



**Fred Schenkelberg**

# Fundamentals of Design for Reliability



When an item works,





A photograph of a row of trees, likely oaks, standing in a grassy field. The sun is low on the left side of the frame, creating a strong yellow and orange glow that filters through the leaves of the trees on the left. The trees in the center and right are more fully illuminated, showing vibrant green foliage. The sky is a pale, hazy white. The overall mood is peaceful and natural.

or doesn't work





Why?



Reliability occurs at the  
point of decision



# Decisions & Culture





# Design & Development

## Decisions & Culture

Design in reliability, deliberately

Balance cost, time to market, etc

Is there feedback?

Is there firefighting?

Reactive or Proactive





# Management Decisions & Culture

Stated and Actual Priorities

Is there a reliability vision?

Is there a risk management  
program?

Reactive or proactive





# Across the Organization

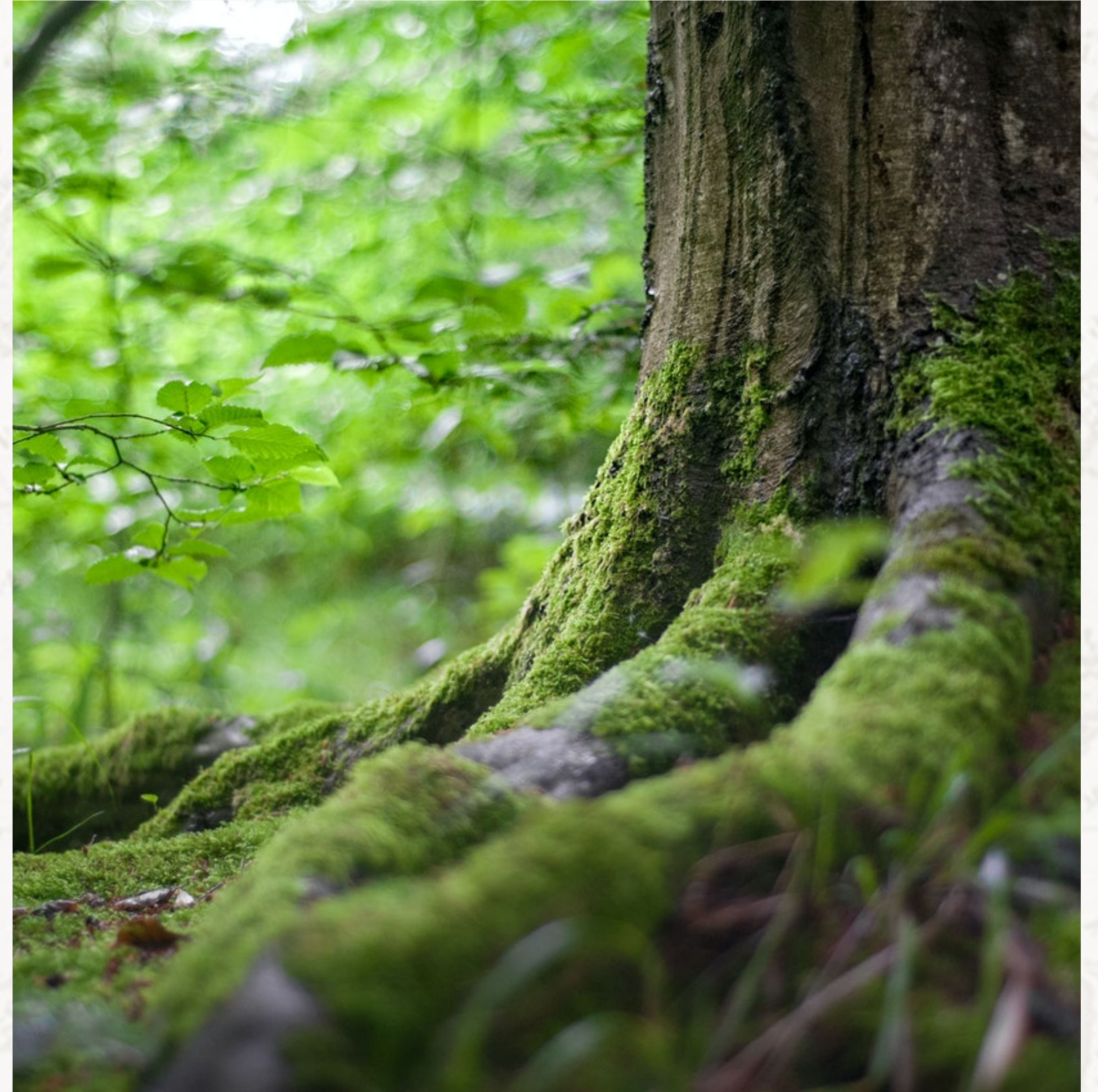
## Decisions & Culture

Identifying customer needs

Setting expectations

Sourcing components and materials

Manufacturing & delivery systems





How does *XYZ*

*affect reliability?*



# Role of the Reliability Program





# Enable Better Decisions

## Role of the Reliability Program

Cost, time to market, functions  
measured, tracked every day

Reliability performance?

