



Covered Conductor

- Dimensions
- Benefit

Spring 2026 ICC



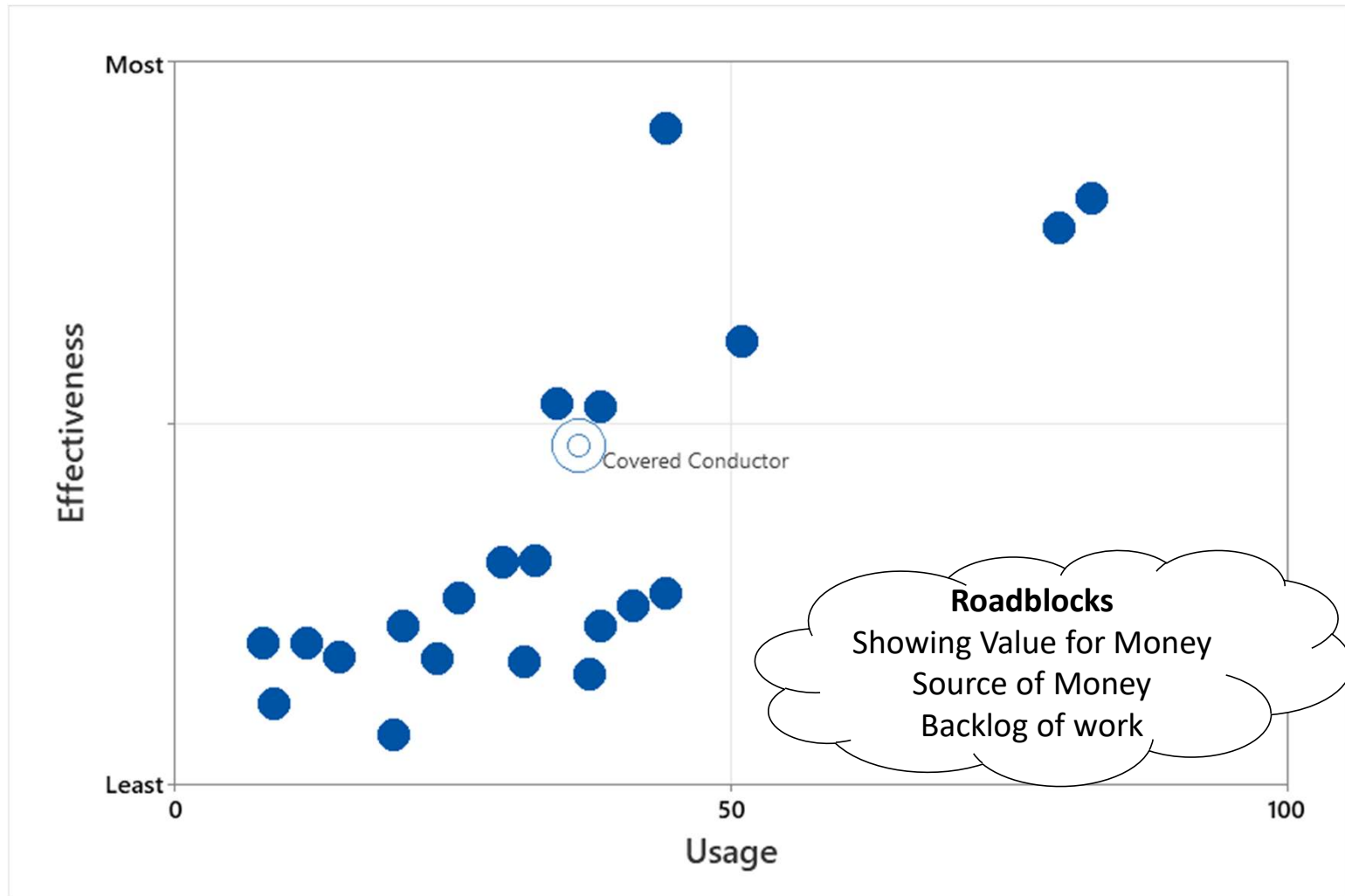
N. Hampton
J. Perkel

Resiliency 2025

- **Reliability**
metrics show
long term
improvement



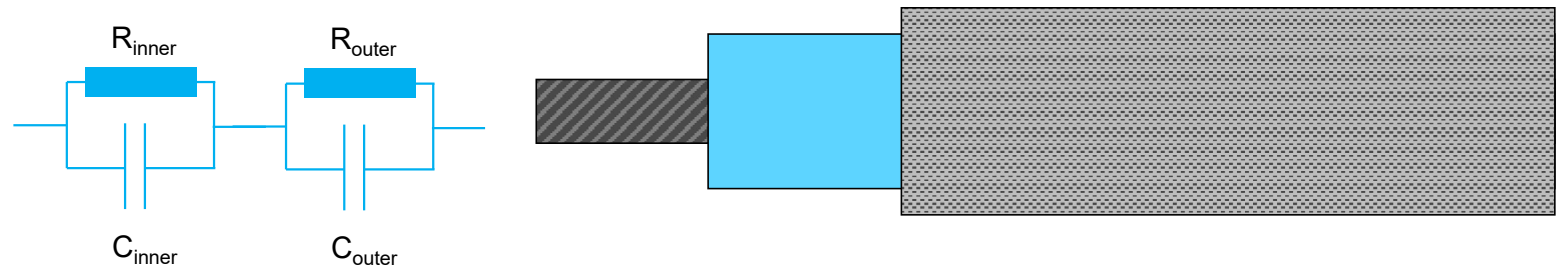
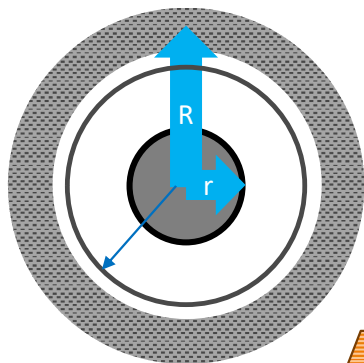
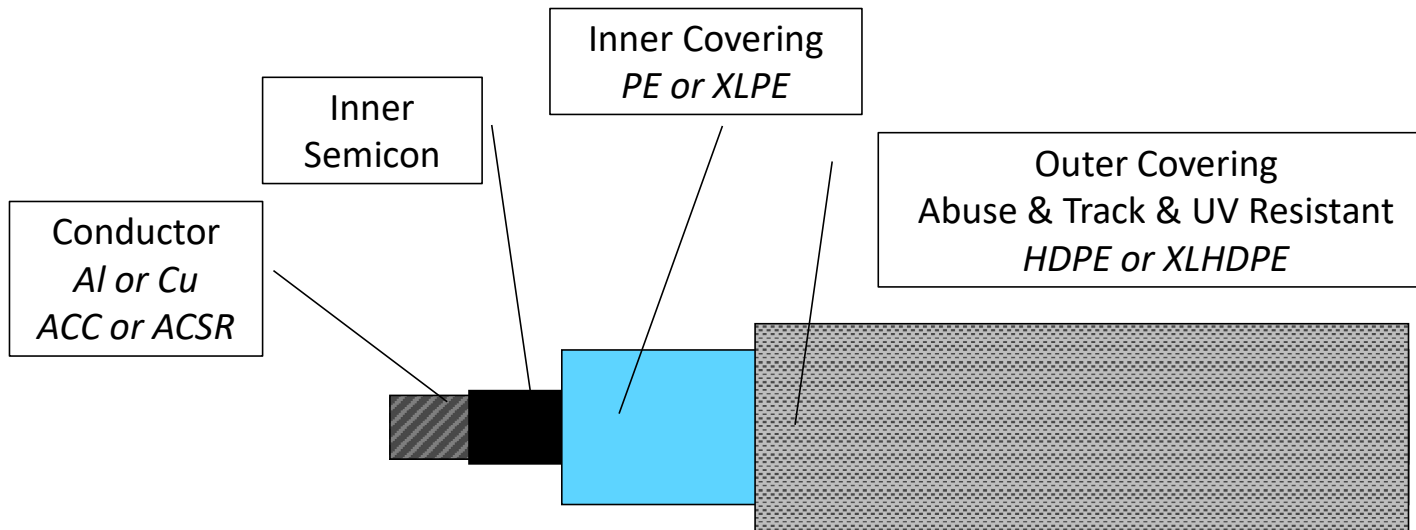
- **Resiliency**
indicators show
a long term
