

**Fred Schenkelberg**

# Dealing with Small Sample Sizes





Ask for 100





Receive 3







Asked to not  
break them....

Have you ever receive  
enough samples?



# Focus on Decisions





# Prioritize Key Decisions

## Focus on Decisions

Before estimating how many  
sort out what you need them for

Samples are expensive

use them on the highest priority  
decisions





# Samples to Information

## Focus on Decisions

If a set of samples will not provide  
the necessary information

don't do that test/experiment





# Sample Allocation

## Focus on Decisions

Linking sample requests to key decisions

Permits you to focus on the importance/value of the required samples

Instead of statistical significance, argue about the value of the information created





**How do you prioritize**

**sample use?**



# Other Methods





# Analytical Methods

## Other Methods

Physics of failure models

Expert judgment

Finite element analysis

Computational fluid dynamics

Emulators

etc.





# Historical or Coupons

## Other Methods

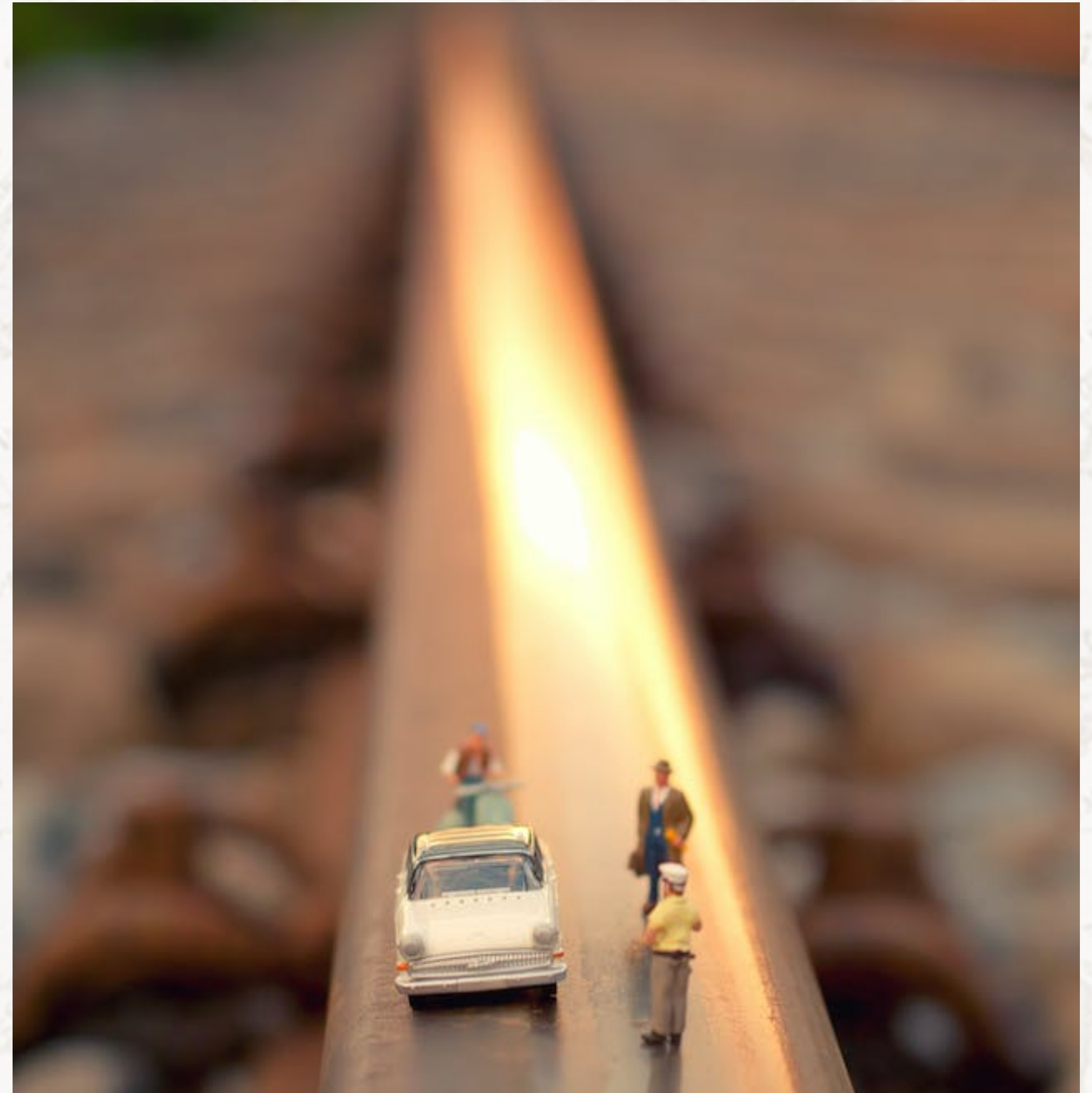
Field data

prior testing

similar products performance

Subsystems or components

Material coupons or mock ups





# Literature & Vendors

## Other Methods

Books, papers, etc.

(not tabulated failure rates)

Vendors (sometimes) have great information

Failure analysis labs

Competitor tear down





Have you used great

vendor information?



# Maximize Sample Information





# Waterfall Path

## Maximize Sample Information

Use each sample more than once

organize least chance of destroying  
to most

sequence to apply stresses in  
meaningful manner





# **HALT, Comparison, etc**

## **Maximize Sample Information**

Use methods that require fewer samples.

(if the produced information is useful for high-priority decisions)





# All Samples

## Maximize Sample Information

Organize and gather information from all samples created.

Track all issues, observations, failures from all samples

Build on regulatory testing or use those samples (when able)





Have you ever had

too many samples?



# Additional Comments and Questions



# Thanks

**see more at [AccendoReliability.com](https://AccendoReliability.com)**