What is the cost per failure?

What is the cost of failure  
per unit shipped?

Lessons learned (an effective system)





# **Guide Best Practices**

## **Role of the Reliability Program**

**Guidelines**

**Training**

**Best Practices**

**Celebrate successes**

**Learn and adjust with failures**

**Support & Celebrate  
Proactive Behaviors**





# Support Reliability Thinking

## Role of the Reliability Program

Demonstrate reliability thinking

Set expectations

Encourage

Enable reinforcing structures





**What is the role of**

**a list of reliability tests?**





Useful Tactics





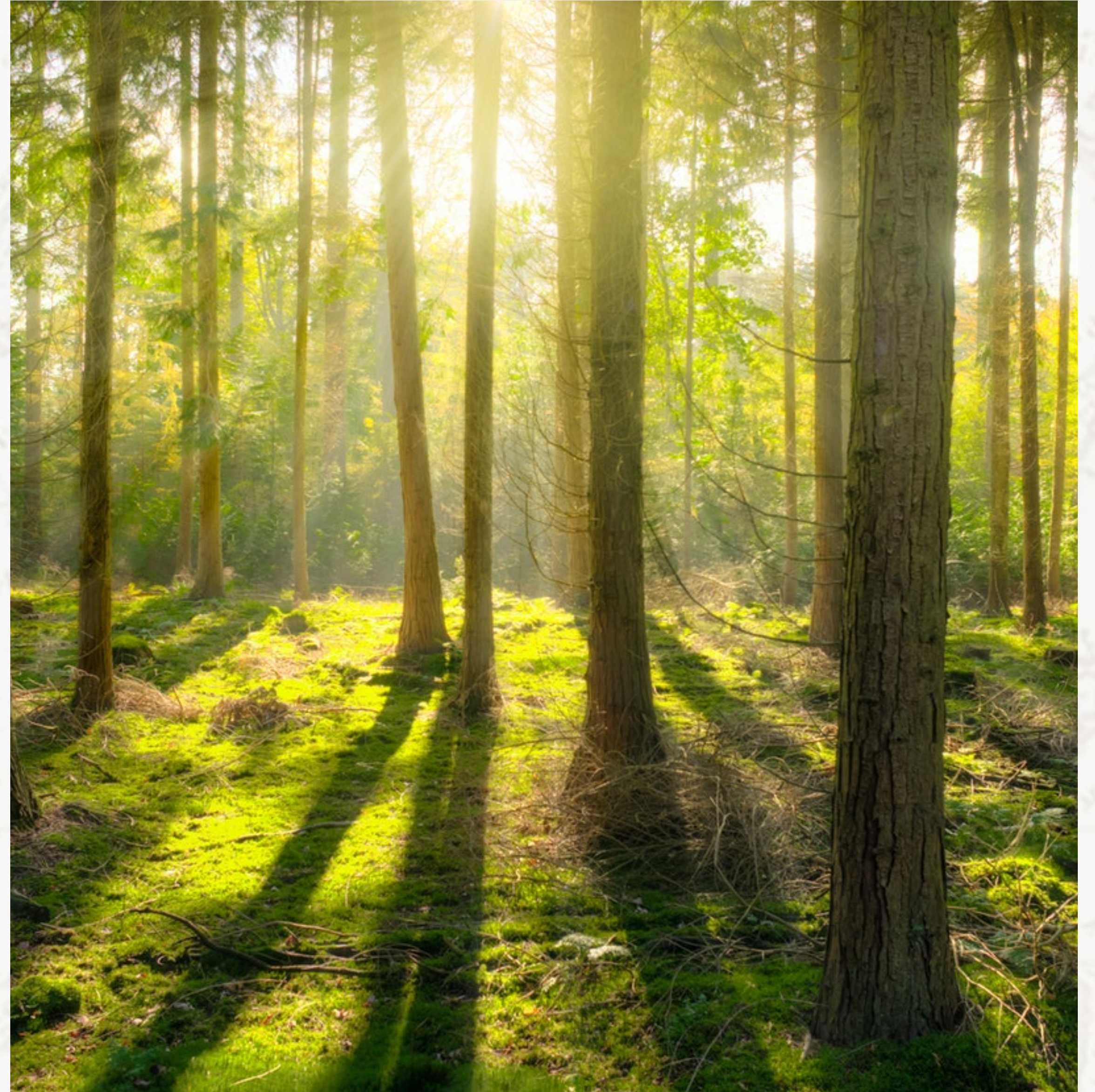
# Goals & Models & Estimates

## Useful Tactics

From reliability vision  
establish specific goals

Build reliability models  
to facility discussion

Encourage evolving & improving  
reliability estimates





# Define Environmental Conditions

## Useful Tactics

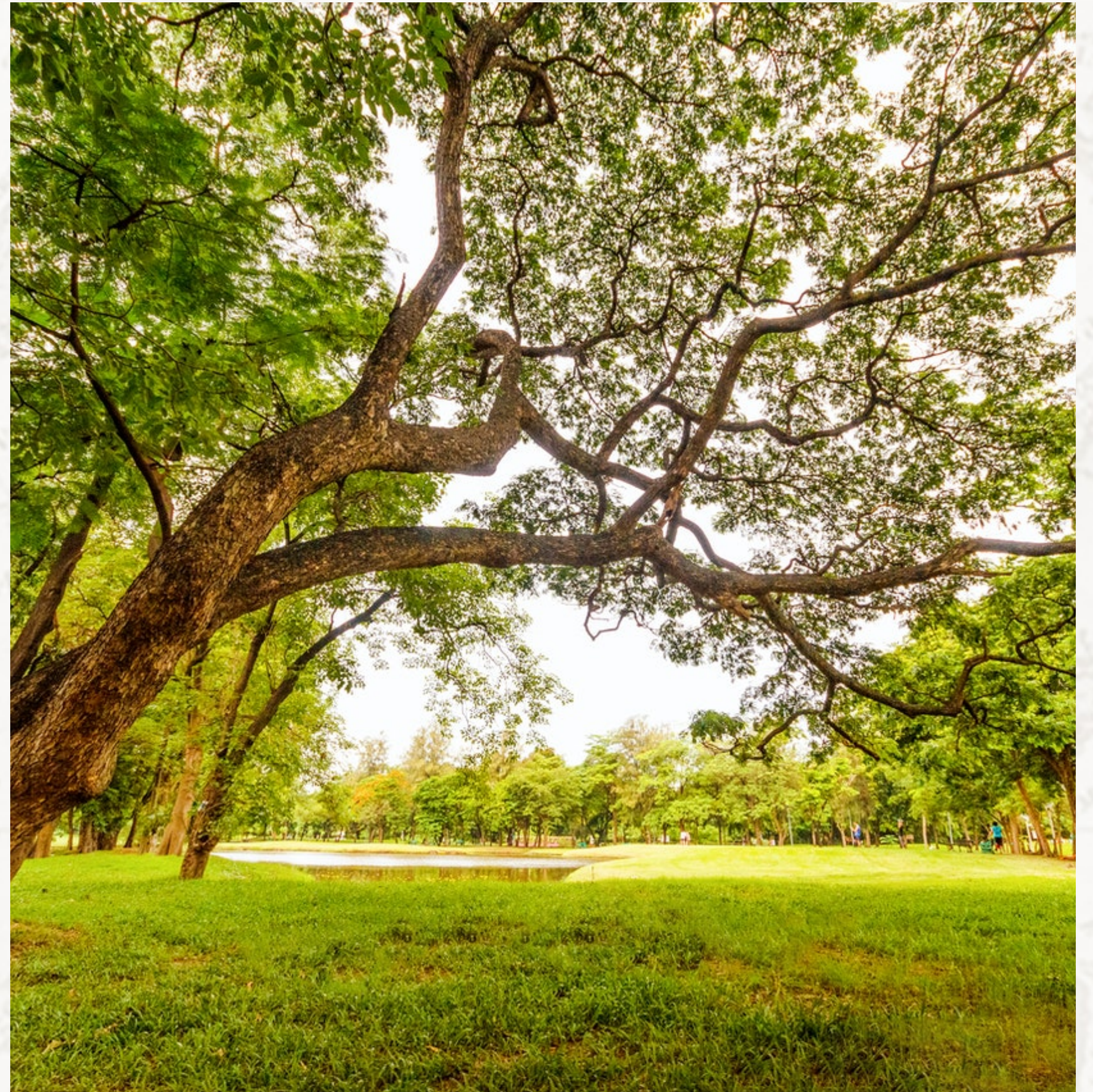
Everything varies

Min/Max is not sufficient

Fully characterize both  
environmental conditions  
and use conditions

Create a regularly updated  
document available to all