degradation



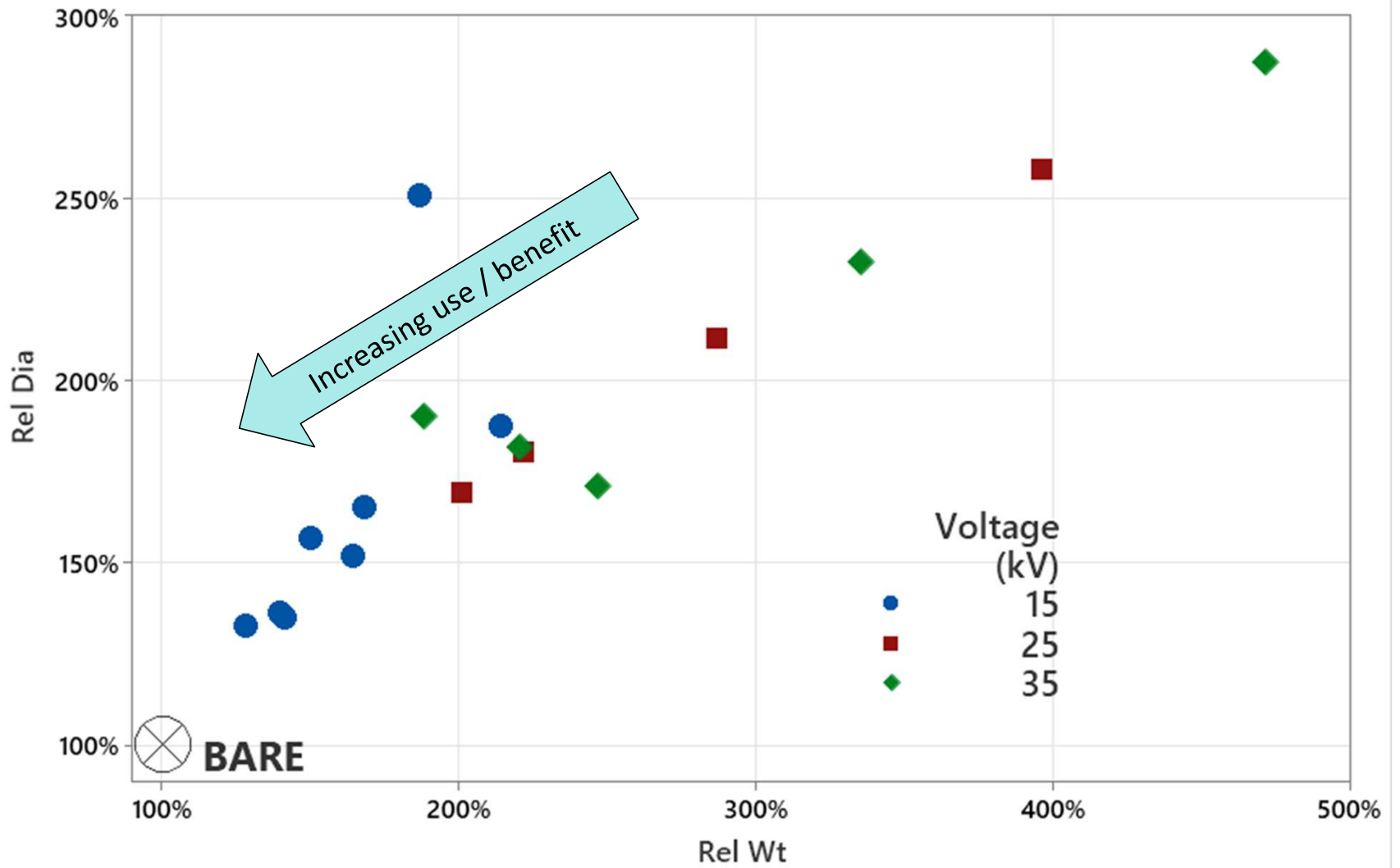
A blue-tinted image showing a pair of hands holding a globe. The globe has a grid of latitude and longitude lines. The word "Dimensions" is written in white, bold, sans-serif font across the center of the globe. The background is a dark blue gradient with faint, glowing lines and dots, suggesting a cosmic or digital theme.

