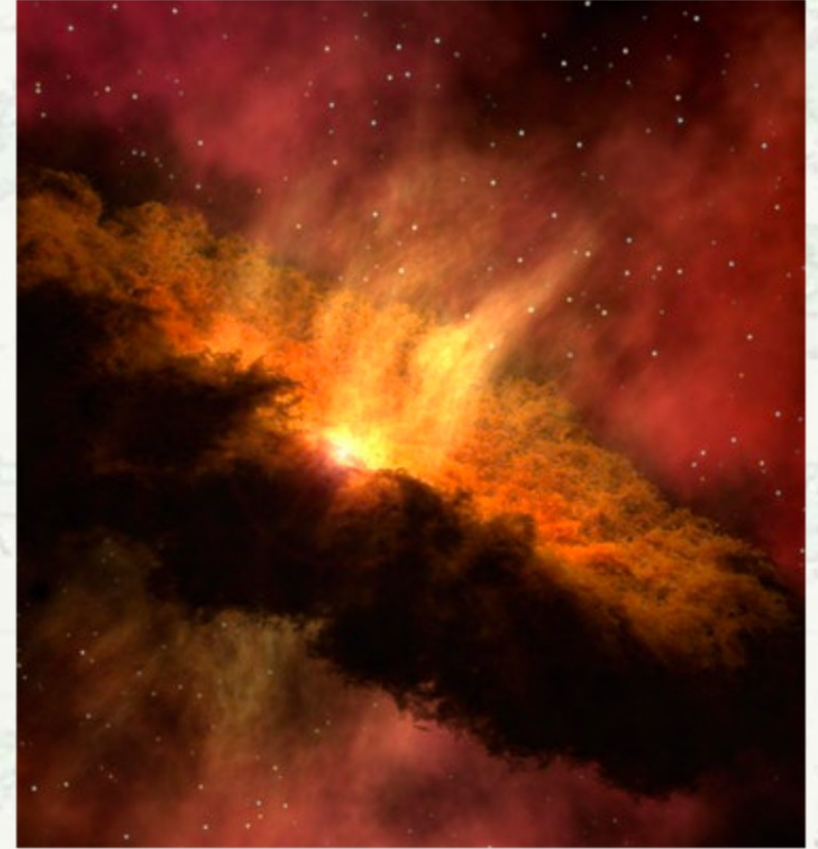
Our Leadership Role



Problem Solving



Unique View



Adding Value

Problem Solving



How do you become a team leader?

Solving problems is fun, btw

Even more fun when the problems solved
prevent customers from experiencing the problems

Detection, investigation, brain storming,
experimentation, collaboration, implementation

Remember the long term or systemic solutions

We have a Unique View



By our nature, we work across silos

We get to work with
engineering teams,
managers,
technicians,
suppliers,
customers,
etc.

Add Value



... with every interaction

To build trust, add value with every interaction

Ask good questions (aimed at understanding)

A reliability program can be useful, or not

A reliability engineer can be useful, or not

it is your choice

How have you

added value recently?

In Summary

Failures Happen

Leadership



Understanding



Influence



More Information

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

images from Pexels

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

Download the Finding Value ebook