Teach everyone how to use

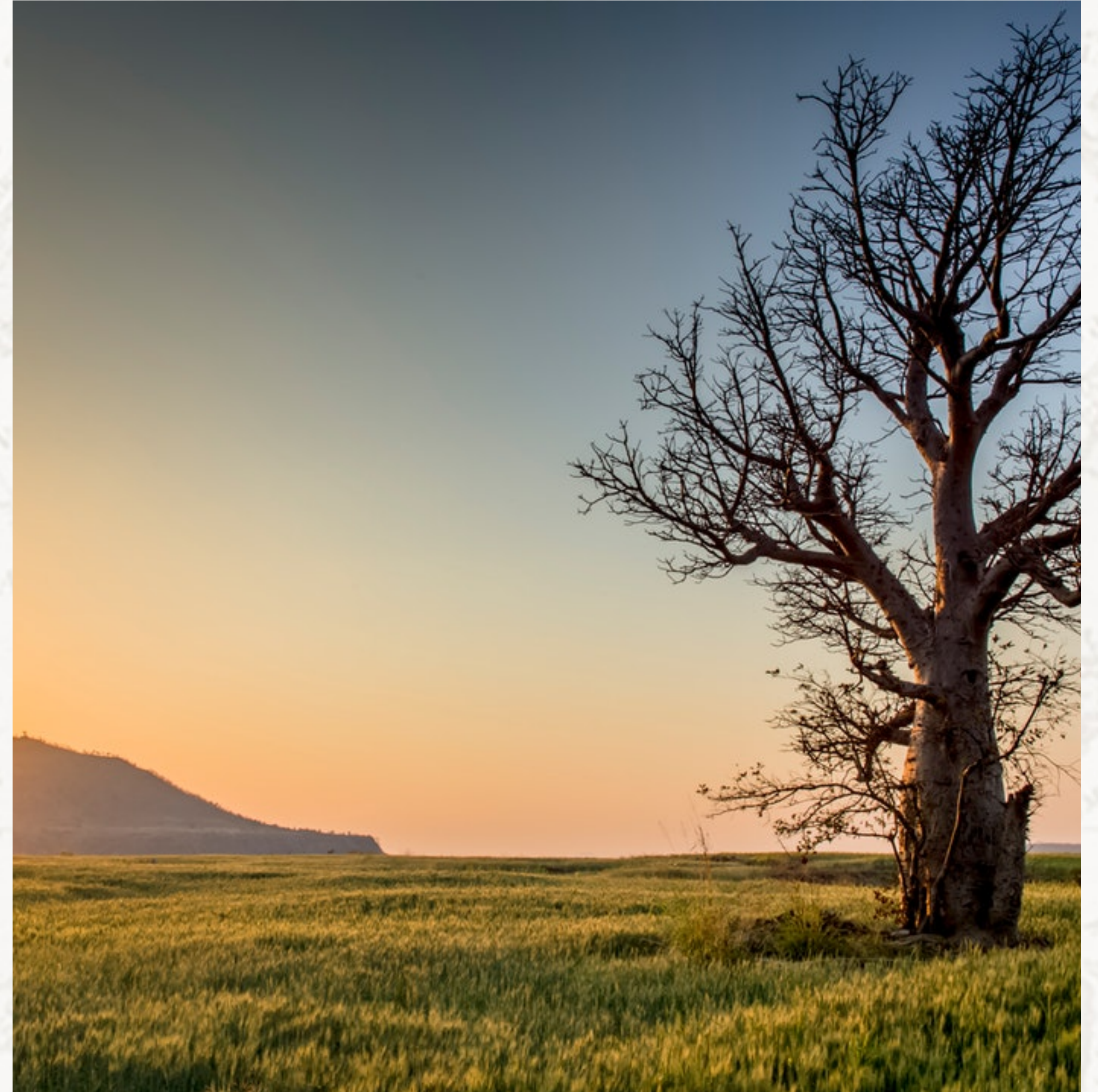




# Risk Management

## Useful Tactics

What do we know  
and do not know  
and what are going to do  
to reduce uncertainty?





# Focused Experiments

## Useful Tactics

Start with the question that needs  
an answer

before designing a test

Every 'reliability' test must  
create actionable and  
valuable results





**What other practices**

**should we consider?**



How is the reliability culture  
in your organization?



# Thanks

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