Dimensions

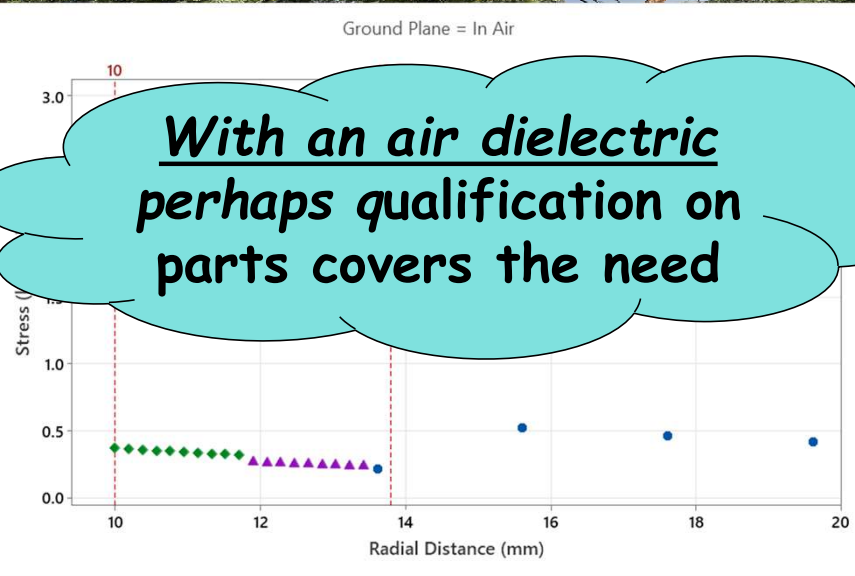
Background – Covered Conductor



Δ Dia, Δ Temp, Δ Weight



Operational modes – air dielectric



With an air dielectric
perhaps qualification on parts covers the need

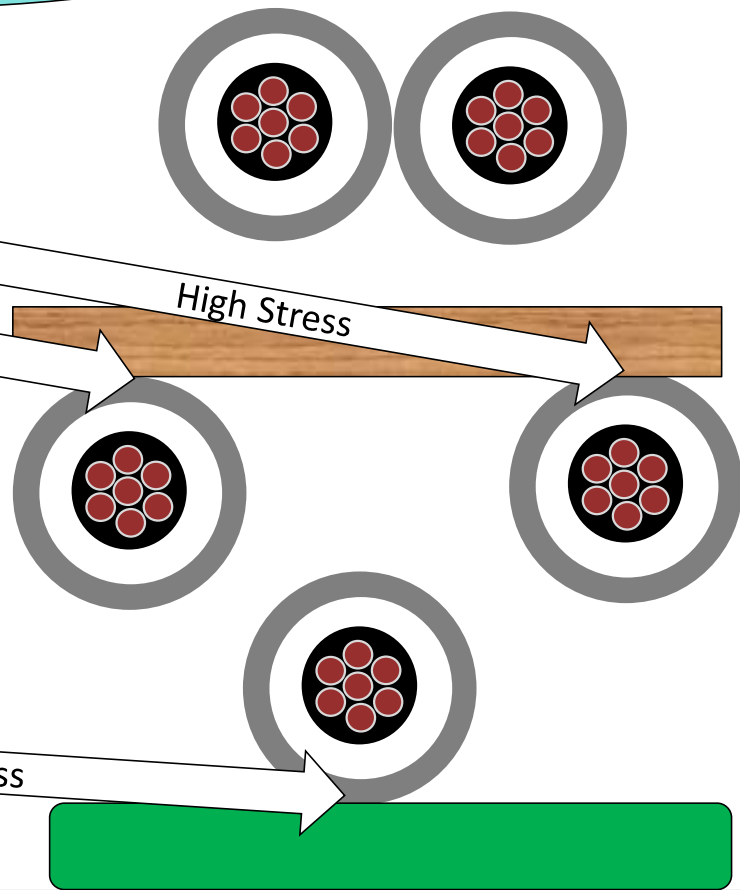
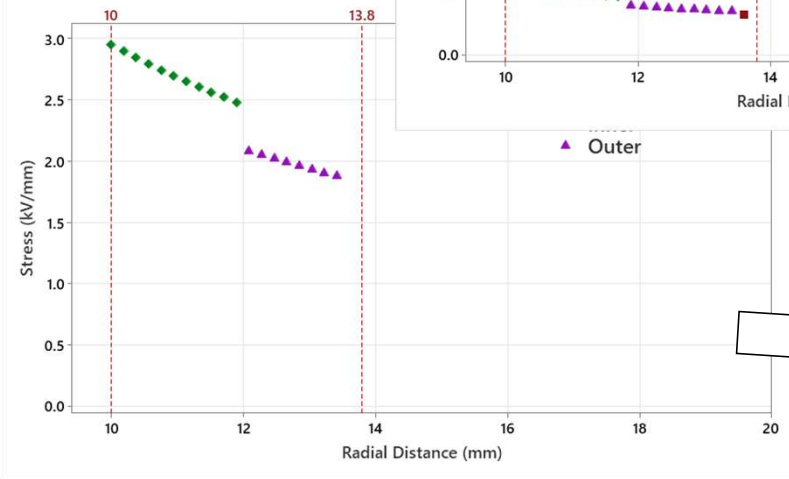
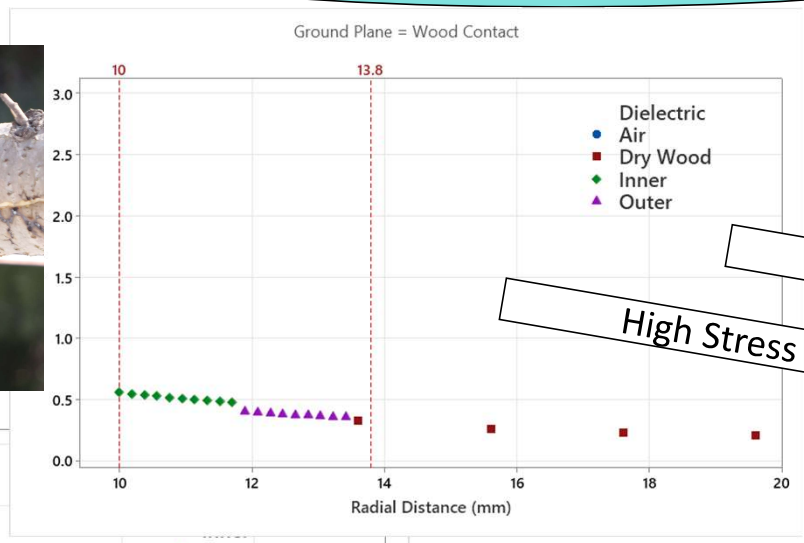
No high voltage
No heating
No current & voltage

Qualification on parts
No tests on whole!!

		test
Semicon		Brittleness Test Resistance Stability
Inner Covering (XLPE or PE)		
Covering		Dielectric Constant
		Env Stress Cracking Sunlight Resistance Tracking Resistance

Operational modes – covering dielectric

The covering is there for when there is no air dielectric



Covering - what should we know to change design

How likely is failure at these high stresses with a hot conductor

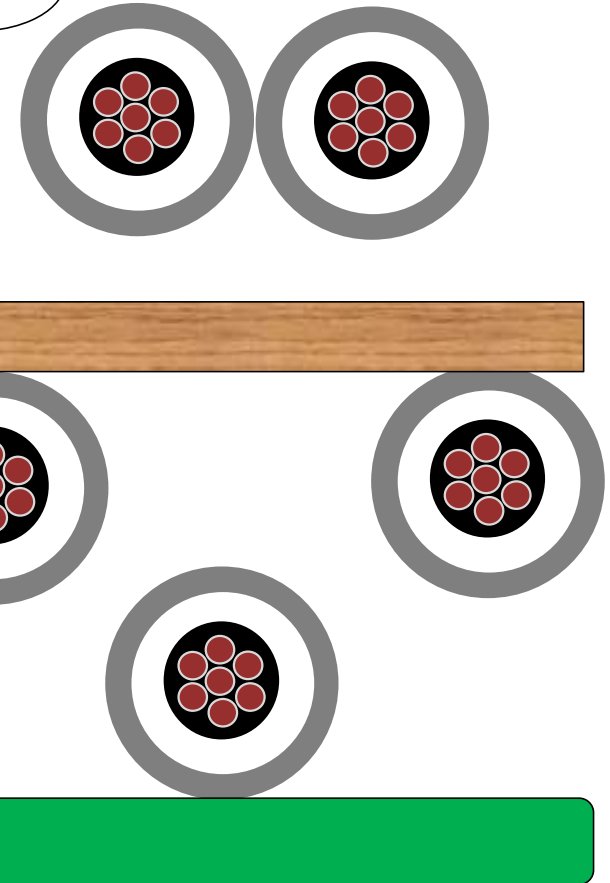
How large is the leakage current high stress with hot conductor

Probability of Failure

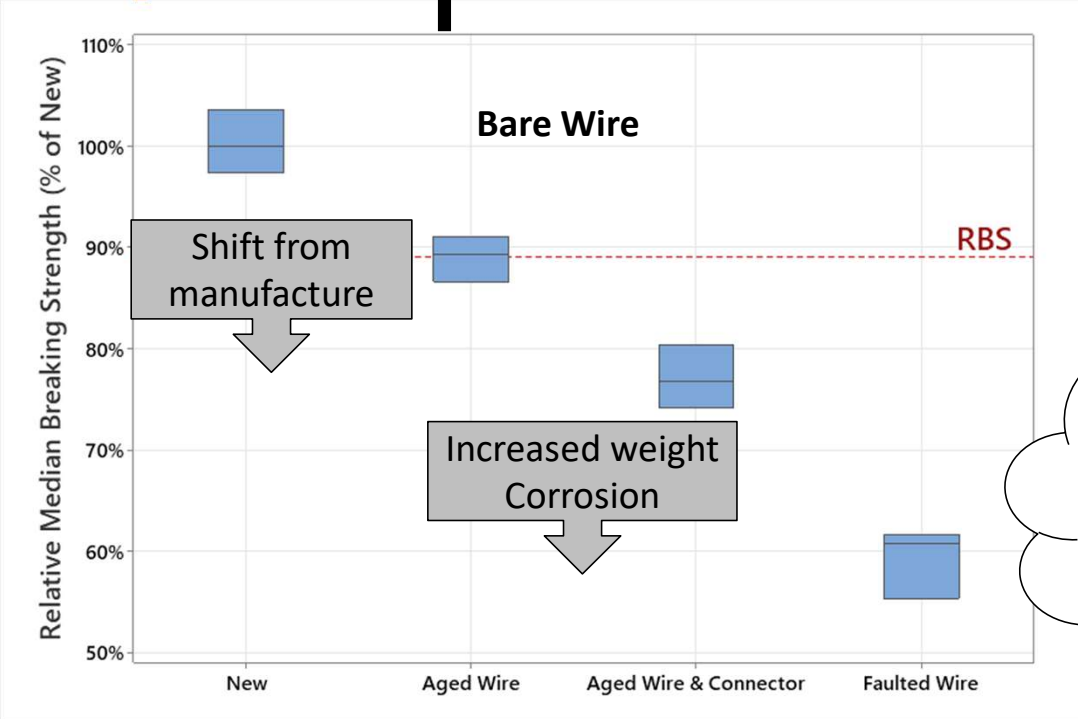
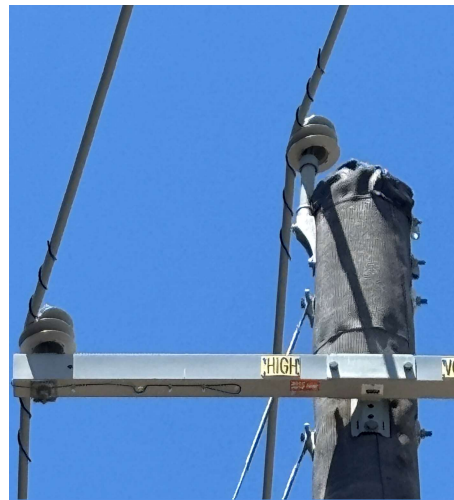
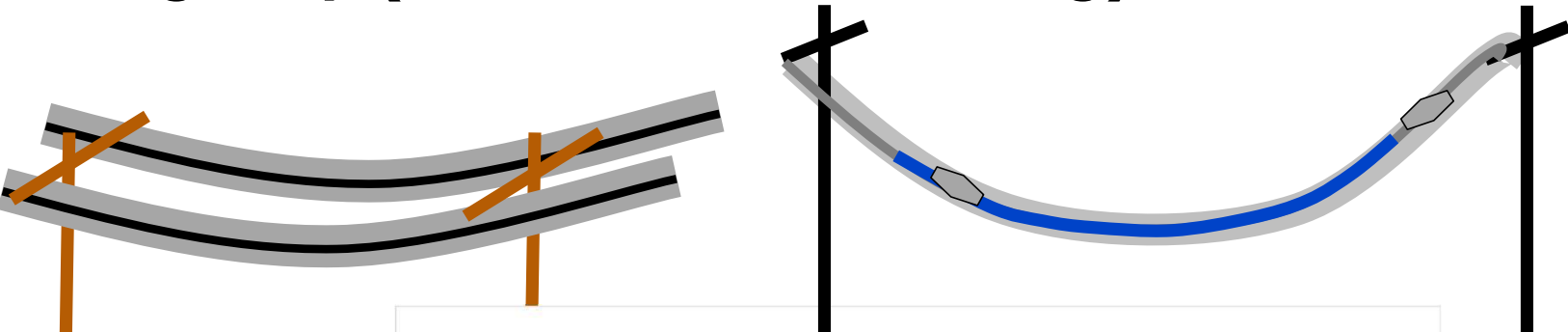
Relatively low occurrence

Consequence Mitigation (relaying)

Electric Stress



Longevity (conductor / covering) - what do we miss



How does the cover age?
How does the cover interact with the conductor?
How would this change with new dimensions?

Open Research Questions

1. We don't have robust information about many of the performance characteristics in the critical applications – qualification based around the assumption of an air dielectric – what should be included in Lab evaluations?
 - Voltage
 - Water
 - Temperature
2. How do covered conductors age?
 - Conductor
 - Covering
3. Connections

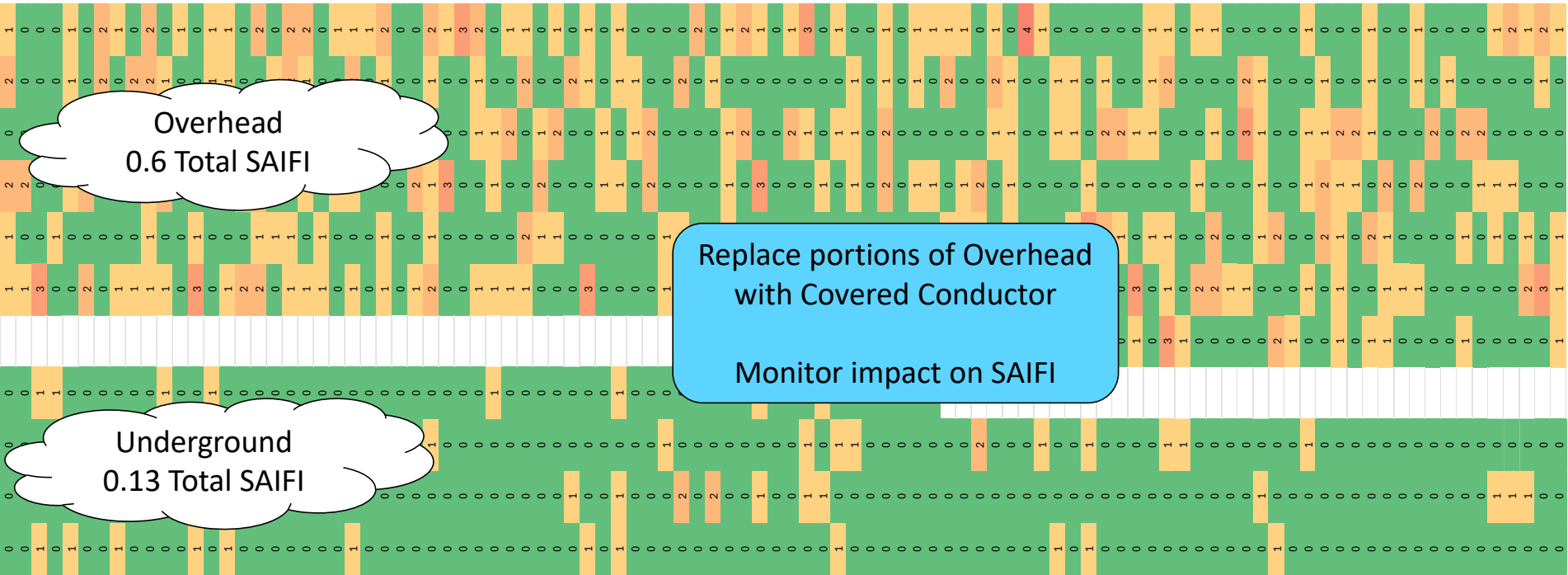
A hand holding a globe of the Earth against a starry blue background. The globe is centered in the frame, and the hand is visible from the bottom and sides, holding it gently. The background is a deep blue with many small white stars, suggesting a night sky or outer space. The overall tone is hopeful and futuristic.

Benefit

**Modeling shows how this might be attempted
and what results might look like**

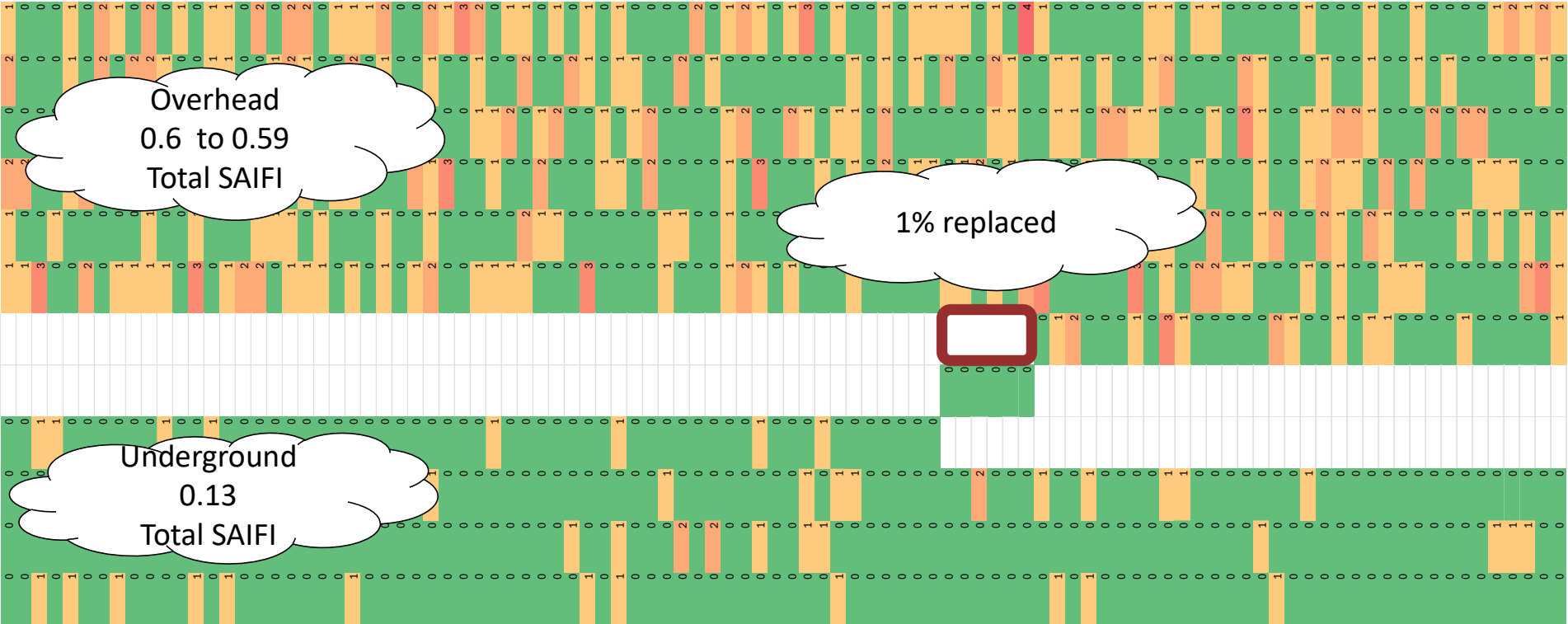
Benefit / Cost – contribution to SAIFI model

1000 segments, 36% Underground, 0.42 Total SAIFI

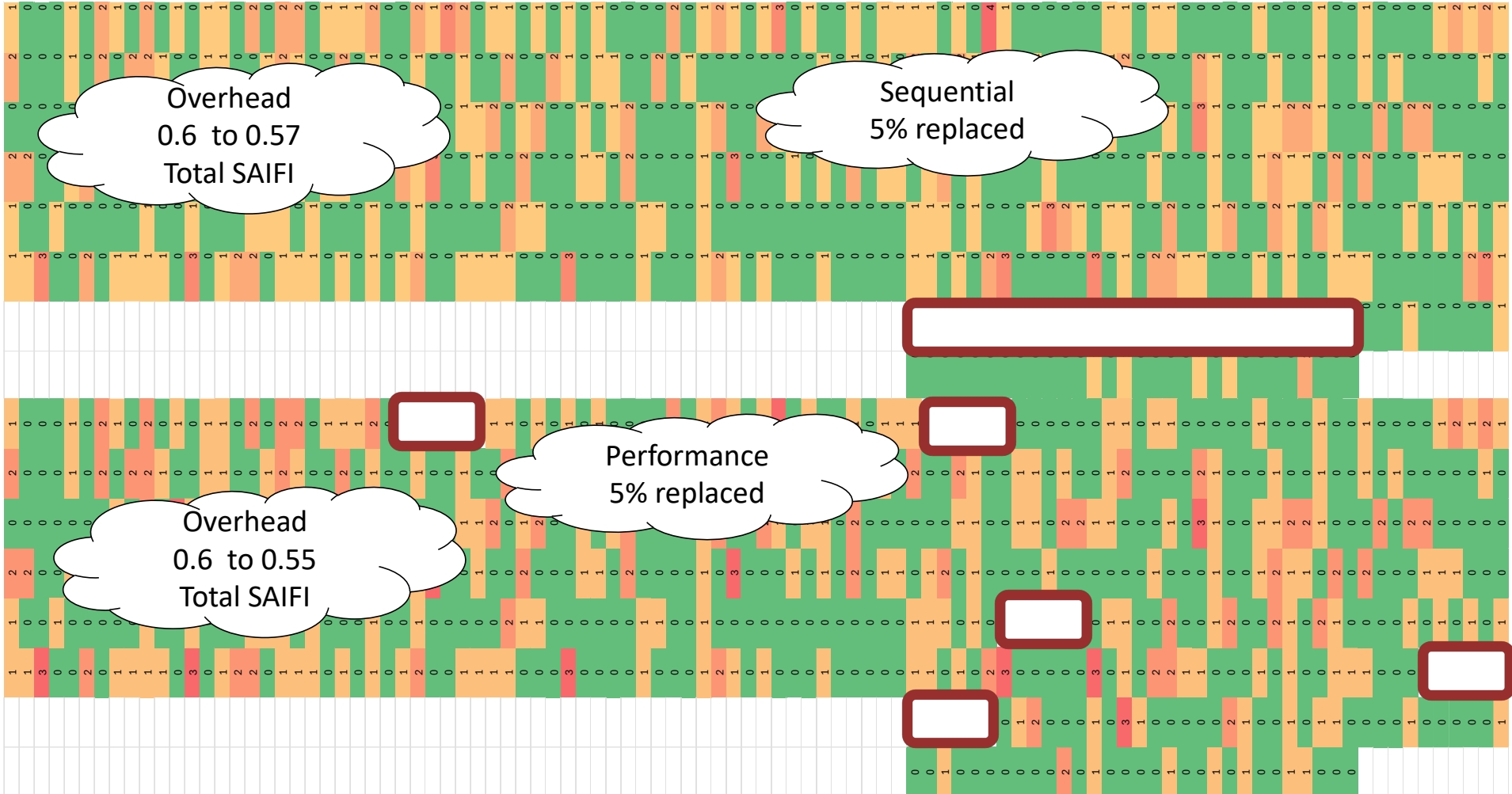


Benefit / Cost

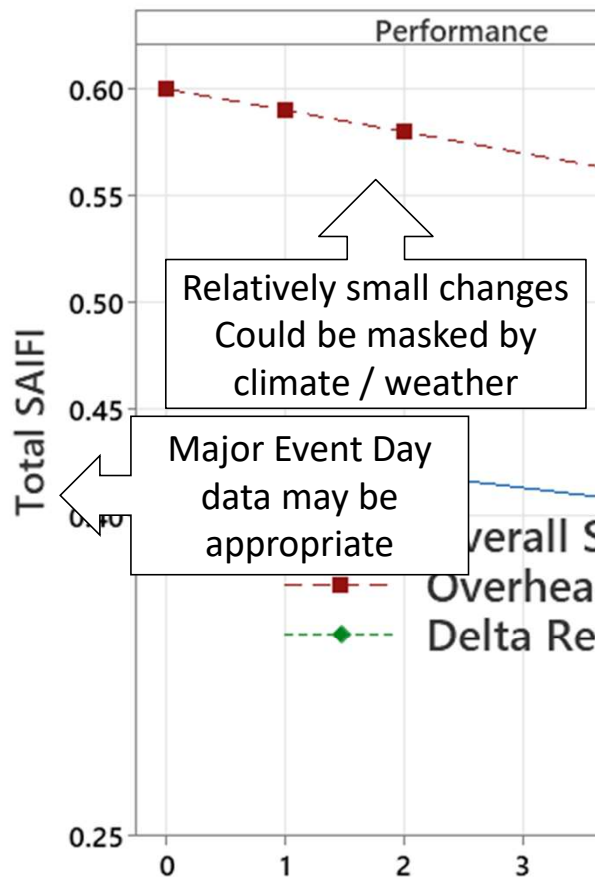
1000 segments, 36% Underground, 0.42 Total SAIFI



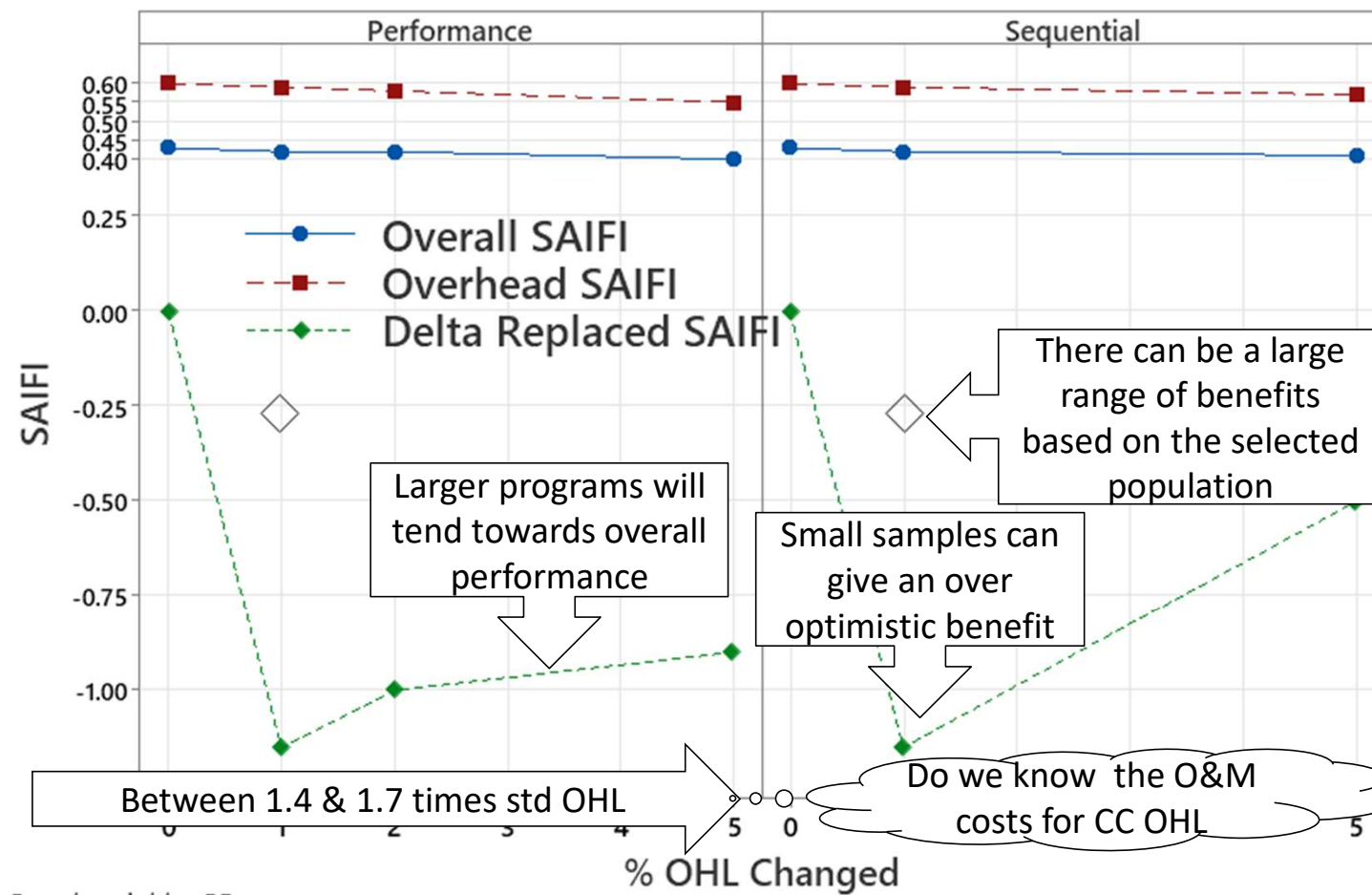
Benefit / Cost



Benefit / Cost



Panel variable: C5



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Open Research Questions

1. We don't have robust information about many of the performance characteristics in the critical applications – qualification based around the assumption of an air dielectric – what should be included in Lab evaluations?
 - Voltage
 - Water
 - Temperature
2. How do covered conductors age?
 - Conductor
 - Covering
3. How do we estimate the benefits and ascribe a value to them?
 - Field Performance
 - Metrics
 - Capital cost
 - O&M costs
4. Connections